family of ten or twelve persons, ought not, with thorough economy, to consume more than one sixth of a tun of coals in the year. Count Rumford shows in his treatise that 25 lbs. of bread ought to be baked with one pound of coal, and that 100 lbs. of meat should be cooked with 2¼ lbs. of coal. If, therefore we fully utilized our fuel, it is clear that, in the preparation of our food and hot water for domestic purposes, ½ lb. of coal per head of the population ought to be a sufficient daily allowance, which would be equivalent to one twelfth of a tun per annum; and in large households even less than that quantity ought to suffice. I do not suppose that we shall ever attain to this minimum of consumption, but it is well to consider what the standard is, so that we may not rest satisfied till it has been much more nearly approached than hitherto.

The three main parts of the ordinary cooking apparatus are the oven for baking and roasting, and the boiler, and the hot plate. If the boiler is to be of the form most effectual in saving fuel, the flame and gases from the fire should play under and round every part of it.

Then, as regards the oven. The baker's oven of firebrick, in which the fire is made inside the oven and the whole heat retained in and reflected back from the sides and top and bottom, is a very economical instrument when in continual use. With iron ovens, attached to a kitchen range, the case is different. An oven which roasts requires a temperature of from 400° to 450° at least. Therefore, to maintain this temperature, the gases must pass off into the flue at a temperature even higher; when the oven is a roaster, a considerable volume of air is being continually passed through it to carry off the steam from the meat. This air, if admitted cold, as is the case with many ranges, acts so as to cool down the interior, and therefore additional fuel has to be consumed to counteract this cooling down process. Hence, it is desirable to utilize some of the heat, which passes off, at above 450°, into the flue, for the purpose of raising the temperature of the air to be admitted into the oven.

The hot plate is the third of the most important parts of the modern close cooking range. In its present shape, the hot plate wastes an enormous amount of heat. It is wasteful, because it radiates the heat largely; because the application of heat to the saucepans is only through the bottom of the saucepans, and the bottom of the saucepan is not always in immediate contact with the flame, but is frequently allowed to receive the heat through the medium of the cast iron hot plate, which is a very moderate conductor of heat. Just consider what the difference of effect is. The heat of the flame, if directly acting on the bottom of the saucepan, would be 1,200° Fahr.; but, unless the hot plate is red hot, probably not above 450° will pass through, but the heat in the flue which heats the hot plate will be at 1,200°, and the spare heat from the flame will be wasted up the chimney.

It is evident from the foregoing that, although hundreds of stove and range inventions have been made, there is still room for a new and better series of devices whose merits are to consist in their economy of fuel.

A NEW THERMO-ELECTRIC BATTERY.

When a bar of bismuth is soldered to one of antimony in the form of a ⊲ and the point of junction warmed, an electric current is set up, which may be increased by augmenting the pairs of the combined metals.

A new form of this battery, recently invented by Mure and Clamond, consists of 60 pairs, made of iron and lead, and the electro-motive power is equal to two Bunsen elements. By the use of 39 gallons of gas, about 2 drams of copper were precipitated in an hour, the surface of the electrodes being 11 square inches, and their separation from one another 0·4 inch. The cost of depositing 2⅔ lbs. of copper by this battery, in Paris, where gas is sold at 3 cents per 35 cubic feet, would be $2.36.

The largest battery which has been as yet constructed upon this plan consists of 150 large pairs, and has an intensity equivalent to 5 Bunsen cells of medium size. A battery of 560 small pairs arranged for tension have an intensity equal to 60 Daniell cells. In both cases, the gas consumed is about 210 gallons per hour.

THE SOUTHERN CANAL.

A correspondent, P. K. McM., alludes to Professor Colton's lecture on a proposed canal to connect the Mississippi with the Atlantic, printed on page 376 of our volume XXVIII, and asks:

"Has your attention ever been called to the fact that the head waters of the Tombigbee are only 8 miles from Bear Creek, a large stream that runs into the Tennessee?

From Fulton, Atawamba county, Miss., to Bear Creek is only 8 miles, over an undulating country; from thence to the Tennessee river is 15 miles, down a creek that is nowhere less than 50 feet wide, with from 2 to 3 feet of water in the summer time and no fall worth mentioning.

