a sprocket wheel. This shaft occupies the center of the circle described by the bent rail. The sprocket wheel gears into the endless chain of tables beneath their working surfaces. If rotated, it causes them to travel around the circuit.

It is clear that, if columns were used to carry the semicircular elevated rail, the sprocket wheel would be interfered with. Accordingly this portion of the elevated track, as well as sections of straight track adjoining it, are suspended very ingeniously in the manner shown. A collar is fixed to the vertical shaft. A loose collar sets upon it, and to the loose collar a number of suspension rods are attached which extend diagonally downward and sustain the portions of the railway unsupported by columns. This leaves a free space for the sprocket wheel, and the suspension of the rail from the central shaft avoids the necessity of a more cumbrous system of suspension from the roof trusses or other upper works of the building. The suspension rods are re-enforced by radial pieces extending from a second loose collar at the level of the rail and by a species of U-shaped table that comes inside the rail. As the suspension and radial pieces could not be carried out to the line of the rail, the table is directly carried by them, and in its turn carries the rail.

On one side of the foundry is the moulding table, to be provided with mechanical moulding machinery. A conveyer trough runs from the room in the rear toward this table. A chain propelling scrapers through the trough is kept in motion. As fast as the trough is supplied with moulding sand it is carried to the vicinity of the moulding bench and discharged ready for use. A chain and bucket elevator is arranged in the rear room, which supplies the conveyer with the sand in question.

Adjoining the revolving chain of tables on the side opposite the moulding bench are the cupolas, where the metal is melted.

The operation of the apparatus is as follows: The moulders turn out quite rapidly the moulds by the aid of the machinery. As soon as finished the operator places the mould on one of the traveling tables, which are constantly moving behind him toward the cupolas. The mould is carried around the curve until it reaches the founders. They pour the metal into the mould as it passes. If necessary, the whole series of tables can be stopped for this process.

The mould, now filled with metal, goes on its way and enters the rear room. There it is thrown off the table and the casting is extricated from the sand. The sand is sifted in a revolving sifter, and is elevated to the conveyer, which returns it to the moulders.

It is obvious that snap flasks may be used to advantage on this apparatus, or that regular flasks may be employed. The machine lends itself to any of the ordinary modifications of foundry practice.

The chain includes 158 tables, and there is a single hold on each table for the tooth of the sprocket wheel.

The Acids of Fruits.

Mr. George W. Johnson, in his *Chemistry of the World*, says, in describing the "vegetable food of the world:"

"The grateful acid of the rhubarb leaf arises from the malic acid and bin-oxalate of potash which it contains; the acidity of the lemon, orange, and other species of the genus *Citrus* is caused by the abundance of citric acid which their juice contains; that of the cherry, plum, apple, and pear from the malic acid in their pulp; that of gooseberries and currants, black, red, and white, from a mixture of malic and citric acids; that of the grape from a mixture of malic and tartaric acids; that of the mango from citric acid and a very fugitive essential oil; that of the tamarind from a mixture of citric, malic, and tartaric acids; the flavor of asparagus from aspartic acid, found also in the root of the marshmallow; and that of the cucumber from a peculiar poisonous ingredient called fungin, which is found in all fungi, and is the cause of the cucumber being offensive to some stomachs. It will be observed that rhubarb is the only fruit which contains bin-oxalate of potash in conjunction with an acid. It is this ingredient which renders this fruit so wholesome at the early commencement of the summer, and this is one of the wise provisions of Nature for supplying a blood-purifier at a time when it is likely to be most needed.

"Beet root owes its nutritious quality to about 9 per cent of sugar which it contains, and its flavor to a peculiar substance containing nitrogen mixed with pectic acid. The carrot owes its fattening powers also to the sugar, and its flavor to a peculiar fatty oil; the horseradish derives its flavor and blistering power from a volatile acrid oil. The Jerusalem artichoke contains fourteen and a half per cent of sugar and three per cent of inulin (a variety of starch), besides gum and a peculiar substance to which its flavor is owing; and lastly, garlic, and the rest of the onion family, derive their peculiar odor from a yellowish, volatile, acrid oil; but they are nutritious from containing nearly half their weight of gummy and glutinous substances not yet clearly defined."

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PROPOSED AMENDMENTS TO THE PATENT LAWS.

