

WHAT BECOMES OF HEAT?

A correspondent inquires what becomes, in the winter, of the heat which accumulates in the polar regions during the summer? That great natural force which we call heat, so mysterious in its origin and essence, has been the object of study and observation by many of our clearest intellects, and a vast number of facts in regard to its action have been learned in the last 50 years; and especially in the last 25 years. Dr. Wells' observations of the dew, which were published in 1814, lead the way in the common-sense mode of conducting this series of modern studies of heat; and his very thin volume is well worth reading by any man who takes an interest in the works of nature, and in the correct action of the human intellect, both for the interesting truths which it contains, and as one of the most beautiful and perfect samples of rational investigation. By the means of a few bunches of wool, and some delicate scales and thermometers, Dr. Wells unraveled the cause of the dew, which had, before his time, eluded the comprehension of all who had studied the subject. Since his time the radiation of heat has been investigated by Melloni and others, who have made very numerous and very delicate observations, which resulted in the revelation of many of the laws of its action.

Heat is a restless force; it is constantly rushing, with inconceivable velocity and unmeasurable power, from one body to another—at all events, whenever its equilibrium is disturbed, a circumstance which is constantly occurring in this whirling universe. All substances radiate heat; that is, it is the nature of heat to be constantly rushing out and flying away from any substance in which it exists; and unless the supply is renewed, either by being generated within or by being sent from surrounding bodies, the substance becomes continually more cold. In portions of India where the temperature of the air never falls below 40°, ice is regularly made for sale by simply cutting off water from receiving heat, and allowing it to radiate a portion of that which it contains. Large pits are dug some two feet deep, and filled nearly full of straw, and on this the water is set in broad shallow pans. The straw being a very slow conductor of heat, prevents that which is in the earth from ascending to the pans; and the pans are placed a very little below the surface of the plain to avoid any breeze, and thus prevent a renewal of warm air from continuing the supply of heat to the water. On clear and still nights, these arrangements are found to be perfectly successful, and ice is produced in considerable quantities for market. The water thus placed continues to radiate its heat, as it is always doing; and, being cut off from its usual sources of supply, the temperature soon falls to the freezing point. When there are clouds in the sky, ice does not form; the clouds, radiating heat as well as the water, send down enough to keep the water too warm to freeze. A wind also prevents the formation of ice; the water being supplied with heat by constant contact with fresh bodies of warm air. The pans of water are placed on broad plains, where they may be exposed to a large portion of the sky, and out of view of other masses of matter from which they might receive heat; as heat, like in light, moves straight lines.

Dew is also formed by the radiation of heat to the sky. Heat passes away from bodies which are exposed to space, and if the supply is not maintained, the bodies become enough colder than the air around them to condense the moisture in the air, which appears upon them in little drops of dew. On cloudy nights and on windy nights, no dew is formed, from the same reason that no ice is formed in India under similar circumstances. A board, or even a piece of cloth, suspended horizontally above the ground, by radiating its heat, keeps up the supply to the bodies beneath, and thus prevents them from becoming sufficiently cold to condense the moisture of the air; and this is the reason why no dew is formed in places thus protected. Some surfaces radiate heat much more rapidly than others. Leslie filled a square can with hot water, and, by coating its outside with various substances, he was able to measure with a thermometer the relative heat emitted by each. The following table exhibits the results of his experiments:—

Lampblack.....	100	India ink.....	85
Water.....	100	Ice.....	85
Rosin.....	96	Isinglass.....	81
Sealing-wax.....	95	Red lead.....	80
Crown glass.....	93	Cr. plate.....	75
Polished lead.....	79	Polished iron.....	16
Polished tin.....	12	Polished copper.....	12

From which it seems that lampblack emitted more than

eight times as much heat as polished tin, and ice about six-sevenths as much as lampblack.