Please look at it. We are agitating it now down here; and if the West wants as great a market for her productions as the Georgia canal would give her, at one tenth the cost, let her turn her eyes this way. By this route, too, corn could be laid down in Montgomery for 16 cents a bushel. All the advantages that would accrue to Alabama by the other route would also be afforded by this.

This canal would supply the richest part of Alabama (the cane brake belt) with a direct line to the West. It is also to be noticed that Bear Creek enters the Tennessee below Muscle Shoals."

NEW BOOKS AND PUBLICATIONS.

LANDSCAPE ARCHITECTURE, as applied to the Wants of the Great West; with an Essay on Forest Planting on the Great Plains. By H. W. S. Cleveland, Landscape Architect. Price $1.50. Chicago: Jansen, McClurg & Co., 117 State Street.

We have here an excellent treatise on an interesting and important subject, which may be read with profit by all who are building, planting, and laying out gardens and parks. The second part of the work, on the subject of forest planting, is especially valuable, the question of the effect of forests on the humidity of the climate being well explained and commented upon.

COMETS AND METEORS, their Phenomena in All Ages, their Mutual Relation, and the Theory of their Origin. By Daniel Kirkwood, LL.D., Professor of Mathematics in Indiana University, and Author of "Meteoric Astronomy."

The author, well known to all readers of the SCIENTIFIC AMERICAN, *Nature*, and many other contemporary journals, has here given the world some light on the vexed question of the origin of comets, which, coming from an undoubted authority, will be welcomed by all students of astronomy.

THE SPECTROSCOPE AND ITS APPLICATIONS. By J. Norman Lockyer, F.R.S. Price $1.50. New York and London: Macmillan & Co.

This elegant little volume contains three lectures, delivered by Mr. Lockyer, in 1869, before the Society of Arts, and carried down, by considerable additions, to the present time. The book is copiously illustrated, and is intended as an introduction to the whole science of spectroscopy, which has been exhaustively treated in the large work of Professor Roscoe.

DECISIONS OF THE COURTS.

United States Circuit Court--District of Maine.

PRESERVED GREEN CORN PATENT.—JOHN W. JONES *et al. vs.* R. K. SEWALL, Administrator.

CLIFFORD, *J.*:

Inventions lawfully secured by letters patent are the property of the inventors, and as such the franchise and the patented product are as much entitled to legal protection as any other species of property, real or personal. They are, indeed, property, even before they are patented, and continue to be such, even without that protection, until the inventor abandons the same to the public, unless he suffers the patented product to be in public use or on sale, with his consent and allowance, for more than two years before he files his application for a patent. (5 Stat. at Large, 123; 5 Ibid., 354.)

On the 8th of March, 1853, Isaac Winslow, of Philadelphia, filed in the Patent Office an application for a patent for "a new and improved mode of preserving green corn. The application was rejected by the Patent Office, which for nine years persisted in its erroneous decision. *

On the 18th of February, 1872, the inventor filed in the Patent Office a new application for a patent, referring to the fact that his prior application, as modified, was rejected, and renewing the prayer that letters patent might be granted to him for the entire improvement. *

Four several letters patent were granted * as follows: 1. No. 34,928, dated April 8, 1862, for a new and useful improvement in preserving Indian corn in the green state. 2. No. 35,274, dated May 13, 1862, for a new and useful improvement in preserving green corn. 3. No. 35,346, dated May 20, 1862, for a new and useful improved process of preserving green corn. 4. No. 35,326, dated August 26, 1862, for a new and useful improvement in the process of preserving green corn. *

The method of manufacturing the product is substantially as follows: Select a superior quality of sweet corn, in the green state; remove the kernels from the cob by means of a curved and gaged knife, or other suitable means; pack the kernels in cans, and hermetically seal the latter so as to prevent evaporation under heat or the escape of the aroma of the corn. When packed the cans of corn are to be exposed to steam or boiling heat for an hour and a half, then puncture the cans, and immediately seal the same while hot, and continue the heat for two hours and a half longer. Afterward the cans may be slowly cooled in a room at the temperature of seventy to a hundred degrees Fahrenheit. Indian corn thus packed and treated, the patentee states, may be warranted to keep in any climate. Being preserved in its natural state, as near as possible, it retains the peculiar sweetness and flavor of fresh green corn right from the growing field, and it is only necessary to heat the corn in order to prepare it for the table, as it is fully cooked in the process of preserving. What the patentee claims in that case is—

The described new article of manufacture, to wit, Indian corn, when preserved in the green state without drying the same, the kernels being removed from the cob and packed in cans hermetically sealed and treated substantially in the manner and for the purpose set forth in the specification.