Quite a number of bills have been introduced in Congress for the amendment of the patent laws, one of which (H. R. 9953) we will now briefly review.

The first section is to the effect that patents may be issued and will be valid, provided the invention is new and has not been patented or described in any printed publication before the invention or discovery thereof by the applicant.

The second section provides that no patent shall be issued for an invention already patented in a foreign country, unless the patent shall be applied for within two years from the date of the earliest foreign patent.

As the law now stands, an American patent may be granted at any time during the term of the foreign patent, provided the invention has not been in use for more than two years.

The second section also provides that the American patent issued as above shall run for 17 years from the date of the earliest foreign patent.

Under the present law the American patent expires when the earliest foreign patent expires. This is a good amendment and should be adopted. The third section provides that an inventor, after describing his invention in the specification, may use such language in stating his claims as he prefers.

We do not exactly perceive the object or value of this amendment. As the law now stands, the inventor may use such language as he prefers in presenting his claims. It is true, the examining officer, in many cases, objects to the wording of claims, and inventors are subjected to long delays in answering and overcoming these objections. If the object of the amendment is to compel the examiners to allow patents upon whatever claims the inventor chooses to present, the amendment should state so explicitly.

Such an amendment, if carried into effect, would make a sweeping change in the present practice of the office. It would render unnecessary the present cumbersome system of official examinations. It would give to every applicant a patent, and leave to the courts the settlement of the question whether the patent was valid or worthless. This is the way they deal with patents in nearly all other countries, and the plan works well.

It makes the inventor his own examiner, and if he chooses to take a patent for an old device, it is his own affair. It is the opinion of many that this is the best method, and sooner or later it must be adopted in our Patent Office.

Section 5 provides that all assignments, licenses, and conveyances of patents shall be void against any subsequent mortgagee or purchaser, unless recorded within three months from date.

By this provision a *bona fide* purchaser and actual possessor of a patent may be deprived of his property without compensation.

To accomplish this it is only necessary for the former owner to give a second deed to another party and place it on record, the first deed, perhaps through ignorance of the holder, oversight, or trick played upon him, having been kept away from record for three months.

This section needs amendment so as to prevent injustice to the first *bona fide* purchaser.

Section 6 provides that aliens, resident here a year and having declared intentions of citizenship, may file caveats. At present two years' residence is required.

Section 7 provides that when an application is made for a patent for an invention already patented, the Patent Office may, by the assent of both parties, decide the question of priority and grant a patent to the new applicant if he proves priority.

If the assent of both parties is not given, the Patent Office may take *ex parte* testimony from the applicant and give him a patent if he proves a date of invention earlier than the date of the filing of the application of the first patentee. A similar provision applies to rejected cases and competing applications. Whoever proves by *ex parte* testimony that his invention was made before the date of the filing of the application cited against him, is to receive a patent.

This section if adopted would put an end to a vast amount of litigation now carried on before the Patent Office, under the general designation of interference proceedings; it would turn over nearly all questions of priority to the courts, where they properly belong, and where, in fact, they now go for final settlement.

Section 8 provides for issuing certified copies of patents at a charge of twenty-five cents extra for the certification. Section 9 provides that in suits no damages or profits shall be recovered except for six years last preceding the bringing of such suit. This will be a help to infringers.

Section 10 provides for the recording in the Patent Office of all injunctions relating to patent infringements.

Section 11 authorizes U. S. courts to pass the title to a patent by decree, in the case of an insolvent or bankrupt; such decree to be recorded in the Patent Office.

Section 12 relates to infringements of design patents, and makes a verdict of infringement to be conclusive evidence that the profits made by the de-

fendant were due to the infringement. This seems unnecessarily severe and needs revision.

Section 13 provides for taxing patents ten dollars at the end of five years, and twenty-five dollars at the end of ten years. If for any reason the tax is not paid, the patent ceases.

One of the important differences between our patent law and those of other countries is that when a patent is given it holds good for the entire time without taxes or conditions of any kind. There is no need of any such taxation as that here proposed, and it is to be hoped Congress will not adopt it. Its only effect would be to deprive inventors or their families of their patents, who by oversight, inability, absence, or death, should neglect to pay the taxes. The inventor should be treated, every time, as a benefactor to his country, not as a criminal or wrong doer, requiring to be governed by special pains and penalties. This is the European method. Let us not introduce it here.

