Miscellaneous.

History and Construction of the Thermometer.

(Continued from page 403.)

PRECAUTIONS NECESSARY TO BE OBSERVED IN CONSTRUCTING ACCURATE THERMOMETERS.

A general idea has been already given of the mode of constructing a thermometer, but where so much accuracy is required, there are many niceties that demand attention.

1. The tube should be of equal diameter throughout the whole stem. As obtained from the glass house, the tubes are in reality frusta of very elongated hollow cones, which by extension, become more or less nearly cylindrical, and as the divisions of the scale are usually equal, it is very important that the tube should not perceptibly differ from a true cylinder.

For these purposes, after a tube has been chosen by the eye as equal in calibre as possible, the best makers blow a bulb on it, and introduce a short column of mercury into the stem, perhaps an inch in length, which is accurately measured on a fine scale of equal parts in different portions of the tube, as the column is, by the heat of the hand, moved from the bulb to the open extremity of the tube. Should the mercurial column subtend the same number of divisions on the scale in every part of the tube, it may be considered as a perfect tube for the thermometer.

The late Mr. Wilson, of Glasgow, introduced thermometric tubes of an eliptical bore. The advantage of this form is, that a very small column of mercury is much more visible when it is expanded at right angles to the line of vision. If due precaution be taken to ensure the equality of the tube, this form answers well, especially for ordinary purposes; but where great nicety is required, we would commend the cylindrical tube.

2. The form and proportion of the bulb may vary according to the purpose for which it is to be applied. The larger the bulb in proportion to the stem, so much more delicately susceptible of changes of temperature will be the thermometer. The spherical bulb is to be preferred, for their shape is least likely to be affected by the varying pressure of the air; but when the bulb is very large, this form renders the thermometer less susceptible of minute changes of temperature, and pyriform or cylindrical bulbs are usually adopted.

In forming the bulb the mouth must not be employed to blow it, otherwise moisture will condense in the tube, which is expelled with much difficulty, and, if suffered to remain, will greatly impair the value of the thermometer. Good instrument makers use a small bottle of caoutchouc, or elastic gum, fastened by a thread on the end of the tube, while the other extremity is softened by the flame of a tallow lamp, urged by a blow pipe. By compressing the bottle, after the orifice of the softened end of the tube is closed by the aid of another rod of glass, a bulb is formed of any required size; but a neat workman will rarely consider the first blown bulb sufficiently well formed for his purpose. It is generally dilated till it bursts; the glass, while still soft, is compressed into a rounded mass, and a fresh bulb formed of a regular shape and size proportioned to the calibre of the tube. Should the artist not intend to seal the tube immediately, he usually hermetically seals the other end of the tube to prevent the entrance of damp air and dust.

3. The necessary precautions used in filling thermometers with mercury are plainly pointed out in Nicholson's Chemistry, viz:—

The mercury should be clean, dry, and recently boiled, to expel air as much as possible. Mercury is often cleaned by thermometer makers by agitating it in a phial, for some time, with sand, and then straining it through leather: for nice instruments it should be distilled from iron filings, or reduced from its sulphurets in clean iron vessels at a moderate heat.

The bulb to be filled, is heated in the flame of the lamp, and the open extremity of the tube is immersed in the mercury; as the bulb cools the pressure of the atmosphere forces through the fluid into the tube and ball. The bulb should be but moderately heated at first so as on cooling to become only half filled.

4. To ensure a delicate thermometer the mercury is next tobe boiled in the thermometer. For this purpose a slip of clean paper is to be rolled tightly round the upper part of the tube, so as to form, beyond the orifice, a cup or cylinder, capable of containing as much mercury as the bulb: secure this round the tube with a thread, put a drop of mercury into the paper cavity, and again apply the heat to the bulb, holding the tube by the part covered with the paper, the mercury will soon boil, and about one half of the contents of the ball will rush up into the paper cup. On removing the bulb from the candle the mercury will suddenly return. Repeat this operation again and again, until the speedy boiling of the mercury, and the diminished rise and agitation show that the whole has been well heated, and air and moisture expelled from it. Should there be the least moisture in the tube before this part of the operation, it is very likely to burst the bulb; and the same accident is likely to happen if the mercury be too strongly boiled the first or second time.