The heat which comes from the sun upon the polar regions, when they are inclined towards him, is constantly flying away into the boundless depths of space, and as soon as the supply ceases the temperature falls. Some philosophers have speculated upon the probability of the sun, and with it the earth, being gradually cooled till all life shall be extinguished upon our globe, and have attempted to calculate how many millions of years the process will occupy. But, as the solar system is sweeping through space, we know not what sources of heat may lie in its path; neither do we know enough of the generation of heat to render these predictions of any value. As well might the ephemeron, whose existence is limited to a summer's day, infer from his own observations the eternal and unchanging conditions of the earth, as for the human race—which is but an ephemeron in the unlimited flow of time—to conclude from its observations what is to be the eternal condition of matter.

HYATT'S PATENT EXTENSION CASE.

COMMISSIONER BISHOP'S DECISION.

UNITED STATES PATENT OFFICE }
November 4, 1859 }

On the application of THADDEUS HYATT, for the extension of a patent granted to him on the 12th of November, 1845, and re-issued on the 3d of April, 1855, for "Improvement in Vault Covers":—

The character and amount of testimony submitted in this case, as well as the acknowledged ability of the counsel employed by both the applicant and the remonstrants, justify the conclusion that the issue involved is one of considerable importance. If no opposition had been made to the extension, and the case rested entirely upon the evidence submitted by the applicant, I should not hesitate to grant the prayer of the petitioner. I shall therefore proceed at once to an examination of the objections to the extension on the part of the remonstrants, with the view of ascertaining whether there is anything therein contained to justify the rejection of this application.

Mr. Hyatt asserts, and has submitted evidence to prove, that he is the first and original inventor of the plan of lighting subterranean apartments by means of the invention set forth in the following claims:—

"What I claim as my invention and desire to secure by Letters Patent in covers for openings to Vaults in floors, decks, &c., is making them of a metallic grating or perforated metallic plate with the apertures so small that persons or bodies passing over or falling upon them may be entirely sustained by the metal, substantially as described; but this I only claim when the apertures are protected by glass, as and for the purposes set forth.

"And I also claim, in combination with the grating or perforated cover and glass fitted thereto, the knobs or protuberances on the upper surface of the grating or perforated plate for preventing the abrasion or scratching the glass, substantially as specified."

The applicant further asserts, notwithstanding the greatest exertion upon his part that owing to the neglect and refusal of the public to make use of his invention when first offered to them, he has failed to obtain a sufficient remuneration for the time, labor, ingenuity and expense bestowed upon it, and its introduction into use.

It is claimed, however, by the remonstrants, that Hyatt is not entitled to a patent for this invention, for the reason that the same thing was patented to J. T. Christy, in England, in 1841. As evidence of this the London *Mechanics' Magazine*, for 1841, is exhibited, in which we find, under the head of "List of Designs registered between June 28th and July 28th," the following:—

"Date of registration—July 6, 1841; No. on the register—742; Registered proprietor's name—J. T. Christy; Subject of design—Coal Plate; Time for which protection is granted—3 years."

From this it appears that J. T. Christy, on the 6th day of July, 1841, registered a design for a coal plate, in the exclusive sale of which he was protected for the term of three years. What this particular coal plate was does not appear from the printed publication. No one in this country would imagine that the words "coal plate" meant an iron frame with several openings filled with thick glass to be placed upon sidewalks or floors for the purpose of admitting light into vaults, cellars, basements, &c. It cannot therefore be claimed that this notice in the *Mechanics' Magazine*, unaccompanied as it is by any explanation of any kind, is a printed description of the particular device for which Letters Patent were granted to Hyatt in 1845.

But the remonstrants have offered in evidence what purports to be a copy of a drawing of an "Improved Coal Plate," registered in England in July, 1841, by John Fell Christy and Company.

I am clearly of the opinion that this drawing and the accompanying affidavits, as well as the affidavit attached to the so-called coal plate, cannot be received as evidence in this case, for the reason that the applicant did not

have the opportunity offered him to be present and cross-examine the witnesses, a right which is virtually guaranteed him under the rules of this office. I am aware that it has been urged by remonstrants' counsel that this was the best evidence that could be produced, for the reason that there is no provision under the laws of England for taking certified copies of registered designs. It would require, however, something more than the naked statement of an attorney to satisfy my mind upon that point, particularly in the face of the following remark found in the letter of Newton & Son, patent lawyers, of England, to remonstrants' counsel, marked Exhibit T. "The courts of law are bound to accept as evidence the copies of a design stamped with the Registrar's seal." No such stamp appears upon the drawing purporting to be a copy of Christy's registered design.