The second patent purports to embody an invention for a new and useful improvement in preserving green corn, or, in other words, the patented invention is for the process of manufacturing the new product described and patented in the first mentioned letters patent. *

Two other patents are set forth in the bill of complaint, but it is clear that the patents are each for the new and useful improvement in the process of preserving green corn, and that they severally embody substantially the same invention as that described in the second patent. *

The third and fourth patents described in the bill of complaint are void. More than one patent for the same invention cannot be legally issued by the Commissioner, but the irregular issuing of the second patent cannot impair the right of the patentee under the first patent, if it was valid at the time it was granted. Tested by these rules of decision, it is quite clear that the bill of complaint as to the third and fourth patents must be dismissed, but that the complainants are entitled to a decree for an account and for an injunction for the infringement of the first and second patents, unless the defenses, or some one of them set up by the respondent, are sustained.

The first defense is that the patentee is not the original and first inventor of the respective improvements. *

Evidence was introduced by the complainants, of the most satisfactory character, showing that the patentee, Isaac Winslow, of Philadelphia, discovered the patented process of preserving green corn early in the year 1842, and that he made successful experiments in reducing his invention to practice at Westbrook, in the State of Maine, during the latter part of the summer or in the early part of autumn of that year, leaving no doubt that the process discovered was the same as that described in the second patent, on which the suit is founded. *

Much examination, in detail, of the parol proofs introduced by the respondent, to show that the patented process was known or used in the United States before the early experiments made by the patentee, may well be omitted, as it is not pretended, nor can it be, that any other person, resident in this country either before or since that time, ever invented such a process; and a careful scrutiny of the evidence given by those witnesses as to what was in fact done by the several deponents will show that no one of them ever preserved any green corn, in the mode of operation substantially described in the specifications of the patents, until the witness, in some way and to some extent, became acquainted with the process of the patentee, either from rumor or from some one who had assisted the patentee in making those experiments, and in most cases not until years after the invention was made, and in some cases long after the patentee had filed his application for letters patent in the Patent Office. *

Beyond all doubt, the patentee was the original and first inventor of the process in the United States, and sufficient appears, even in the proofs introduced by the respondent, to convince the court that the first knowledge which those witnesses ever had of the patented process was procured, directly or indirectly—as by report or rumor—from persons residing near the place where the experiments of the patentee were made, or who had at some time been the employees of the inventor and had assisted in his experiments. *

Next the respondent insists that the process described in the English patent to Peter Durand supersedes the invention of the assignor of the complainant as a prior discovery and for the same improvement. Vegetable substances intended to be subjected to that process, the specification states, are to be put into the vessels selected for the purpose, in the raw or crude state; but the patentee, in enumerating the articles to be preserved, does not mention green corn, nor does he state whether the kernels are or are not to be removed from the cob, or, if to be removed, whether the removal is to be effected in a manner to leave the kernels unbroken or by means of a gaged knife, as in the mode of operation described in the complainant's patent, nor is any mention made of preserving green corn or any other vegetable substance in the natural juices of the article, as in the mode of operation set forth in the patent mentioned in the bill of complaint. *

It is quite clear that a careful comparison of the descriptions given of the inventions in the respective specifications, fully justifies the opinion of the learned expert examined by the complainant, that the two patents are essentially and substantially unlike, to which may be added that persons having no other knowledge of the complainant's process than what they derive from perusing the specification of the other patent, would never be able to preserve green corn by that mode of operation. *

Patents otherwise valid may be avoided in a suit for infringement by proof that the invention was in public use and on sale more than two years, with the consent and allowance of the patentee, before he filed his application for a patent, which is the next defense presented by the respondent. *

Nothing short of proof that the invention was on sale or in public use, with the consent and allowance of the inventor, for a period exceeding two years, will support such a defense, as the party charged with infringing the rights of an inventor must bring himself fairly within the words of the act of Congress, which justify the acts charged as an infringement. *

If the sale or use is without the consent or allowance of the inventor, or if the use is merely experimental, to ascertain the value, utility, or success of the invention by putting it in practice, that is not such a sale or use as will deprive the inventor of his title. *