5. The tube is now to be hermetically sealed, that is, closed by the fusion of the glass at the upper extremity, which, for this purpose, is previously drawn to a capillary orifice. When it is intended to free the tube entirely from air, which is the best method with mercurial thermometers, heat is again to be gently applied to the bulb, which, at the same moment, is to be softened by another flame, and closed in the usual way, as soon as the mercury reaches the extremity of the tube. When the ball has cooled a little, the sealing is rendered more secure by fusing the glass more fully around the top, so as to completely obliterate the orifice. If the vacuum be perfect, the mercury will fall to the extremity of the tube, on inverting the thermometer, unless the calibre be absolutely capillary; in which case capillary attraction will overcome the force of gravity, and the mercury will retain its position in the tube, in every situation of the instrument. Where there is a complete vacuum in the tube, the mercury must be well boiled before the sealing, as above directed. And when we choose a thermometer, the ready falling of the mercury, on inversion of the tube, is the best test we can have that the mercury has been well freed from air and moisture. This vacuum is not, however, so essential to the true action of the thermometer as was once supposed. A thermometer with a small dilation of the tube when sealed, containing some common air, has lately been recommended as preferable to the instrument with a vacuum on the surface of the mercury.

6. We come now to the last and most delicate step of the process, the adaptation of the scale to the instrument.

In the manufacture of thermometers this is conveniently done by plunging the new instrument, along with a standard thermometer, into two liquids at different temperatures: but the graduation of this standard instrument is a work of such nicety and importance, that a committee of seven members of the Royal Society was formed to investigate the subject, and their elaborate report is given in the society's transactions, where all the requisite circumstances are distinctly noticed, and the best manipulations minutely described. Two fixed points are sought, and the freezing and boiling points of water are most convenient for that purpose. To find the first, nothing more is necessary than to place the thermometer to be graduated, after it is filled, in melting snow, or ice, in such quantity around the ball and tube, as to bring it to the desired temperature. When the mercury has become stationary in the tube, a mark is to be made on the tube with a file, just opposite to the top of the mercurial column, and that mark fixes the freezing point of the scale of the instrument. The determination of the boiling point is much more difficult because it is affected by atmospherical pressure, and even by the form of the vessel in which the water is heated. The Committee of the Royal Society recommend that the boiling point ought to be fixed under a barometrical pressure of 29·80 inches.

The Present Cotton Crop.

Any cry of a short crop from the southern planter is considered an attempt at a panic by the cotton brokers of New York and the spinners of Manchester. But the culture of the cotton-plant and the theory of its production, have been reduced to such unerringly successful practice, and to experiments and calculations, by millions of attentive and observant minds, that neither will hardly allow of any improvement. Any intelligent planter can tell you precisely what effect certain kinds of weather will have upon the cotton crop—whether a rain will make the "squares" "sheer," or "stick;" whether damp, cloudy weather will benefit or injure the devouring "lice," or whether precisely the same season would increase or decrease the "rust." Sometimes drouth benefits, sometimes injures cotton; so also with rain. Through all these changes an intelligent planter can look to the result as certainly as you can tell the effect of a chemical combination. I have been over every section of the cotton-growing country, and my experience and observation enables me to state that any great atmospherical change near the 32° N. latitude, is certain to be general over the whole cotton region. Judging, then, from our experience, let us make a calculation as to the extent of the present crop. An examination of the following causes will enable us to determine: Human or Artificial Causes; these are,

First—Our planters are just learning that first rule of trade—the effect of supply and demand. Experience has compelled them to believe that a shorter crop brings more money; ergo, by general consent they have not increased their crops.

Second—The changing of cotton into sugar plantations, in the States of Texas, Louisiana, Mississippi, Alabama, Georgia and Florida.

Third—The immense amount of labor (entirely black) diverted from the culture of cotton to the building of railroads and factories.

Fourth—The scarcity of corn, from last year's frost, has raised its price from 100 to 200 per cent. (varying in different localities,) and has compelled planters to increase the corn crop. Indeed, I do not know, even under the increased planting of this year, a single farmer who will have corn to sell.

Fifth—The continued agitation of the slavery question has diverted capital from the cotton culture.

I think you will agree with me that these causes are competent to produce some effect. Now for the natural causes—

First—The seed is very much deteriorated by last year's frost; indeed, if next year proves as unfavorable as 1849–50, we shall be compelled to get our seed from Mexico again.