But even admitting it to be true that a certified copy of a design registered in England cannot be obtained, does it follow that the affidavit of any private individual can be received in lieu of such certified copy, when the opposing party has had no opportunity of testing by a cross examination the character and veracity of the witness? I apprehend that no Court of law would recognize a principle so manifestly dangerous and unjust. Waiving the objections of applicant's counsel to the admissibility of the testimony of John Stuart, and what do we have to establish the fact that the invention claimed by Hyatt was patented in England in 1841? Stuart testifies that he saw vault covers in use in England made of one piece of cast-iron, with four holes in each, about 3½ or 4 inches in diameter, with pieces of thick glass fitted into each hole, and that said vault covers were similar to one exhibited to him on the stand. There is, however, no legal or admissible testimony to show whether the particular vault cover shown to Stuart was made in London, Paris, or New York; whether it was made by Christy, in 1841, or by J. T. Jackson, in 1859. Stuart does not testify that the vault cover which he saw in England was, to his knowledge, ever patented or even registered. All that can be inferred from his testimony is that he saw such vault covers in use or on sale in England in 1841 or 1842. The point is well settled that the mere prior knowledge and use of an article in a foreign country does not destroy the validity of a patent for the same thing in this country. I deem it, therefore, unnecessary to inquire whether a registered coal plate is, within the meaning of our laws, a patented coal plate, as there is no legal evidence to show what the particular coal plate registered in England was. But if we admit the affidavits, the cast-iron coal plate, and the alleged copy of Christy's drawing, there is, even then, nothing to destroy the validity of Hyatt's patent. All of this evidence proves no more than that Christy's registered coal plate was a round iron cover with four round holes in it, while Hyatt's invention, as described in his original specification, is a vault cover so constructed "as to admit light through a considerable number of small glasses or lenses which are so set in the iron cover as to effectually defend them from injury by the falling or pressure of weighty bodies upon them, or from the contraction or expansion of the metal; they being protected by knobs or protuberances on the iron cover, and defended also by being set in a frame-work of wood or soft metal or wood and soft metal combined, which will yield to percussion, and thus aid effectually in preventing the breaking of the glass."

The testimony of Wm. W. Cornell (in which he states that he saw in England, in 1857, "a light marked 'Christy; registered July 6, 1841,' twelve inches in diameter, containing four round glasses, each four inches in diameter,") fails to establish the fact that Christy's coal plate, as registered, contained any glasses at all. I have examined the purported copy of Christy's registered drawing, the *Mechanics' Magazine* for 1841, the cast-iron coal plate, the testimony of Stuart and Wm. W. Cornell, as well as all the rejected affidavits, and am unable to find anything therein to prove conclusively that the Christy design registered in 1841 was for a cast-iron plate containing holes filled with glass. We have just as much right to suppose that the holes exhibited in the drawing were not to be filled at all, or were to be filled with pieces of wood or iron in such a manner as to be removed for the purpose of ventilation, as to suppose that they were intended to be filled with glass. The rejected affidavit of Richard Folkard shows that the holes in one of Christy's coal plates were filled with disks of iron after the glasses had been broken out. If Mr. Cornell had chanced to have seen that coal plate with the holes so filled with disks of iron, we would be as much bound to believe that the apertures in Christy's registered coal plate were designed by him to be filled with iron as that they were to be filled with glass.

Cast-iron vault covers, with holes through them for admitting light and air into vaults, had been in use in this country long before the invention of Mr. Hyatt. These were of various shapes and designs, and there is no admissible evidence submitted in this case to justify the conclusion that the Christy registered coal plate was anything more than a design for an old-fashioned open vault cover.

Although, under the view I have taken of this point, it is a matter of no importance, still it may not be amiss to state that the coal plate referred to in the *Mechanics' Magazine* is represented as being registered by J. T. Christy; the one referred to in Exhibit A, by John Fell Christy & Company; while the name shown in said exhibit upon the drawing itself is J. E. Christy & Co.

For the reason hereinbefore referred to, I must set aside the Christy coal plate as having no bearing upon