



Ingenious Device to Prevent Boiler Incrustations—Letter from an English Engineer.

MESSRS. EDITORS:—Although not an actual subscriber, I have been a constant reader of your valuable paper for years, having more than twelve volumes of it, and heartily wish we had as good and as cheap a paper in England. Now, having received many, very many, useful hints in reading it, I think it my duty to give a little of my experience in water heating, in connection with boiler incrustations—if you deem it worthy a space in your very valuable publication, and trust it may be of benefit to some of your many readers. First, I look on the many advertisements of patents for preventing boiler incrustations as almost useless, although I won't condemn any, not having ever tried one, for I hold if the water introduced into the boiler contains impurities, nothing can prevent its settling somewhere, unless it is frequently blown out. Now, I put up a 10-horse power two years ago, and my greatest fear was from incrustation of boiler, and knowing that by heating the feed water I should lessen it, if not prevent, I concluded the hotter the water the less silix in the boiler. I introduced the feed water from cold-water pump into the exhaust pipe, at about seven feet from heater, as it may be called, for which I made use of a strong cask, holding about 120 gallons; the exhaust steam drove the water in a fine spray into the heater, and deposited its silix all round the inside of the cask, more especially opposite the jet. I took a pipe of the same diameter as the exhaust (3 inches) vertically from the top into the open air, and one, same diameter, one inch lower than the exhaust, to carry off any surplus that might arise at any time from shutting off the feed from hot-water pump; this pipe I put in at right angles to the exhaust, so as not to take any of the jet of spray. This pipe went into a 6-inch drain, 200 feet long, to the reservoir, and condenses four quarts of water in five minutes, or 240 gallons in ten hours; now, after ninety-seven days run I cleaned out the boiler, and found no scale, except a very thin film over the bridge; the greater part of the fire-box had no scale whatever, and, I suppose I had no more than six gallons of mud altogether, but inside the cask I had a coal of hard silix three-fourths of an inch thick, which I removed by means of a hammer and chisel; the cask I furnished with a man-hole complete. I should have said the feed is heated to boiling point by being blown through the exhaust and finely subdivided. I can draw from the hot water feed pipe at 207°, which necessitates my having a slight head above the hot water pump. I find the exhaust being partly condensed in blowing the water through is a relief to the engine's working, although silix forms within it as fast as in the heater, and which has of course to be cleaned out when the heater is cleaned. This spring I replaced the cask for an iron cylinder, seven feet long by fourteen inches in diameter, lying horizontally in a line with the exhaust, and can plainly hear the jet striking hard against the extreme end, being about sixteen feet from where the cold water enters the exhaust pipe. All the other arrangements are the same. I find it necessary to have plenty of room in the heater, otherwise the spray, instead of quietly settling, will be blown up the vertical exhaust pipe into the open air. I am situated over a sand-stone rock, but have no doubt I should find my plan answer as well on a chalk formation as on a sand-stone range.

I hope this article may be of benefit to some of your readers. I receive your paper from Mr. A. J. Chapman, gunsmith, Schenectady.

EBENEZER RUSSELL.

Union Mills, Cranbrook, Kent, Eng., May 11, 1865.

[We are pleased to publish Mr. Russell's communication, and thank him for his good opinion of our paper. We recommend a trial of his device to our engineers. His ideas accord with our own upon this subject. We deem it much better to remove the incrustations from the boiler by preventing them from entering than by employing nostrums for the

purpose, which, in the hands of inexperienced persons, are always fraught with danger. The compound Mr. Krause mentions is made in one form as follows:—Powdered charcoal, common soda, and alum, which may be mixed in about equal parts; add to these matters wood dust, and mix the whole together. This will remove incrustation from old boilers, and prevent it in new ones.—Eds.

Incrustation Powder Swindles.