Second—The length of the season, which is six weeks later than usual; this is easily proved by the picking; I have not picked a boll yet, and shall not commence until about the 5th [last week,] although I have had cotton ginned and packed fully a month earlier. My father, a very successful planter, had a saying that he would not give "one stack two weeks older for two, two weeks younger." Every planter knows how good the adage is in a short season.

Third—The cotton stock, thrown back and stunted by the drought, is too small to bear a good or even an average crop of bolls.

Fourth—The immense heat (average 98° in the shade) and no rain (2·95 inches in ten weeks), have forced the cotton plant to an early maturity, and the bolls are not half as heavy as usual, while the continuous drought is causing the bolls and squares to drop continually.

Indeed, it depends upon continuous moderate showers until October, and a very late frost, whether we make a decent crop; though I do not know whether an early frost will damage the crop or not, as this fall is an anomaly in cotton culture. The last crop of "squares," if this is an ordinary season, (frost 15th of Oct.,) have been made about two or three days since; as we do not calculate upon a "bloom" after Sept. 10, and it requires 3 weeks for a square to form a bloom. Last year we had equal to no frost at all, as I have "rattoon" cotton in my corn fields which came up from the old stocks, and has stood four plowings without being killed. Without pretending to estimate the crop, I must say, that I think it (the crop of 1850–51) will prove the shortest of a long series of years.

STATE RIGHTS.

La Grange, Geo.

Quadrature of the Circle.

Observing in your paper of the 27th ult., an article on the Quadrature of the Circle, I am led to suggest a few remarks on the subject. —Neither by numbers nor geometry will this question, in all probability, ever be solved —but by a simple experiment in mechanics it can be. Thus, take a block of metal, place the same in a perfect engine and reduce it to an exact square, ascertain how much fluid this square will displace. This can be done correctly by an apparatus that shall leave but a small surface of fluid to be operated on; then take another block of the same material, which should be reduced to the exact thickness of the square heretofore described, place the same in the engine, reducing the other four sides, by turning down until it will displace the same quantity of fluid as the square before described. If correctly done, and the metal have no imperfections in it, the two blocks should weigh precisely alike. This being the case, the square before described is circled, consequently the circle is squared. The proportion of the diameter of the square to that of the circle, or the proportion of the circumference of the circle to that of the four sides of the square, is hereby demonstrated. The square of the sphere, also, is to be obtained by a similar experiment.

EXPOSITOR.

Providence, R. I.

[We have received quite a number of articles on this subject since we noticed the work of Mr. Fleming on the subject. We did not intend to publish any of them, because they reflect no new light on the subject. The above article being short, we thought we would publish it, because others may be wasting their time with the same lucubrations. It is perhaps needless for us to say, that the above leaves the subject in the same region in which it was before, for there is neither formula left to guide, nor proof correctness stereotyped in it.

The Floods of 1850.

This summer has been remarkable for its storms and freshets. We do not remember of a summer in which so many storms occurred, and storms of such a destructive nature. From East, West, North and South, the news of disaster by the overflowing of rivers and creeks, is most appalling. During a part of last week, the State of Pennsylvania in the Lehigh region, suffered greatly. Schuylkill river carried dreadful destruction on its swollen waters. In New Jersey there has also been great loss of property, and New York has had her share of disasters. The dam at the Albany Nail Factory, near Troy, was carried away, and much damage done; in fact, from every State we have news of more or less destruction of property by these remarkable rain storms. The year 1850 will be long remembered for its storms and floods. Old men say they do not remember such a stormy season in all their lives.

Rats for the Table.

There are many parts of the world where rats are eaten, and such rats as would astonish those accustomed to our species, which, take even the largest, are Lilliputian as compared with a native of the East Indies, first satisfactorily described by Gen. Hardwicke in the seventh volume of the "Linnæan Transactions." The specimen he described was a female and weighed two pounds eleven ounces and a-half; its total length being two feet two inches and a quarter. He assures us that the male grows larger, and weighs three pounds and upwards; so that the natives have before them on table an animal as large as a wild rabbit, doubtless, as they have no prejudices or scruples, just as palatable.