If the object of this section is to cut off and extinguish patents that certain persons consider to be good for nothing, if such extinguishment is desirable, then the proper and better way to effect it would be to provide by law that any holder of a patent who desires to surrender and cancel the same may do so, and shall, on making such surrender, receive back the sum of twenty dollars, being part of the government fees originally paid in. It would be better to repay something to the patentee, in order to cancel his patent, rather than oppress him with taxes after having given him the patent.

A COMMUNITY OF READERS.

The report of the City Library of Springfield, Mass., which has recently been issued, is extremely interesting, as it conveys a good idea of the reading habits of a representative New England community.

The population of Springfield is about 42,000, and the number of books in its free library is 72,485, which are classified as follows: History, 5,612; biography, 4,278; travels, 5,883; science and education, 5,585; theology and philosophy, 2,986; foreign literature, 2,781; fiction, 66,082; juveniles, 41,435; poetry, 2,380; law and politics, 914; fine arts, 524; language and general literature, 5,188.

The whole number of persons drawing books on May 1, 1890, was 11,317, which is an increase during the year of 1,203. As the number of persons drawing books is over one-quarter of the whole population, and as the books drawn are probably read by several members of the same family, this showing would seem to entitle the city of Springfield to be named as a community of readers.

The report shows that there has been a decided improvement in the kind of books read during the past year. The percentage of books of fiction called for was 49·1, which is less than any previous year in the history of the library. The total number of books given out was 143,648, which is a decrease from the showing of last year; but the statement is made that a larger proportion of the books drawn have been of a higher intellectual grade, and that such books are not exchanged as often, which accounts for the decrease. The causes which have led to these changes are given by the Rev. Dr. Rice, secretary of the library, as follows:

"Among them might be mentioned the development of the taste for the higher department of literature, which has resulted from the formation of classes for special study and the organization of clubs devoted to literary culture. The reading pursued by the pupils in our public schools, in connection with their school work, has been an influence in this direction, and has also led to the reading of a higher class of juvenile literature. But aside from these special causes, the result is in a large measure owing to the elevating influence upon readers by the opportunities which a valuable public library affords. The habit of reading is a great educator of the taste of those who read, and the best fiction is not only valuable in itself, but also develops a taste for other departments of literature."

The building occupied by the City Library was planned to accommodate from 75,000 to 80,000 volumes. It was opened in 1871, and then contained 25,000 volumes. Additions were made last year to the extent of 3,709 volumes, bringing the total wealth of the library up to 72,485 volumes, so that a larger building will be needed in the near future.

These are interesting facts, especially at the present time, when Mr. Andrew Carnegie's generous gifts of free libraries to Pittsburg and Allegheny are fresh in mind, and gifts of a similar nature are to be noted in several localities. These facts give additional force to the following statements, with which Mr. Rice closes his report:

"Certainly nothing can contribute more to the well-being of the city, even in regard to its material interests, than the continued development of its citizens in intelligence, in taste, in practical knowledge, in cultivated skill, and in power to apply to industrial pursuits the constantly increasing discoveries in science and art. No money brings so rich a return as that which is devoted to secure this development, and no instrumentality can be more effective to this end than a public library established on a broad and generous basis, supplemented by an art collection illustrating to some extent the industrial as well as the fine arts.

"John Jacob Astor was one of the merchant princes of New York, distinguished among his contemporaries for his sagacity and enterprise and for his large accumulations. Scarcely a generation has passed away since his death, and yet he is now best known as the founder of the library that bears his name. It is for this that in all time he will be remembered and honored. Who among our citizens will leave behind him such a memorial?"

Interesting Exhibits of Mineralogical and Geological Specimens at the Brooklyn Institute.

The annual reception of the departments of mineralogy and geology of the Brooklyn Institute occurred on June 5. There were several thousand exhibits of great merit, and the hall of the Institute was thronged with interested visitors until a late hour. Much credit was due the reception committee and the exhibitors for the arrangement of the tables and specimens, which enabled a large number of persons to examine the exhibits without confusion. It is obviously impossible for us to give the specimens more than a passing notice. We will mention them in the order in which they occur upon the programme, without attempting to arrange them in the order of their merit.