MESSRS. EDITORS:—Your valuable paper serves to spread so much useful knowledge among the mechanics and all producing classes of the country that I think it is but the duty of every reader of the SCIENTIFIC AMERICAN to assist you in your work to free the mechanic and manufacturer from all individual taxes that are everywhere imposed upon the ignorant. Being opposed to all secrecy and secret compounds for any use whatever, and the vendors thereof, because nine times out of ten, if the facts are known, they are either worthless or have been known in the scientific world for years; as, for instance, the case you reported, "How to make *Aqua Regia*," as one of the secrets sold to an ignorant party. I wish to report you a case of great usefulness to all who use steam boilers, to prevent boiler incrustations. Boiler incrustations are caused (except on salt water) by the crystallization of lime, etc., held in solution by the water with which the boiler is fed, and water will only dissolve a small portion of lime and other earthy substances if saturated with carbonic acid, which is the case with most all well and river water; and, as the water is evaporated, the lime, etc., crystallizes on the iron. To prevent this, all that is necessary is to drive the carbonic acid out of the water as fast as it enters the boiler, and the lime will then not crystallize, but form a mixture with the water like an insoluble fine powder, which can be swept out of the boiler; or, if the water is let out at the beginning of boiling produced by a quick fire, after the water has been cold, this powder will leave the boiler with the water in almost every instance.

The substance which will produce this action of depriving the water of its carbonic acid is common wash soda—carbonate of soda; one or two pounds in a boiler, from ten to twenty horse-power, will do this most effectually until the water is let out. The action is simply that of depriving the water of the carbonic acid, the soda forming a bicarbonate of soda wherever the water of a lower temperature enters the boiler; and as soon as the bicarbonate of soda is heated to the temperature of the steam, it again parts with one half of its carbonic acid, which is immediately carried off with the steam, and thus the soda will renew its work as long as there is any in the boiler.

I have used soda for more than ten years with success, and it is my impression that all incrustation preventive mixtures are nothing but soda mixed with something else to hide its real character. An incrustation powder sold extensively in the West, chemically analyzed, proves to be nothing but soda mixed with sawdust, and then baked to give the sawdust a brown mysterious color, and to make the world believe (as the agent informed me when I told him that it was sawdust and soda) "that every pound of it was imported across the Atlantic," and sold here at thirty cents per pound—about eight pounds of sawdust with one pound of soda; a very profitable secret to deal in, indeed. This powder has the certificate of a number of our best mechanics in the West as a very efficient preventive of boiler incrustations, and to stop leakages, etc. Soda will prevent incrustations, and sawdust will, of course, fill up cracks, but this might be procured at one-thirtieth of the cost, soda at eight cents and sawdust for nothing.

F. W. KRAUSE.

Chicago, Ill., May 22, 1865.

Light and Heat from Water Power.

MESSRS. EDITORS:—There is a stream of water running near my house in which I propose to set a water wheel which shall turn a magneto-electric machine to produce a current of electricity. This current of electricity shall decompose water, and produce oxygen and hydrogen gases; I will bring these together in a Dr. Harris's compound blowpipe, and burn in a manner to produce the calcium light which will light my house. Without producing the calcium

light I think I can expand the heat produced at the blowpipe, and so do my cooking, and warm my house, with water, as well as to burn a cold water candle. Why not?

B. P. R.

Hartland, Vt., May 31, 1865.

[If you have power enough you may produce the electric light, but it will require a very large magneto-electric machine, and the light is not sufficiently diffused for ordinary illumination. The amount of heat that you will obtain will be very small indeed in proportion to the power expended, though the fire will be the cleanest and most perfect of all fires.—Eds.]

The Center of the Earth Composed of Gold.

MESSRS. EDITORS:—The question as to the kind of matter composing the interior of the earth has long been one of considerable interest among that class of men who "dare to think;" and though our present knowledge of facts does not allow us to answer it in a positive manner, yet, I think it does enable us to draw conclusions which, at least, are highly probable.

When we consider the constant and never-varying changes to which the universe of matter is subject, we must conclude that there was a time—though that time be almost infinitely remote—that our world, as such, did not exist. Though as to the mode of its origin, and the time at which it first took its place among the spheres as an independent body, we can hazard nothing more than vague conjectures. It may have been hurled forth as a fragment from some mighty sphere, and thus attained an independent existence; or, it may have been by the collection into one body of a number of fragments or smaller worlds. But what would seem to be most probable, is, that it attained its present independent position by the condensation of a vast collection of gases, vapors and fluids, which had gathered around some aërolite or fragment, which served as sort of nucleus.