The theory and practice of Dr. Cheyne was, "the slightest and least of meats and drinks a person can be tolerably easy under, is the shortest and most infallible means to preserve life, health, and serenity."

☞ Reported expressly for the Scientific American, from the Patent Office Records.

LIST OF PATENT CLAIMS

ISSUED FROM THE UNITED STATES PATENT OFFICE,

For the week ending September 3, 1850.

To Lambert Alexandre, of France, for improvements in sub-marine vessels.

I claim the method of effecting a circulation of the air, and of maintaining an atmosphere in the cabin of the requisite bulk to prevent the encroachment of water during the descent of the vessel, and of preventing the waste of air by its expansion and escape from the cabin during the ascent of the vessel, by pumping it either out of or into thecabin or air reservoir, as may be required, even when the density of the atmosphere in the compartment whence the air is drawn is less than that of the atmosphere in the compartment into which it is forced, as herein set forth.

I also claim the device, consisting substantially of the drop platforms, chains, and draw pin, for the purpose of carrying ballast on the exterior of a submarine vessel and of discharging it at will, as herein set forth.

To C. F. Brown, of Warren, R. I., for improved method of attaching lines to harpoons.

I claim the manner of attaching and securing the line to the harpoon by means of the ring sliding on the shank, and the rounded end of the socket or butt, in the manner substantially as herin described.

[This is a most excellent invention.]

To L. S. Chichester, of Troy, N. Y., for improvement in machine for dressing staves.

I claim in the above described machine for shaving staves from rived bolts, the employment of two concave knives for shaving the outer or convex surface of the staves, substantially a herein described, in combination with a single knife for shaving the inner or concave surface of the staves, when the said single knife is placed in a line midway between the other two, that is, oppposite the space between the other two, substantially in the maner and for the purpose specified.

To S. A Clemens, of Granby, Conn., for improvement in pressing cotton, and other substances into bales.

I claim the method of packing and compressing substance into bales or packages in a series of successive layers or strata by means of rolling pressure or its equivalent, substantially as herein specified.

I also claim combining with the laying and compressing rollers or cylinders or their equivalents, a bed which shall be gradually separated from the rollers or cylinders as the layers or strata accumulate, and which shall also traverse from end to end under the rollers or cylinders or vice versa, substantially as specified.

I also claim, in combination with the cylinders for packing and pressing substances in successive layers, a lapping apparatus for forming such substance or substances into a lap or laps, to be delivered to the rollers or cylinders or their equivalents, to be laid and pressed into the bed substantially as described.

I also claim, in combination with the laying and compressing cylinders or their equivalents, the series of rollers or their equivalents, for retaining the layers or strata as they are successively compressed, substantially as specified.

I also claim, the bed made without sides or ends substantially as and for the purpose specified, in combination with the carriage provided with adjusting plates at the ends, for the purpose and in the manner substantially as described.

And finally, I claim in combination with the adjusting plates at the ends of the carriage, the stationary plates at the ends of the frame under which the adjusting plates pass, to remove the substance that may have accumulated on them, substantially as described.

To Samuel Colt, of Hartford, Conn., for improvements in repeating fire-arms.

I claim making the central bore of the many chambered rotating breech which fits and turns on a central pin or arbor, to extend from the rear part thereof to within some distance from the front end, and thus leave the front end closed, substantially as described, to prevent the access of smoke, when this is combined with the connecting of the barrel with the shield piece and lock plate, substantially as described.

To David Current, of Crittenden, Ky., for improvement in hand-spinners.

I claim the combination of the clamp lever with the cord and drum, for the purpose substantially as described.

To Wm. Field, of Providence, R. I., for machine for bevelling the surfaces of washers, &c.

I claim the method substantially as herein described of drawing out and giving a bevel form to metal clinch rings, washers, &c. by the action thereon of the surfaces of a series of travelling rollers turning on bearings, arranged about a common centre of rotation and combined with a spindle or mandrel, adapted to the reception of the clinch rings or washers, to be formed and provided with the means, substantially as herein described, for turning it to present in succession every part of the periphery to the action of the rollers, substantially as described.

I also claim, in combination with the spindle or mandrel for presenting the clinch rings or washers to the action of the travelling rollers, a gripe, substantially as described, for griping and holding the said rings or washers on to the spindle or mandrel, whilst passing under the action of the travelling rollers as described.

