A Furnace Patent Decision.

Judge Blatchford, of the United States Circuit Court for the Northern District of New York, has recently rendered a decision in a suit involving a certain construction of hot air furnaces which is of much importance to the trade. From a report in the Utica *Observer*, we learn that it was a test case, and would, had the decision been the other way, involve several of the largest furnace manufacturing concerns in the country.

The Palace King furnace is manufactured under what is known as the Goodenow & Owen patent by Russell Wheeler, Son & Co., of Utica. In October last this company brought an action in the United States Circuit Court for the Northern District of New York against the firm of H. Gilbert Hart & Co., which firm is composed of H. Gilbert Hart, Frank T. Budlong, and Milton K. Merwin, manufacturers of a furnace known as the Royal hot air furnace. The complaint in the action alleged that the Royal hot air furnace was an infringement on the Palace furnace, and an injunction was asked restraining its manufacture and sale. The action also involved a demand that the manufacturers of the Royal furnace pay over to the complainants all profits derived from its manufacture and sale.

The action was thoroughly prosecuted, over four weeks being consumed in taking proofs, covering 500 pages of printed matter, or about 2,000 folios. The case came on for argument at the June term of the United States Circuit Court, held in Canandaigua before Judge Blatchford, of the United States Court. August 22, he filed his decision in the United States clerk's office in Utica, holding that defendants' furnace was not an infringement upon the Palace furnace manufactured by Wheeler & Co., and dismissing the complaint with costs.

The claim in the Goodenow & Owen patent upon which the suit was brought was as follows:

"A furnace having secured thereto a detachable radiator, which is provided with one or more horizontal flues opening from a dome leading from the furnace, and a circular or elliptical hot air chamber, having air passages leading from the horizontal flues to the smoke nozzle or exit pipes, substantially as and for the purpose set forth."

The text of Justice Blatchford's decision is as follows:

"The words of claim one of the Goodenow & Owen patent, 'a furnace having secured thereto a detachable radiator,' 'substantially as and for the purpose set forth,' requires, by reference to the description part of the specification, that the radiator shall not only be detachable, but shall be secured by the flange, N, the slots, N, and the lugs, O, which, as the specification says, securely lock it in position, it being made detachable by bringing the lugs opposite to the slots. The state of the art also requires this interpretation of the claim. As the defendants' furnace contains no such means of securing the radiator in position, there is no infringement, and the bill must be dismissed with costs."

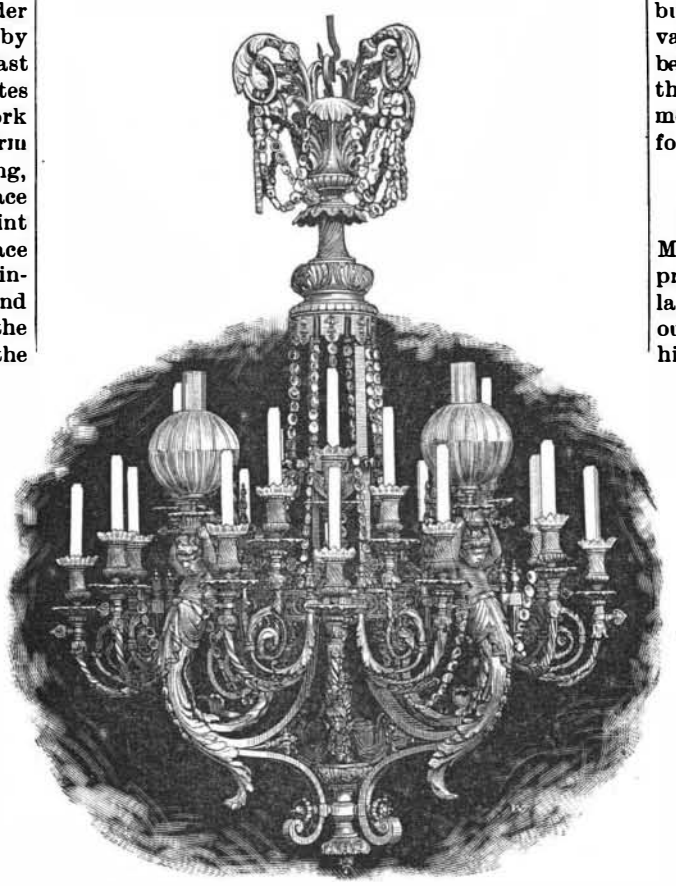
The Hop Louse.