Tested by those rules, as the case must be, it is quite clear that the defense under consideration must be overruled, as there is no evidence in the record to show that the inventions, or either of them, were in public use or on sale more than two years before the inventor applied for a patent, or for any shorter period, with the consent and allowance of the patentee, or that he had any knowledge of any such sale or public use at the time it was made. *

Inventors have a right to employ all means necessary and proper to enable them to perfect their inventions and to reduce the same to practice, and it is clear that no such experimental act can justly be viewed as legitimate evidence to support the defense of a prior unauthorized public sale or use of the invention, or a use inconsistent with the right to apply for a patent to secure the exclusive authority to make and use the invention, and to vend it to others to be used, as provided in the patent act. *

As pleaded, the defense is that the inventor abandoned the invention to the public before he filed his application for a patent. His first application was filed on the 8th of March, 1853, and he filed the second application on the 18th of February, 1862, which it is conceded is substantially the same as the first one, which is still on file in the Patent Office. Evidence of an affirmative character to show that the inventor ever uttered a word or did an act signifying his intention to abandon his invention to the public before he filed his first application for a patent is entirely wanting, nor is there any circumstance introduced in evidence to support that theory, except the mere lapse of time from the discovery of the invention to the filing of the application, and it is settled law that the mere forbearance to apply for a patent during the progress of experiments, and until the party has perfected his invention and tested its value by actual practice, affords no just grounds for any such presumption.

Apply that rule to the present case, and it is clear that the proofs furnish no ground for such a presumption before his first application was improperly rejected by the Patent Office. Such an adverse decision operates as a great discouragement to an indigent inventor, as was strikingly illustrated in the case of the inventor of the improved mode of manufacturing wool, who, in consequence of such a decision, was kept out of the enjoyment of the fruits of his genius for forty years.

Abandonment or dedication of an invention to the public, being in the nature of a forfeiture of a right, is not favored in law, and Mr. Justice Nelson decided that such a defense could not be sustained, unless the acts of the party invoked for the purpose were corroborated by some declarations manifesting such an intention; but it is not necessary to apply that rule in this case, as the evidence fails to disclose either any act or declaration to support the theory. Argument to show that the inventor was entitled to a patent at the time his first application was rejected is unnecessary, as the proposition stands confessed by the Patent Office. Nothing beyond the decision of the Office reversing their former action would seem to be required to establish that proposition. * Truth was crushed for the moment, but, happily for the cause of justice, the reasons given for the erroneous decision remained on file, which enabled the Office, at a later period, to correct the error and to do justice to a meritorious inventor. *

Delays in the Patent Office, which an inventor cannot prevent, will not impair his title to his invention, nor can any use of the invention during such delays, if without his consent and allowance, afford any evidence to support the issue that the inventor abandoned the invention to the public. *

All must agree that he did not intend to dedicate it to the public, as his application for a patent was then pending in the Patent Office, and the evidence shows that he continued to press it, with confident hopes of success, until the adverse decision was announced. Nor does the record exhibit any evidence to show that the invention got into public use with the consent and allowance of the inventor, or through any negligence or improvidence on his part, as it appears that he visited the Patent Office as often as it was necessary, to ascertain whether the opinion of the Commissioner had undergone any change, and that he presented his second application for a patent as soon as he could obtain any hope of receiving a decision in his favor. *

[*Wm. Henry Clifford*, for complainants.
R. K. Sewall, Bradbury & Bradbury, A. A. Strout, for respondent.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From June 6 to June 11, 1873, inclusive.

CASTING ROLLS.—G. G. Lobdell, Wilmington, Del.
HYDRAULIC HOIST.—T. Stebins *et al.*, San Francisco, Cal.
ENGRAVING MACHINE, ETC.—H. D. Sedgwick, New York city.
GAS BURNER.—T. Clough, New York city.
IRON FURNACE.—G. E. Harding, New York city.
LOCOMOTIVE ENGINE.—H. Fairbanks, St. Johnsbury, Vt.
PRESERVING IRON.—W. H. Sterling, San Francisco, Cal.
RAISING COAL, ETC.—A. Lawton, Elizabeth, N. J., *et al.*
REFINER.—W. Neil, San Francisco, Cal.
REFRIGERATOR.—T. D. Kingan, Indianapolis, Ind.
ROLLING MILL.—W. Sellers, Philadelphia, Pa., *et. al.*
UMBRELLA FRAME, ETC.—A. and I. Herzberg, Philadelphia, Pa.
WASHING DISHES, ETC.—A. Fischer, New York city.