A general selection of minerals neatly mounted formed the exhibit of Mr. G. O. Simmons. The next in order was the exhibit of Mr. F. B. Jones, which consisted for the greater part in gems and cut stones. Messrs. H. W. Dresser, F. H. Johnson, F. Livingston, and J. Vogt had creditable exhibits of miscellaneous minerals. Minerals from Baltimore County, Md., were exhibited by Mr. A. H. Ehrman. Among these was a fine microscopic specimen of beaumonite on haydenite. Prof. H. Hensoldt displayed a large variety of meteorites, most of them etched to show their characteristic structure. Mr. J. Walker exhibited microscopic sections of Brooklyn minerals. Mr. T. B. Briggs showed graphic granite microscopically with polarized light; also a section of coal fossil, Sigillaria. Mr. L. Reiderer's exhibit consisted of microscopic specimens of aurichalcite. Mr. J. D. Mallonee's exhibit consisted of microscope, spherulitic chert shown by polarized light. Prof. D. S. Martin had an interesting exhibit of copper-bearing rocks of the Keeweenaw series, Lake Superior, carbon minerals, illustrating the stages of alteration from vegetable fiber through coals, etc., to graphite. Mr. E. A. Hutchins displayed emeralds, hiddenites, and rutiles from Alexander County, N. C. Several interesting specimens of corundum from North and South Carolina, Georgia, and from Siam and Ceylon; he also showed some fine opals.

Mr. A. A. Hopkins exhibited various copper ores, a set of models of the principal diamonds, objects cut from white and smoky quartz, and a variety of miscellaneous specimens of interest. Cut topaz from Spain and Saxony and agates from South America formed the excellent exhibit of Mr. G. W. Street. Mr. F. Braun exhibited a large number of specimens of minerals, rocks, and fossils found in Brooklyn. Mr. W. G. Rothe made a general exhibit of minerals. The exhibit of Mr. G. W. Mather consisted of a large variety of very interesting specimens, among which were stibnite from Japan; fossil ivory, which might readily be mistaken for coal; black cassiterites; pyrite crystals in the matrix; picrolite from Bergen Hill, N. J.; bayrite; natural bismuth from New South Wales; rhodochrosite; niccolite and arragonite from Saxony.

Mr. C. M. Skinner had a beautiful exhibit of gems and cut stones. A fine collection of miscellaneous minerals was exhibited by Mr. A. Chamberlain. Zeolites, etc., from Bergen Hill, N. J., formed the exhibit of Mr. F. Cato. Mr. G. F. Kunz's exhibit consisted mostly in meteorites; two large specimens were shown, one of meteoric iron, the other siderolite; he also exhibited fragments of meteorite that fell May 2, at 5:30 P. M., at Leland, Iowa. The great novelty in this exhibit was the cut meteoric stones.

Prof. W. G. Levison had a general selection of minerals, among which were a large specimen of star mica, crystallized native copper, and a specimen showing stratified sandstone and iron ore. A number of interesting specimens of minerals and fossils from the cabinet of the Institute were displayed on the platform. Dr. J. H. Hunt, president of the department of mineralogy, had a large and well selected series of exhibits consisting of silica, quartz, opal, chalcedony, jasper, silicified wood, and a large number of pseudomorphs.

Dr. A. J. Watts had a very interesting exhibit consisting of sylvanite. Graphic tellurium. A telluride of gold and silver. Smugglers' mine, Cali. Amalgam; a natural crystal of silver, mercury and gold from Moschell, Landsberg, Palatinate, Germany. Lace gold, California. Gold (crystallized). Plumas Co., Cal. Wire gold (Rave), Plumas Co., Cal. Lace gold from Australia. Native gold, Vorospatak, Transylvania; an artificial preparation of gold crystals, and many others.