Professor Riley, the entomologist of the Department of Agriculture, has made public the result of an exhaustive personal investigation into the habits of the *Phorodon humili*, or hop louse. His discoveries are expected to prove of great value to hop growers, as he has succeeded in learning the habitation of this plant pest during the winter months, and tracing it through the varying stages of insect life. Before the investigation, it was not known how or where the insect survived the winter. As a result of his inquiries, Professor Riley has satisfied himself that the eggs laid by the female at the close of the summer are deposited in plum trees, where the insect hatches in the spring, and resides until the third generation. This third brood, unlike its predecessors, is winged, and immediately after development abandons the plum tree and attacks the hop vine. In the autumn a counter migration from the hop vine to the plum tree occurs, the winter eggs are deposited, and the cycle of life goes on in the same way.

It is a notable fact that in regions where the cultivation of hop vines is a new industry, the growers have had complete immunity for a while from the pest. In California to-day they are not troubled by it. Professor Riley believes that the *Phorodon humili* has been brought to this country from Europe on plum stock; and there is reason to believe that the *Phylloxera*, the dreaded grape pest, was carried from this country to Europe on grape vine cuttings. Therefore California hop growers are warned to beware of importing plum stock from eastern hop regions. These discoveries render it possible to check the ravage of the hop louse either by the use of insecticides in the spring time, before the insect has reached the winged state, or by the destruction of the sheltering plum trees. The experiments will be continued with a view to protecting the hop vines after they have become infected.—*Science.*

FINE BELGIAN METAL WORK.

In the accompanying illustration is represented a specimen of beautiful work in bronze gilt, executed in Liege, Belgium. Its rich and elaborate ornamentation and brilliant gilding make it a most conspicuous feature even in such gorgeous salons as are to be found in French and Belgian palaces. Unlike our practice in the use of gas, this has been designed to be provided with



A BRONZE-GILT LOUIS XVI. CHANDELIER.

candles and the French mechanical lamps so much in use in Europe. This practice of illuminating salons being the almost universal custom in foreign countries, owing to the belief that the yellow light emitted is more becoming to the complexion than the more dazzling glare of gas or the electric light.

ARTISTIC WORK IN SILVER AND BRONZE.

The excellence of much of the work now executed by the leading American silversmiths is such that their productions unquestionably compare favorably with the best samples of foreign workmanship, while in all lines of plated goods our decided superiority over the manufactures of other countries will be readily admitted. Although every device is adopted whereby hand labor may be abbreviated, in the production of staple goods, expense is lavishly incurred in the getting out of new designs, and in the making of the most perfect steel dies for stamping, when the goods are thus formed, while in such articles as are cast such care is taken with the mould that they generally come out sharp and clean, and with an almost perfect finish.

LAMP IN SILVER AND BRONZE—ADAPTATION OF ORIENTAL DESIGN.

An ornamental lamp after a somewhat Oriental design, which presents no small difficulties in its execution, is shown in the accompanying illustration, and is the work of one of the best known of our manufacturing silversmiths. The dragon which forms the stand is of bronze, its serpentine body being wound around the horn, which forms the reservoir, and its crested head and wings, coming under the portion of the lamp bearing the greatest weight, give a proper sense of solidity, its claws furnishing the feet. The horn is of hammered silver, or of copper plated, oxidizing the silver making a most effective contrast and affording an article which will be very serviceable while needing but little care. The finish of this piece, and of a great variety of work of similar character, leaves nothing to be desired. In all such work the American public has the opportunity of obtaining goods of real artistic merit in a wider variety of design than they can be found anywhere abroad, and at a moderate cost.