To C. W. Finzel, of Bristol, England, for improvement in draining sugars.

I claim the mode of applying steam or liquids, to machines used for separating syrups or fluids from sugar by means of centrifugal force, for the purpose of clearing and keeping clear the meshes or apertures in the periphery of the revolving cylindars of such machines, in manner herein described.

To E. B. Forbush, of Buffalo, N. Y., for improvement in clamps for holding paper in writing and drawing.

I claim the clamping slides made to slide freely on the parallel rods operated by the lever and the springs, substantially in the manner and for the purpose as herein set forth.

To O. W. Hogle, of Somerset, N. Y., for improvement in fastenings of Hay Rakes.

I claim, first, the manner of holding the teeth firmly in their required positions against the sliding bar, during the operation of the machine, by means of the aforesaid combination of the ratchet wheel, pawl sliding bar, and stern helical spring fixed-bar and slide attached thereto, with the parallel guiding arms and revolving finger shaft, arranged and operating in the manner and for the purpose above set forth.

Second, I claim the combination of the slide helical spring strap and roller, with the parallel arms and fixed bar, for disengaging the sliding stop bar from the rake teeth, without moving the hand from its usual position on the hand roller, to allow the teeth to revolve to deposit the hay in windrows, as herein fully set forth.

To S. S. Jewett & F. H. Root, of Buffalo, N. Y., for improvement in Stoves.

We claim the jambs of stove or grate fronts or ends, constructed with a recess closed by doors, within which the doors of the fire place are folded up and concealed from view; the fire place doors being constructed and arranged to turn back into the recess, substantially as herein described.

To David S. Neal, of Lynn, Mass., for improvement in Car Couplings.

I claim the bearing roller (or rollers) placed within the body of the coupling, and the bearing roller located in one end of the connecting link, for the purpose of enabling the connecting bolt to be easily detached from the link when the cars are in motion; when this arrangement of the said rollers and connecting bolt is combined with the loop, the catch head and cord, for uncoupling, in such a manner that the loop will be disengaged when force is applied to withdraw the bolt, but will prevent the connecting bolt from being accidently thrown out of place when the cars are in motion.

To J. F. Ostrander, of New York, N. Y., for improvement in Planing Machines.

First, I claim the use and employment of the cutter made in form or any analgous manner, whereby the peculiar cutting, bevelled scolloped edge is obtained, for planing or dressing plank or other material, substantially as herein set forth.

Second, I also claim the use and employment of the cutter in combination with the compressing spring feed rollers and straight edge, or any one or more of them, in form and manner and for the purposes substantially as herein set forth.

To Barthelemy Thimonnier, Sen., of Amplepius, France, (Assignor to Philip Mayof London, England) for improvements in Sewing Machines.

I claim the hook, the surface, the tube or holder and thread carrier, working substantially as above described.

To John H. Towne, of Philadelphia, Pa., (Assignor to Solyman V. Merrick, of Philadelphia, Pa.) for improvements in the direct action steam-hammer.

I claim attaching the hammer to the sliding steam cylinder, substantially as herein described, the steam being admitted and discharged to and from the sliding steam cylinder, substantially as herein described.

To Wm. P. Tatham, of Philadelphia, Pa., for improvements in manufacture of lead pipe.

I claim the method, substantially as herein described, of setting or cooling the inside of the mass of metal within and throughout the length of the cylinder and before or preparatory to pressing out the pipe, by passing a cooling fluid into or through a long core or core-holder, extending through the length of the cylinder, as herein described, the said method having the effect at the same time to keep the said core or core-holder cool and stiff, as described.

To Seymour Tomlinson, of Washington Hollow, N. Y., for improvement in apparatus for Breaking Horses.

I claim the method, substantially as herein described, of breaking horses by means of the shafts which are connected together by a bow passing around in front of the horses breast, substantially as herein described, in combination with the two straps, one passing over the crest and the other under the breast, by which the horse is harnessed to the said shafts, substantialy as described.

To Benjamin Welch, of Lakeville, Conn., for improvement in Surgeons's Splints.

I claim my improved surgeons splints, composed of thin strata of wood combined with some elastic adhesive substance interposed betweeen them, substantially as herein set forth.