This latter idea concerning the mode of the earth's origin, seems to be the one most generally entertained by those who have given attention to the subject. But be this matter as it may, there is one thing which the teachings of geology so clearly established that it does not admit of a doubt, that at some remote period there must have been a vastly greater proportion of the earth in a gaseous and fluid state than at the present time.

Accompanying this idea a very singular and absurd notion has gained the popular ascendancy, that is, that the gradual cooling of the earth took place first at the surface, and that during the gradual change of the gaseous to the fluid, and the fluid to the solid state, a sort of crust was formed upon the surface, while the center still remained a fluid mass. No idea on the subject could be much more contrary to the known laws of matter. This notion, doubtless, arose from the idea that heat was a material substance, and would have to pass off from the earth before it could cool; whereas, the more modern researches into science show that heat is no more a material substance than motion, gravitation or magnetism, but that it is merely a condition of matter, and that, in the case in question, instead of passing off from the earth it would only become, by a gradual chemical action, fixed or latent. But even supposing that the cooling would, or did, take place first at the surface, it is a well known fact that all substances (water in a state of ice excepted) increase in density and weight as their heat is diminished, so that the cooler portions would be the first to sink from the surface toward the center. There are many other very absurd notions prevalent among the masses upon this subject. Some suppose that the interior of the earth consists mainly of water; this could not be, since water has a specific gravity inferior to nearly all the mineral substances; though it doubtless penetrates to a great depth through the crevices. Others suppose that its interior is one melted and burning mass, and that the volcanic mountains serve as chimneys to this great internal fire. Prof. Sims maintained, with considerable force of logical reasoning, that there is a vast hole running through the center of the earth from pole to pole. I once heard a distinguished clergyman maintain that the infernal regions were located in the center of the earth, according to which idea it is to be the future and eternal abode of nearly the entire human race,

and should command our utmost attention. For my own part I have quite a "golden" idea upon the subject—that the interior of the earth is abundantly supplied with, if not mainly composed of, gold, platinum and other precious metals. If we suppose but for an instant that the earth was once in a gaseous or fluid state, is it not quite evident that those substances most difficult of fusion, and possessing the greatest specific gravity, would be the first to find their way to the center? Now gold, platinum and a few other of the precious metals, possess these properties in a high degree above all other known substances, and though we know them to be scarce on the surface of the earth, we have no assurance but that they are abundant in nature. In view of these facts, is it not reasonable to suppose that these substances rapidly increase in quantity as we approach the center of the earth?

But it may be said that this probable or possible increase depends upon the idea that the earth was once mainly in a gaseous and fluid state. But even supposing that such never was the case, and throwing aside all possible and probable changes which the earth may have undergone, and taking only such changes as the learned geologist, who has carefully studied the chemical composition, structure and general position of the various strata of rocks, must know have actually taken place, we would ask, would it not be the constant tendency of these substances, being so much heavier and more difficult of fusion than other substances, to work away from the surface toward the center? And is it not probable, in view of the properties of these metals, and the known changes which the earth has undergone during the myriads and myriads of ages it must have existed, that they do actually increase in abundance as we approach the center portions of the earth. Indeed it is a matter of wonder that they are to be found at all on the surface, and such a fact can only be accounted for by the supposition that they exist in great abundance in nature.

It may be further urged in favor of this theory that these metals occur in nature invariably in a metallic state, and but little alloyed with other metals.

JOHN CALVIN MOSS.

[The specific gravity of the earth is only about one-third that of gold, the earth being $5\frac{1}{2}$ times heavier than a mass of water of the same size would be, and gold more than 19 times heavier than its own bulk of water. Consequently the earth cannot be nearly all gold, though the idea that there is a great deposit of gold and platinum at the center may not be improbable. The specific gravity of the earth has been measured by three different methods.