Albuquerque, New Mexico.

The geographical location of this region of the Rocky Mountains is such as to exclude the possibility of the presence of moisture from either ocean or any other large body of water. The air is so pure and clear that our perception of distance seems to be almost annihilated, the mountains, some twenty miles to the east, appearing only two or three miles distant. The bodies of animals dying on the plains dry up, becoming mummified. May we not have here the ideal long sought for by every surgeon—a pure *aseptic* atmosphere, entirely free from germs? Bright, sunny skies, some portion of the day, is the rule even during the rainy season; two or three pleasant days often intervening between the showers. The winters are extremely mild. The ground was not covered with snow a single day during the past winter. During the past seven months there were only *four* entirely cloudy days—a land of almost perpetual sunshine, it even being extremely comfortable, throughout the winter months, to sit outdoors many hours of the day and enjoy the luxury of a mid-winter sun bath.—*Dr. T. J. Cummins, in Medical Record.*

The New United States Steamer Boston.

The new war cruiser Boston made a successful trial trip on the first instant, over the waters of Long Island Sound. 4,264 h. p. was developed and a speed of about 16 miles an hour attained. This is one of the ships built by the late John Roach. The substantial construction of the vessel and the superior character of her machinery were conspicuously shown on this trial, and do credit to the memory of her builder.

Alum for Bad Water.

The use of alum to clear muddy water has long been known, but Professor Leeds, in the course of an investigation on an outbreak of typhoid fever at Mount Holly, discovered another value in the use of alum, which, if his observation proves correct, may be very important. He found that the water which was supplied to the inhabitants of Mount Holly was swarming with bacteria, about fifteen drops being capable of forming 8,100 colonies of these microscopic vegetal germs when spread upon a suitable surface. He tried the experiment of adding a minute amount of alum to this water in the proportion of only half a grain to a gallon, and found that not only was the dirt and coloring matter precipitated, but that instead of the same quantity of water containing 8,100 colonies of bacteria, it contained only 80, and these were all of a large form.

On filtering the water through two thicknesses of filtering paper, he found that the filtered water contained no bacteria, but was "as sterile as if it had been subject to prolonged boiling." This amount of alum is too small to be evident to the taste, and is not harmful to health. If his observations shall remain unrefuted, they may form a valuable method of purifying polluted drinking water. Of course it does not follow that, because bacteria are removed, therefore the obscure cause of diseases due to impure drinking water is also removed; but bacteria and these diseases appear to be coincident, even if not linked almost as cause and effect, according to modern theories, and it is not too much to hope that, if the bacteria are removed, the virus of these diseases will be removed with them.—*Public Ledger.*

Adulterated Flour.

Adulteration of flour by means of potato flour may be detected by means of acids. Take a spoonful and pour upon it a little nitric acid; if the flour be of wheat, it will be changed to an orange yellow; if wholly of potato flour, the color would not be altered, but the flour formed into a tenacious jelly; if therefore the flour be adulterated with potato flour, it will not be difficult to decide. Again, take a spoonful of the flour, and pour upon it a little muriatic acid; if the flour be of pure wheat, it will be changed to a deep violet color, without odor; but if potato flour be mixed in it, it will then have an odor like that of rushes.

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Sneezing.