Mr. G. E. Ashby's exhibit consisted of flos ferri on limonite from Colorado, limonite and siderite from Colorado, chaleotrichute exhibited microscopically. Mr. J. W. Freekelton showed a superb specimen of limonite from Salisbury, Conn., phrenite from Paterson N. J., and section of stalactites from Luray, Va. Proustite, ruby silver ore and limestone with polished surface presenting arborescent forms constituted the exhibit of Dr. R. C. Moffat. Prof. L. B. Hannaford showed a good general selection of minerals. Mr. W. G. Bowdoin displayed some interesting fossils from the coal measures of Pennsylvania, bird track from Massachusetts. A quite extensive and very interesting set of fossils, shells, univalve and bivalve, crinoids, corals, trilobites, etc., ranging from the oldest fossiliferous period, the Silurian, and following through the Devonian, Carboniferous, Cretaceous, and Pliocene periods, and typical of these several geological ages, was exhibited by Professor J. Mickleborough. Professor F. W. Hooper's share of the exhibit consisted of a general collection in lithology. Dr. S. E. Stiles showed microscopic specimens consisting of conochalcite and vanadinite. Dr. L. E. Meeker exhibited a number of fossils, among which were a tree stump from Nova Scotia, bark and ferns from coal measures, fish from Wyoming, palm from Colorado, and fossils from Vancouver's Island.

Fossils, consisting of paradoxides from Newfoundland; phacops-rana, Hamilton group, Moravia, N. Y.; calymene niagerensi, Niagara group, Grafton, Ill., formed the exhibit of Dr. R. P. Stevens. Mr. R. D. Dodge had a general selection of minerals. Miss Alice Dinsmore exhibited fossils from Illinois coal fields and miscellaneous minerals. Miss A. A. Douglass displayed fossil plants from the coal measures. Mr. G. D. Hiscox, besides showing various interesting specimens of minerals and fossils, exhibited a fine specimen of a new brecciated marble from Manchester, N. H.

The officers of the department of mineralogy are as follows: president, Dr. Joseph H. Hunt; vice-president, G. M. Mather; secretary, J. W. Freckelton; treasurer, W. G. Rothe.

The officers of the department of geology are: president, Professor D. G. Eaton; vice-president, Dr. R. W. Raymond; secretary, William G. Bowdoin; treasurer, W. F. Sebert; curator, Frederick Braun.

Utilizing Waste Material.

We often speak about the triumphs of invention, and mean thereby the conquest which science and mechanism are constantly making over the forces of nature. And it is indeed wonderful how many of nature's raw materials enter into the manufacture of articles used to satisfy man's daily needs and comforts. But the wonders of production are not confined alone to minerals dug from the earth's bosom, or to the organic life which flourishes upon its surface. On the contrary, man's inventive skill has perfected the art of utilizing waste materials, so that the residue of former arts furnishes the substance upon which new workers expend their labor. Illustrations of this do not have to be sought alone in stores for second hand clothes and furniture, but rather where new and costly commodities are bought and sold. It is necessary to specify only a few representative manufactures where the raw materials are waste products to see the extent to which they are carried on. For instance, millions of bushels of cotton seed have been thrown away in the various States of the South. But now it is utilized in the manufacture of oleaginous products, and promises to be the chief source of many kinds of oils. The slag of furnaces for many years was dumped into ravines and piled upon vacant fields until it had accumulated in vast quantities, but now it is being mined again, resmelted in some instances, made into asbestos or used in ballasting roads. Paper is made mostly from waste materials, and it enters into the composition of a thousand things, from a cigarette wrapper to a car wheel. Blood is manufactured into door knobs, shutters and doors are made from wood pulp, sawdust is a most useful article, dust and dirt are transformed into multitudinous building materials, while the waste products of the gas house are more valuable, if possible, than the original substance. It was formerly supposed that clay was useful only for embankments, for making bricks or pottery. But now a most useful and beautiful metal is extracted therefrom, and clay banks, rich in aluminum, will soon be as valuable as iron mines. And so the catalogue might be extended indefinitely, but this is sufficient to show the variety of uses to which waste products are put. It also shows, adds the *Baltimore Herald*, a tendency to economy in manufacture, which is one of the hopeful signs of the times.

GUM ghatti, being the subject of a paper by C. F. Henry, is said by him to produce a mucilage of bland and not unpleasant flavor. Only 75 per cent of the gum is soluble in water, even with a boiling temperature The residue increases considerably in bulk, however. A 1:3 mucilage is of greater density than a B. P. mucilage of gum arabic, and possesses much greater adhesive properties. As regards cost, an ounce of ghatti gum produces about twice as much mucilage as a similar amount of acacia and at one-twelfth its cost.