A commission, of which Dr. Franklin was a member, measured the contents of the mountain Schehallien, in Scotland, and from the specific gravity of the rocks of which it was composed, computed its weight. Then a ball was suspended by the side of the mountain, and, by observations on the stars, the extent to which the ball was drawn from a vertical position, by the attraction of the mountain, was ascertained. From this the relative power of the mountain and the earth in attracting the ball, and hence the relative weight of the two, was computed.

A second plan, tried by Cavendish, was to measure the attractive force of a large leaden ball by means of a torsion balance.

A third plan, which was tried by the Italian astronomers, Plana and Carlini, and which has been recently repeated by Professor Airy, is to observe the effect upon the oscillations of a pendulum produced by varying its distance from the center of the earth.

The first method gave the specific gravity of the earth.....	4.95
The second.....	5.48
The same repeated by Baily.....	5.44
Plana and Carlini's result was.....	4.95
Professor Airy's was.....	5.56

The mean of these is..... 5.44
Eds.

THERE are some lines of railroad in this country running side by side. The Morris and Essex and the New Jersey Transportation Company, are examples. Trains on these roads start at the same hour and for three or four miles run side by side so close that passengers reach out of the windows and shake hands with each other when running 25 miles an hour.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Hats and Caps.—The object of this invention is to thoroughly ventilate a gentleman's hat or cap, and it is effected by securing the sweat lining upon the interior of the hat body in such a manner that a space will be left all around between it and the body proper, through which space air is freely admitted to the hat, and after circulating through it escapes at the ordinary ventilating apertures made in the top or sides of the hat. A good and thorough ventilation is secured by this arrangement; the hat easily adjusts itself to the head, and has, in every respect, the appearance of a hat having its sweat lining attached in the usual manner. This invention is applicable to any style of hat or cap now in the market, and any one wearing a hat having this ventilating arrangement will experience much comfort and relief during the hot and sultry weather of the summer months—the head being always kept cool. The inventor of the above is Chas. L. Rahmer, Brooklyn, L. I., and the hats are now being manufactured by Messrs. Spruham & Rahmer, No. 21 Park Place, New York City.

Apparatus for Making Extracts.—This invention relates to an apparatus which is particularly intended for extracting oil from paraffine, but which can also be used for making extracts of any other material. The invention consists in subjecting the material to be extracted to the pressure of the atmosphere by placing it in a tank with a perforated false bottom, and forming underneath said bottom a more or less perfect vacuum. The means employed for producing the vacuum are of different kinds, and can be varied as may be convenient. Patented in the United States and in Europe through the Scientific American Patent Agency. Lyman Smith, Erie, Pa., is the inventor.

Watchman's Time Detector.—This invention relates to an improvement in that class of time detectors on which a patent was granted to JOHN BUEK, Jan. 1, 1861. In that case a strip of paper is used stretched on the circumference of a drum, to which a rotary motion is imparted by a clock or watch movement, and a series of spring points serve to perforate this strip according to the same, when these points are operated by a series of keys of peculiar shape. On the strips are marked the hours corresponding to hours on the dial of the clock or watch, and the time when one or more of the spring points have been actuated can be ascertained after the strip has been taken off. This construction necessitates a drum in addition to the ordinary clock or watch movement, whereby the expense of the mechanism is increased; and, furthermore, the operation of applying and removing the strips of paper is tiresome, and requires much care. These difficulties are avoided by using a clock or watch with a stationary index and revolving dial. On this revolving dial are fastened removable dials of paper, or other suitable material, with a series of circles corresponding to the positions of the spring points, and these spring points are concealed under the stationary index. By inserting one of the keys, and turning the same round, the paper dial is pierced by one or more of the spring points, and the time when this takes place can be ascertained by examining said dial when the watch or clock is opened. The perforations in the paper dial are made from below, under the stationary hand, leaving a slight beard on the upper surface, and a similar perforation cannot be produced, even if the watch or clock be opened, except if the paper dial is taken off. Jacob E. Buek, Boston, Mass., is the inventor.