At a recent meeting of the Physiological Society, Berlin, Dr. Sandmann spoke on respiratory reflexes originating in the nasal mucous membrane. In order to study the possible connection between asthma and diseases of the nose, which has been so often supposed to exist, the speaker has made experiments on the respiration in rabbits and cats whose nasal openings had been completely occluded. In addition to confirming the phenomena which had been already described by earlier observers, he found that the changes in volume of the thorax were the same as in normal animals, whereas the intra-thoracic pressure was considerably increased when breathing was carried on entirely by the mouth; similarly, the respiratory undulations of the blood pressure tracing were increased in amplitude. He next investigated more closely the respiratory reflexes which originate in the nasal mucous membrane; of these three are known, namely, inhibition of respiration, sneezing, and coughing, as a result of stimulation of the nose. Inhibition of respiration was observed to occur, according to the strength of the stimulation, either in the phase of expiration or of inspiration, or merely as a more pronounced expiration. Sneezing was brought about by tickling the nasal mucous membrane, and was found to consist of a deep inspiration with simultaneous closing up of the pharynx and mouth by the application of the tongue to the palate, followed by an explosive expiration. When the stimulation is slight, only the deep inspiration is produced; if the stimulation is strong, the deep inspiration is followed by a somewhat lengthy inhibition of the same, which is frequently accompanied by slight expiratory movements; when the stimulation is of moderate strength, an ordinary sneeze is the result. After section of the phrenic nerves the deep inspirations were no longer observed. Dr. Sandmann, by section and removal of the mucous membrane in rabbits, has further examined the various regional areas of the same, and found that sneezing can only be produced by tickling a limited area of the mucous membrane. On the rabbit this area is found in the entrance to the nose on the anterior surface of the lowest nasal muscle; but in addition to this place, the same reflexes may be produced by stimulation of the front part of the septum and roof of the nasal cavity. Sneezing cannot be produced by stimulation of any other portion of the nasal mucous membrane. In man the region of the posterior nasal openings is also connected with the reflexes involved in sneezing in addition to the regions mentioned above. An anatomical investigation of the areas whose stimulation leads to sneezing showed that they are supplied entirely by the ethmoid nerve. Stimulation of this nerve in the orbit was followed regularly by sneezing, which could therefore be produced to a certainty by stimulating the trunk of the nerve. The third kind of respiratory reflex—namely, coughing as the result of nasal stimulation—could not be experimentally produced in the cats and rabbits used in these experiments.

How to Teach a Pacer to Trot.

BY JOSEPH CAIRN SIMPSON.

Boots are applied, and there is little doubt that the improvement in the trotters of the present day is greatly owing to the more intelligent use of these adjuncts. Still it is manifest that boots and hoofs of the hind feet, extending above the coronet, on the pasterns, ankles, and shins, must, more or less, hamper the animal wearing them, and if the difficulty can be obviated by a change of shoeing, it will be a superior method of overcoming it. But if this change in the shoeing should give a wrong bearing, an unnatural set of the feet or limbs, the remedy would eventually be worse than the disease. The use of tips presents a better opportunity to modulate the action than is possible to accomplish with shoes without endangering the feet and limbs. An illustration, and one which has struck me with the greatest force, is the change in the action of the colt when first shod. He has been broken and driven some before anything is placed upon his feet, and his trainer will tell you that there will be a favorable change whenever he has the iron fastened to his hoofs. In ninety-nine cases in a hundred the result will be as predicted, and the shoes, weighing in the neighborhood of a pound each, will increase his speed by several seconds. I have found a tip of not more than six ounces to have the same effect. Again, a tendency to pace is overcome by a heavier shoe or the resort to something else which has been found to have an analogous effect.

