Correspondence.

A Steam or Compressed Air Sky Rocket.

To the Editor of the Scientific American:

After reading the account of the singular boiler explosion at Orleans, given, with an engraving, in your number for July 19, it occurs to me there is an excellent opportunity for some ingenious person to invent a steam rocket. If a large steam boiler, standing on wheels in the street, like a steam fire engine boiler, can be made to lift itself over housetops, as shown in your engraving, it would seem not to be a difficult task to construct a steam or compressed air rocket applicable to useful purposes. Let inventors try.

O. B. SERVER.

Contraction of Steel.

To the Editor of the Scientific American:

In your issue of July 12 you give some peculiarities with which mechanics have to contend in the working of steel, that have not received the attention that ought to be given to so important a matter. Some years ago I had occasion to temper many cutters, dies, punches, and other tools, and experienced all the difficulties alluded to in your article. From Edes' "Management of Steel," and another little English book, I obtained many *points*, and by careful working, paying strict attention to heating and the bath, was able to increase or decrease the tool to be tempered at pleasure.

The idea that *steel* is *steel*, and must have similar treatment for all kinds of tools, ought no longer to find advocates. Steel suited for one kind of tool may be totally unfit for another, or require totally different treatment. If makers of tool steel would mark their different brands, and publish a circular giving information of a reliable nature concerning it, a uniformity would soon be reached and recognized among mechanics, and tools would pass for their actual worth according to a known standard of excellence.

LEVI K. FULLER.

Brattleboro, Vt., July 11, 1884.

Happiness and Health.

To the Editor of the Scientific American:

In your paper of April 26, quoting from the *Lancet*, you say: "One-half of the 'dyspeptics' we see would be *well* if they were only *happy*." "Be happy, and your sympathetic ganglia will have the blood coursing through them with the bound of health." "With those who live by rule, and tremble as they live, laboring to eat and drink precisely what 'is good for them' and nothing else, the cause of failure is that such persons are overcareful."

Now, this is so totally a one-sided view that I cannot allow it to stand without a word of protest. While admitting fully that the influence of the mind upon the healthy action of the body is absolutely immeasurable, and while practicing upon this belief daily, I at the same time cannot but also admit and assert that the influence of the body on the mind is a factor equally demanding consideration. The first sentence quoted above reads quite as correctly, "They would be *happy* if they were only *well*." I find very many cases in which, speaking in all moderation, it is so nearly *impossible* for the person to be happy, that we can hope for a return to cheerfulness, and to even a reasonable view of the affairs of life, only by a restoration of comparative soundness in bodily fuuctions.

The perfect blackness of despair, a depth of despondency which nothing can fathom, I have often seen, whose origin was purely and simply an exhaustion of nerve force, showing itself chiefly in that very solar plexus to which your article referred, and thence affecting the two organs with which it is so closely associated, and with such myriad ramifications, the stomach and the liver. The remark often quoted that "it is impossible for any one to be a good Christian whose liver is out of order" has in it a world of practical truth and wisdom. A *cheerful* Christian he may well be excused from being. It is not only useless, but it is a cruel folly, to tell such a one that he must arouse himself to cheerfulness and shake off his gloom. It is true he may try, and I may urge him to make every effort in that direction, but I none the less bend all my energies to restoring the physical force which he has lost. When a patient comes under my charge with a fractured femur, is it right for me to tell him to stand up and walk? I prefer to apply splints, and wait for the fracture to be healed. He will be ready enough to walk as soon as he has strength to do it.

It is in fact utterly out of the question to take any fair view of this matter without taking cognizance of the two sides, both physical and mental, and in almost equal degree; and it must never be forgotten that even where the sole cause of the exhaustion of nerve force may have been mental, there have supervened physical derangements which then become of themselves reacting causes of increased difficulty; and those derangements we can scarcely expect the mind to remove without physical aid and the lapse of time. The blood will not go coursing through the sympathetic ganglia with the bound of health (when those ganglia have lost their proper tone) simply because the patient is happy; and the man who wrote as above that "the cause of failure" in persons who were forced, as the price of even decent comfort, to watch carefully their diet, "is that such persons are overcareful," can scarcely, as it seems to me, have had the responsibility of attempting to restore such a weakened power of digestion to a healthy state. Of course the power of the mind can greatly assist, and the patient can and ought to be taught that he can aid his restoration in a remarkable degree; but that weakened stomach has become as much a positive fact as the fractured femur; one needs splints as surely as the other.