Magnetic Principles of the Solar System, or, Deductions from Experiments with the Solar Magnetic Engine and previously known Astronomical Truths.

BY WM. W. HUBBELL, ESQ.

On surrounding a solar magnet of six inches diameter, by eighteen equidistant planetary magnets, I found that by charging the solar magnet with magnetism, and leaving the planetary magnets or bodies uncharged by the batteries, the solar magnet would polarize them at the clear distance of one inch, (a greater distance I did not try.) This fact convinced me that magnetism diverged from the entire circumference of a solar magnet, similar to the radiation of light from the sun, or any body of light. It is also a known fact that the rays of the sun will, in a few minutes, cause a magnet to be more powerful than it will be when kept for a considerable length of time in the dark, showing that the sun-light is instrumental in the production of magnetism. These facts, together with almost universally known astronomical truths that will be recognized in what I am about to state, lead me to the following superstructure of material law, accounting for the variations and intensity of the magnetic needle; of all which I have no doubt.

In analogy to the solar magnet polarizing its planetary bodies when not polarized by a battery, I suppose the sun or solar centre to polarize its planets by means of its divergent rays of light; that these rays of light, like the fluid of the solar magnet, diverge strongest at right angles from its axis; that the polar axis of the planets, or focus line of their poles, is always (about) parallel with the axis of the sun; that the attraction and repulsion existing between the sun and his planets, causing them to approach and recede, and revolve around him, are brought about by the alternate approximation of their poles, owing to the respective oscillating movements of the planets; by means of which, with the earth, (as we say,) the sun passes back and forth between the tropics;—this approximation in the solar engine is produced by changing the planetary poles at the points of aphelion and perihelion by means of the galvanic battery, being another mode of producing alternate approximation of the planetary poles.

My theory, or superstructure of material law, is this: That the sun, by means of his rays of light, polarizes the planets; and the earth being one of those planets, has, as it rotates on its axis, generated by the light of the sun acting on it, a belt or current of electricity strongest between the tropics, over the torrid zone, which polarizes the extreme parts of the earth, to wit, the north and south poles. Now, as the earth oscillates, and the axis or focus line of the poles must be parallel with the axis of the sun, it is evident that the focus of the poles and the axis of the earth can only be coincident when the sun is, as we say, on the equatorial line of the earth, and that at all other times, the focus of the poles must be moving in an approaching or receding spiral circuit about the axis of the earth; this precise conformity of parallelism of polar focus of the earth with the axis of the sun, would also be governed or influenced by the residuary or permanent magnetism of the earth, from which the attaction and repulsion must ensue in the alternate approximations of the poles to the sun; this would influence the degree of variation of the focus of the poles, but nevertheless, true it is, and in accordance with other astronomical truths, that the sun, by means of his light, polarized his planets, and that the focus of the poles can only be coincident with their respective axes when he is opposite, or is passing the equatorial line; and that at all other times the focus of the poles is in a spiral circuit, either approaching, or receding from, the axis of rotation of the planets respectively; and as respects the earth, the magnetic needle at sea and elsewhere varies, always pointing to the focus of the poles, governed by that focus, and varying about the axis of the earth's rotation as it varies. Again, as the sun by his light polarizes the planets, and the earth varies in distance from the sun as it traverses its annular orbit, it follows necessarily that the intensity of the poles must change with the change of distance, and that the polarization is strongest when the earth is at its aphelion, and least when at its perihelion. This affects the intensity of the magnetic needle, and also another fact affecting it, is the varying distance of the polar focus, as it moves in its spiral circuit about the axis of the earth.

There is no law or demonstration that I can find to controvert this superstructure of natural law; the known variations, of course, and intensity of the magnetic needle, or compass itself, go to confirm it.

By a series of observations and calculations based upon this superstructure of natural law, made at our National Observatory, it is highly probable that the focus of the poles of the earth can be located at any given time on any future day, and thus greatly increase the security of navigating the ocean by the aid of the compass.

Philadelphia, Aug. 10th, 1850.

No less than $26,000,000 are paid in duty every year, in Britain and Ireland, for home-made whiskey; the wholesale cost is $40,000,000. For beer, rum, wine and whiskey, more money is spent every year than the whole income of the government—that which keeps up the immense fleet and army of the land.

At the present moment Electro Magnetism, is engaging a great amount of attention.