One of the most successful trainers I ever knew in converting the pacer to a fast trotter informed me that to run the horse with feet weighted until he became too tired either to run or pace was the most effectual method he had ever found to overcome the propensity for the lateral manner of progression. This proves that a heavy shoe or heavy toe weight is inimical to speed, either running or pacing, but is adapted to the trotting gait, and the horse finding he can get along easier when thus encumbered naturally tends to relieve himself by adopting the action suitable to the changed condition, and that which, tired beyond endurance in the other paces, can be sustained at the trot. This is also further proved by the other methods which trainers employ to change the pace into the trot. The old plan was to strew the road with rails and ride the animal over it; another, to practice the horse through loose sand or deep snow; and lately, in Texas, a very fast trotter was converted by driving him on the beach when the water reached his knees. The latter method is evidently a very effectual one to cause the horse to bend his knees, and the theory of the effect of weight on the action and the practice coincide. It is manifest that the knees must be bent more to enable the horse to get through the water easily, for if the leg were pushed along, the resistance of the fluid would be great, consequently the horse soon learns to pick his foot up as nearly perpendicular as he can, and thrust well forward. The most approved theory is that the weight influences the action more strongly where the heaviest weight is placed, and with shoes made much heavier on the inner quarter, the striking of the knee will be more likely to follow, and a horse which hits his knee with an equal shoe will avoid it when the outside is made the heaviest. It will necessarily follow the adoption of this hypothesis that weight on the toe will have a greater influence on the action than the same amount distributed over the whole foot; and though the present form of the weight was invented to obviate the bruising of the heels from the older-fashioned kind, it was based on the scientific principle of the correlation of forces. Thus, a bullet with one hemisphere cast of a denser material than the other will fly in a curve, the shorter radius being on the light side. The lighter the side the greater will be the effect, and if the power could be applied so as to overcome the attraction of gravitation, such a ball would describe a horizontal circle.—*Live Stock News.*

Quicksilver Ores.

Speaking on the character of quicksilver deposits, Prof. S. B. Cristie, of the University of California, in his testimony in a recent case in San Francisco, says: Quicksilver deposits, as a general rule, are very different from those of the ores of other metals. Many other metals occur in well-defined fissure veins, so that there is no difficulty in following the ore, and in many cases of calculating beforehand the amount of ore in sight; but with the exception of the deposit at the Old Almaden in Spain, and to some extent the deposit at the Idria in Austria, the quicksilver deposits, particularly those of California, are characterized by a great and persistent irregularity, so that it makes the mining of these ores much more difficult than that of other metals. New Almaden is a striking example of this irregularity. It has often occurred in the history of the mine that there was none or scarcely any ore in sight, and it has often looked as though the mines must of necessity be shut down, and it has only been by the most careful and painstaking prospecting or dead work that it has been possible to keep up the production of the mine. Very frequently large bodies of ore will almost completely run out, and there will be visible in the face of the works only a slight coloration in the vein matter, which indicates that there is ore left in that particular place, and by following out this little spring of ore carefully it may lead into a large deposit. As a result of this, the workings of the mine are necessarily very irregular, and it requires the greatest skill on the part of the engineer in charge of the works to keep up a regular and steady output of ore. Many times in the past history of the mine, the prospecting work has not been carried on on a sufficient scale, and this largely accounts for some of the irregularities of the production of the mine in former times.

How to Increase the Adhesion of Locomotive Wheels.

At the recent meeting of the American Association for the Advancement of Science, in New York, Mr. Elias E. Ries read a paper describing some experiments made by him with a view of determining whether the increased traction observed on the Daft Electric Railway in Baltimore and Hampden was due to the passage of the current from the rails to the wheels. In these experiments he came to the conclusion that it was possible to increase the tractive force from 50 to 100 per cent by suitable arrangements, and he showed a model car in which the two front wheels were insulated from the axle, and the two hind wheels metallically connected with their axle and the body of the car. He employed alternating currents of low potential obtained from a transformer. The current was led by a rubbing contact into the right front wheel; from there it passed into the rail, going then into the right rear wheel, and by the left rear wheel into the second rail, passing along the latter into the left front wheel, where, by means of another rubbing contact, it was led back to the transformer. The author attributes the increase of friction between the tires of the wheels and the rails to a change of molecular structure and to the development of heat at the points in contact, both of which effects are dependent on the strength of the current. He proposes to increase the traction of locomotives by mounting a small alternate current dynamo and transformer, the transformer being necessary in order to produce currents of very great strength and low tension, which could not be economically done direct from the dynamo. The low tension current would be sent through the wheels and rails, a rheostat being inserted in the circuit, by which the amount of current and the increase of friction could be regulated. He suggests that this system may with advantage be employed on our elevated railways.