And in this connection we are brought face to face with the fact that we continually encounter a condition of nervous exhaustion which is entirely distinct from simple fatigue, and which cannot be removed by rest alone. It is of itself a *disease*, as distinctly and truly so as is typhoid fever. No organic changes of nerve tissue are manifest, and we call it functional in its nature. Perhaps this is true, and then, again, perhaps there *are* changes too minute for recognition. At any rate, this condition of nerve force affects so powerfully all the functions of the body, but above all others the digestion, that it is responsible for a chief part of the depression to which we have referred; and thorough experience has clearly shown that mind and body must both be regarded and thoroughly studied before any hope of its removal can be entertained. Man's dual nature is not a matter pertaining to the theologian or the psychologist only; it much more closely affects the daily work of every physician in active practice. Man is an animal, but he is something more.

W. O. A.

Microscopic Items.

For a good swab for cleaning small vials, test tubes, etc., use a piece of the round leather belting sold by dealers in sewing machine supplies.

Disinfectants.—What is the best disinfectant? *Answer*—A high degree of cleanliness. There is no disinfectant besides this that is perfect in its action. If not thorough, it is almost useless. Many disinfectants only narcotize disease germs, but do not destroy them.

Method for Double Injections.—The veins are first injected through the arteries with colored gelatine, and then a differently colored plaster of Paris is injected in the same way, forcing the gelatine before it, but as this stops at the capillaries, the arteries and veins can readily be distinguished.

The Beautiful Snow.—From the pure and beautiful snow, just fallen, Floegel has obtained living infusoria and algæ, bacilli, and micrococci, mites, diatoms, and great numbers of fungi spores, also fibers of wood, mouse hairs, pieces of butterfly wings, skin of larvæ of insects, cotton fibers, pieces of grass, epidermis, pollen grains, rye and potato flour, grains of quartz, minute pieces of roofing tiles, and bits of iron and coal.

A Pretty Slide.—A very pretty slide, and one very easily made, is the raphides in the sap of the daffodil. It is only necessary to squeeze out a drop of sap from the flowering stem on to a slide, and on its drying, which may occur spontaneously, or be done over a spirit lamp, we find hundreds of crystals strewn over the field of view. With the polariscope they are exceedingly interesting and brilliant. If we drop over the warmed glass a little Canada balsam, we can press on a cover glass.

Simulation of the Tubercular Bacillus.—The memoirs of A. Celli and C. Guarnieri give the results of a large number of observations on the bacillus described by Koch in the nodules of tuberculosis and in the sputa of consumptive patients, and further call attention to certain crystals found not uncommonly in these sputa, which, both by their appearance and by their behavior toward aniline colors, imitate the tubercular bacilli. The microscopic differences between the two classes of objects are minutely described.

Examining Alive the Heads of Insects, Spiders, etc.—Mr. E. T. Draper recommends a cone of pasted paper to be made rather larger than the specimen, with the apex cut off. A vigorous spider will soon project its head through the aperture. When in this position it should be blocked behind with cotton wool slightly wetted. The cone can then be gummed to a slip, apex upward.

Many insects can be arranged in the same way for the observation of facial movements, and such front views admit of interesting and extended study, the action of the antennæ, palpi, and various organs of the mouth may be watched, and curious effects produced by the excitation of saccharine or nitrogenous juices, administered from the top of a sable pencil.

Bacteria Experiment.—During a recent lecture in the Philadelphia Academy of Pharmacy, glass jars were passed around containing samples of cultivated disease germs Potatoes cut in halves had been lightly smeared with a coating of substances containing germs. The bacteria were nourished on the moist surface of the potato, and presented very interesting appearances. Different results were obtained from different bacteria. Some of the half potatoes were covered with an ordinary deposit of mould. On others the disease germs had developed into thin, peculiarly shaped patches of fungous growth of bright blue, red, yellow, and greenish colors. Others had grown into an intricate and extensive network of fuzzy fibers, the growth on the surfaces of two or three potatoes reaching over and covering a space having a diameter of eight or nine inches.

Tenacity of Tubercle Bacilli.—It has been doubted whether the sputa of tubercular patients, which are thrown on the streets and later mix with all kinds of dust, would ever cause the disease. To determine this question, Dr. Vignal (*Deutsche Mediz. Zeitung*, 1884, No. 1) has collected sputa, as they had been expectorated by phthisical persons in the streets. He mixed them with the common street dirt, moistened them, put them on a porcelain plate, suffered them to dry, again moistened them, again let them dry, and continued these experiments for a very long period of time. Then he made inoculation from these sputa in two Guinea pigs; one died a few days later from a different, accidental complaint, the other first became fat—a proof of the experimenter's good feeding—then slowly emaciated, and finally, three months later, died. The post mortem showed a large number of tubercles, many in the state of caseons degeneration, and a great number of bacilli.