Recent American and Foreign Patents.

Improved Sewing Machine.

Lebbeus W. Lathrop, Philadelphia, Pa., assignor to Lathrop Combination Sewing Machine Company, of New York city.—This invention, which was fully described and illustrated in the SCIENTIFIC AMERICAN for October 26, 1872, relates to improvements in sewing machines, and it consists, first, in a combination of a rotary looper and an oscillating looper with a spool carrier and needle, the rotary looper being so constructed that the loop will not only be extended so that a commercial spool may be employed for introducing the locking thread to avoid the winding of bobbins for shuttles, now necessary in the common lock stitch machines, also much of the friction due to shuttle machines, but it is also so contrived that a chain stitch, also a combined lock and chain stitch, can be made. The second part of the invention consists in an adaptation of the revolving loop opener, and application of a shifting pin thereto, for so adjusting the loop, as it is opened for passing the locking thread spool through it, that a chain stitch will be formed by the upper thread, the lower thread being dispensed with; also so that a combined chain and lock stitch can be made, the lower thread being included. The third part of the invention consists in an arrangement of operating gear for working the loopers: also the feed, the revolving looper, together with the bulged palate for holding the discharged loop to avoid kinking. The fourth part of the invention consists in a construction of the metal case of the machine or cover for the working parts in sections, and jointing them together in such manner that by swinging the jointed parts the work below may be exposed readily at any time for inspection, oiling, and adjusting, while the plate on which the sewing is done remains stationary.

Improved Offal Drier.

Matthew Anderson, Chicago, Ill.—For drying and deodorizing the offal of packing houses rapidly and efficiently, it is proposed to have a jacketed cylinder, to be heated with steam, in which the offal will be inclosed, the said cylinder containing an agitator to stir the offal rapidly, and having air-pipes for discharging heated air throughout the mass at the same time. The air is heated in a coil surrounding the steam jacket, which connects with the shaft of the agitator, which is hollow, and conducts the air, which is to be forced in by a pump or blower, to perforated tubes on the agitating blades, from which it is distributed so as to circulate thoroughly through the substance to be dried, and then allowed to escape through a pipe to carry off the odor to a fire, if preferred, where it may be burned.

Improved Apparatus for Freezing Liquids.

Francesco Sajno, of Milan, Italy.—This invention is an improvement in the class of apparatus for freezing liquids wherein a horizontally arranged hollow rotating cylinder is employed. An outer cylinder is jacketed with a non-conducting material to protect the freezing mixture from the heat of the atmosphere. It has contracted ends, which are provided with screw caps, which close the openings so that the water of the freezing mixture will be held in the space below the joints as the cylinder is revolved, so that it cannot leak out. The inner cylinder, for holding the liquid to be frozen, is permanently attached to one end of the outer cylinder, so that the cap of that end opens and closes the passage to it only; also so that, in case the water rises as high in the outer cylinder as the joint, it cannot leak into the liquid to be frozen. Longitudinal plates divide the space between the cylinders into several compartments to confine the freezing mixture equally. A stationary rod in the axis of the inner cylinder has a scraper and kneader on it to scrape the frozen liquid off the surface where it freezes before the middle portion, and stir and knead the mass to facilitate the equal and uniform action. This rod can be removed with the cylinders when taken out o the bearings.

Improved Revolving Cotton Lint Room.

William T. Crenshaw, Burton, Texas.—This invention consists of a lint receiver of two or more compartments or rooms arranged so as to revolve on a vertical axis. Each compartment is provided with inlet passages for lint and doors for taking out the same, so arranged that while the inlet passage of one room is at the gin stand, where the lint will be delivered into it as it comes from the gin, the door of another room will be at the press, whereby the ginning and pressing may be carried on continuously without the hands being exposed to the dust.

Improved Axle and Axle Box for Vehicles.

Friederich Hunsinger, Morrisania, N. Y.—This invention consists in the improvement of axle boxes. Grooves or recesses are made in the bearing surface of the box, which operate as reservoirs for the lubricating material. The box is fitted to a collar, and a nut is so fitted to the axle that when turned up it makes a joint with the end of the box, and confines the oil or other lubricating material. The ends of the box will become worn after a while so that more or less of the material will escape, but the axle will still be lubricated from the material retained in the grooves and retarded by a shoulder or offset.

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