Origin and Progress of the Manufacture of Tin Plate.

Mr. P. W. Fowler Neath, at a recent meeting of the Iron and Steel Institute, gave some interesting information in regard to the history of the tin plate industry. Historic documents show that tin plate was known at the time of the wars of Alexander the Great in the Indies. Herodotus, 450 years before Christ, Diodorus Siculus, Aristotle, and Pliny all speak of tin and the use of it for preserving iron. The tin was extracted from the mines of Setis and St. Michael's Mount, and brought to the shores of the Channel to be carried through Gaul to Massilia (Marseilles).

At the beginning of the 17th century, the manufacture of tin plate was in a flourishing condition in Bohemia. In 1620, the Duke of Saxony established this industry in his states, and in 1665 it was in full prosperity, according to the testimony of Andrew Yarranton.

The plates were hammered by hand, and then pickled in sour barley water, for want of acid. This operation took several days, while with sulphuric acid it can be performed in a few minutes. The tin plates were packed in casks weighing 140 Prague pounds, and carried on the backs of animals over the mountains to Leipzig, or transported down the Elbe on sleds in winter.

From 1650 to 1680, at the instigation of Colbert, aided by Mr. Reaumur, who, like Yarranton, had visited Germany, an effort, which proved unsuccessful, was made to introduce the industry into France. Yarranton states that the iron trade was depressed in England in 1665. The importations from Sweden, Germany, and France lay heavy on the market, and the same was the case with Welsh tin, and so he conceived the idea of endowing his country with the tin plate industry, which he had seen so prosperous in Saxony. A syndicate was formed, but nothing was done until 1720, when Major John Hanbury established the first factory at Pontypool.

The following are the improvements that have been introduced into the industry since then:

In 1728, the plates began to be rolled at Pontypool, instead of being hammered as before. In 1745, a vessel filled with melted grease was used for heating and preparing the iron before tinning it. In 1770, coal was applied to the manufacture of the iron. In 1806, sulphuric acid was substituted for sour barley water for pickling the plate. In 1829, Mr. Thomas Morgan reheated the plates in closed cast iron boxes, instead of bringing them into contact with flames. In 1866, Messrs. Morewood & Sanders took out a patent for rolling tin plates as they came from the tinning crucible. In 1874, pickling apparatus were introduced. In 1875, the Martin-Siemens soft steel was substituted for Swedish iron. In 1883, appeared the Thomas soft steel.

The tin plate industry is now consuming 460,000 tons of English iron and steel a year that would be useless for the same purposes if it were not coated with tin.

In 1885, there were 96 tin plate works, with 320 rolling machines, and the mean production of each machine was 96 barrels per day. During this same year the production was 7,130,000 barrels, 5,230,000 of which were for exportation.

The manufacture of fruit and meat cans is enormous. Three million barrels give 875,000,000 of these. It is due to them that the entire world receives from the far West salmon from the Oregon, mutton from the plains of Australia, fruits of all sorts from California, lobsters from Massachusetts and Nova Scotia, oysters and peaches from Baltimore, sardines and green peas from France, pineapples from the Mauritius Islands, apricots from Lisbon, milk from Switzerland, preserves from Tasmania, and a host of products from foreign climes. These boxes have become a necessity to modern civilization.—*Revue Industrielle.*

The Sense of Temperature.

Dr. Goldschneider lately presented and explained to the Berlin Physiological Society plates illustrating the topography of the sense of temperature. The sense of heat and cold was determined for the whole surface of the body, and arranged in a series corresponding to twelve degrees of intensity. As a general result, it was found that the sense of cold is more extended than that of heat; that both senses are more developed on the trunk than on the extremities; that the sense of temperature is less acute in the median line of the body; that the distribution of this sense over the surface of the body is quite different from that of the sense of touch; and that the points of exit of the nerves possess little or no sense of temperature.

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