This experiment proves that the sputa collecting in the streets and on the floors of dwellings are by no means innocuous, but serve as pathogenic elements in persons predisposed to this disease.—*The Microscope.*

The Vitiation of Air by Different Illuminants.

The following table, prepared for the *Engineering and Mining Journal*, shows the oxygen consumed, the carbonic acid produced, and the air vitiated by the combustion of certain bodies burnt so as to give the light of twelve standard sperm candles, each candle burning at the rate of 120 grains an hour:

Burnt to give light of 12 candles, equal to 120 grs. per hour.	Cubic feet of oxygen consumed.	Cubic feet of air consumed.	Cubic feet of carbonic acid produced.	Cubic feet of air vitiated.	Heat produced in lb. of water raised 10° F.
Cannel gas	3·30	16·50	2·01	217·50	195·0
Common gas	5·45	17·25	3·21	348·25	278·6
Sperm oil	4·75	23·75	3·33	356·75	233·5
Benzole	4·45	22·30	3·54	376·30	232·6
Paraffine	6·81	34·05	4·50	484·05	361·9
Camphene	6·65	33·25	4·77	510·25	325·1
Sperm candles	7·57	37·85	5·77	614·85	351·7
Wax	8·41	42·05	5·90	632·25	383·1
Stearic	8·82	44·10	6·25	669·10	374·7
Tallow	12·00	60·00	8·73	933·00	305·4
Electric light	none.	none.	none.	none.	13·8

A New Source of Electricity.

As well known, hydrogen is an element of great importance. Possessing little stability, it decomposes in the presence of a large number of bodies, and recombines according to the circumstances under which it is caused to act. One of its best known reactions has led Mr. Bremond, of Paris, to think that its presence in privy vaults might be put to profit in the production of an electric current. In the presence of iron, hydrosulphuric acid decomposes, in fact, and gives rise to the following reaction:

$$2Fe + 3HS = Fe_2S_3 + 3H.$$

Free hydrogen is disengaged; but, if it be brought into the presence of an oxidizing body, such as the sesquioxide of iron, for example, it will at once combine with the oxygen of the oxide, according to this formula:

$$3H + Fe_2O_3 = 2Fe + 2HO.$$

It results from this that if things be so arranged that these two reactions shall occur simultaneously, so to speak, an electric current ought to be engendered.

In order to collect this current, Mr. Bremond would arrange his pile as follows:

In a porous vessel of any shape whatever, he would arrange a cylinder of carbon surrounded with an intimate mixture of sesquioxide of iron and powdered charcoal, the whole being placed in a sort of envelope of iron wire. The connections being made, on the one hand with the interior charcoal, and on the other with the external armature of iron, the element thus constituted would be immersed in the privy vault. It is evident that if the circuit were now closed a current would be produced. This granted, a very large number of elements of this kind might be grouped for tension or quantity in such a way as to obtain a current capable of directly supplying lamps, or at least of charging accumulators.

The idea, as may be seen, is very original and seductive, because of its very simplicity. The porous vessel, moreover, which might prove troublesome on account of its brittleness, is not necessary, since the central carbon might be directly covered with an agglomerate of sesquioxide that could be afterward surrounded with an iron envelope. The iron itself is not absolutely indispensable, for zinc would behave in the same way, and might, if need be, be substituted for it; care being taken, however, to increase the number of elements for the same current, since the reaction would not be so lively with zinc. Finally, the sesquioxide of iron might likewise be replaced by any oxidant whatever, but as it is one of the cheapest of such itself, we scarcely see what could be practically employed in its stead except peroxide of manganese.

Such is Mr. Bremond's ingenious and original idea.—*La Lumiere Electrique.*

Launch of a Great Ship.

The Cunard Line steamer Umbria, the largest vessel afloat excepting the Great Eastern and City of Rome, was launched June 25 from the yard of Messrs. John Elder & Co., Fairfield, Govan, for the Cunard Company. She measures 8,000 tons gross, her length is 520 feet, her breadth 57 feet, and her depth 40 feet. Her engines are designed to indicate 12,500 horse power, the most powerful marine engines yet constructed. She was named the Umbria by the Hon. Mrs. Hope. She is built entirely of steel, is divided into ten water tight compartments, and has five decks. The promenade deck extends for 300 feet over the whole breadth of the vessel, and the saloons will all be proportionately large. It was matter of remark among the company present at the launch that it is less than ten months since the keel of the vessel was laid. The new ship will run between New York and Liverpool.