Corset.—This invention consists in a new mode of making corsets and applying the springs used in them, whereby one is enabled to remove them for the purpose of washing the body of the corset, or for any other purpose. Corsets are now commonly made with flat metallic springs inclosed within the stuff of which the corset is made, along the front edges thereof, or else fastened along said edges on the outside of the stuff. In order to unite the edges of the corset on the person of the wearer, the springs are furnished with hooks and eyes or equivalent fastening devices, which are riveted to the faces of the springs or otherwise secured thereto. These springs are

fastened to the body of the corset in a permanent manner, with no provision for removing or detaching them for any such purpose as cleaning or repairing the corset, or of renewing or repairing the springs. In consequence of this construction the corset cannot be washed when it has become soiled without wetting, and thereby rusting the springs, and the common course now is to wear a corset without washing it, until it is worn out, and its place is then supplied by a new one. This invention has for its object to construct the corset and apply the springs in such a manner that the latter can be removed at pleasure. James Bowers, No. 540 Pearl street, New York City, is the inventor.

Handle for Sheet metal Tea and Coffee Pots.—The object of this invention is to obtain a sheet-metal handle for sheet-metal tea and coffee pots, and other similar sheet-metal vessels, which may be cheaply constructed, and have a neat and ornamental appearance—far more so than the common sheet-metal and cast-iron handles at present used. The superior class of sheet metal tea and coffee pots are now provided with japanned cast-iron handles, and also with white-metal handles. These, however, retain the heat from the warm contents of the vessel, and are heavy and expensive—so much so as to augment very materially the cost of such articles. This invention consists in having the handles constructed of two longitudinal parts swaged or stuck up in proper form, of sheet metal, and connected together by solder, so as to form a thin hollow or tubular handle. They can be made according to any ornamental pattern desired. The above is the invention of G. B. Halsted, No. 25 Cliff street, New York.

Device for Washing the Blankets of Printing Machines.—This invention relates to a new and useful improvement in means employed for washing the blankets of machines for printing fabrics, such as calicoes, delaines, etc. Hitherto the blankets have been washed by means of rollers placed in a box or tank containing water, and the blanket arranged so as to work in contact with and pass over said rollers, the blanket then passing between pressure or squeeze rollers, in order to have the moisture taken from it before it passes around the cylinder of the printing machine. This plan is defective. In the first place, the pressure or squeeze rollers wear the blanket; and in the second place, the washing rollers, in consequence of being well charged with moisture, bring an excess of the latter in contact with the blanket, and in case the latter is perforated, or has a hole made in it, by wear or accident, causes the cloth to which the rubber portion of the blanket is attached or cemented to be separated from the cloth, thereby spoiling the blanket. This improvement consists in dispensing with the pressure or squeeze rollers entirely, and using, in connection with the washing rollers, a "docter" or scraper or a pressure roller, so as to take the superfluous moisture from the washing rollers, leaving the latter only possessed of sufficient moisture to wash the color from the blanket. THOS. W. CLARKE, Manchester, N. H., is the inventor.

SPECIAL NOTICES.

CYRUS W. BALDWIN, Boston, Mass., has petitioned for the extension of a patent granted to him on the 2d day of December, 1851, and antedated August 30, 1851, for an improvement in looms for weaving bags.

Parties wishing to oppose the above extension must appear and show cause on the 14th day of August next, at 12 o'clock, M., when the petition will be heard.

ROBERT CRICHTON and James Rees, executors of Henry Carter, deceased, and James Rees, Pittsburgh, Pa., have petitioned for the extension of a patent granted to them on the 26th day of August, 1851, and reissued on the 19th of June, 1855, for an improvement in nut and washer machine.

Parties wishing to oppose the above extension must appear and show cause on the 7th day of August next, at 12 o'clock, M., when the petition will be heard.

Mr. E. S. ALLIN, master armorer at Springfield, has invented a new breech-loading musket, which is highly commended. General Dyer, chief of the ordnance department at Washington has ordered 5,000 muskets of the old model to be changed to breech-loading after Mr. Allin's plan.