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THE PATENT OFFICE THE FRIEND OF THE INVENTOR.

In the recent case of Donovan, on appeal, the Hon. Benson J. Hall, Commissioner of Patents, laid down the following excellent doctrine:

"The rules of the office, particularly rules 68 and 139, point out that at all times in the investigation of an application, and in the progress of appeals, it is the duty of each tribunal having jurisdiction of the case to see to it that the inventor shall secure a patent for whatever patentable matter may be shown in his application. As has been frequently stated by me in decisions, the office must put itself in the attitude of a friend, and not of a litigant with the applicant, and see that he secures every right that belongs to him. Not only is this true of the rules cited, but Congress has seen proper to take especial pains to provide that whenever an applicant, in consequence of any inadvertence or mistake in the framing of his specification or claim, has failed to secure that to which he is entitled, or his patent is inoperative or invalid either by reason of having claimed too much or too little, he may have the proper correction made by a reissue, which will secure him the precise invention to which he is entitled.

"Now, unquestionably, if under rules 68 and 139 it is the duty of the Examiners-in-Chief and the Commissioner to suggest and recommend, in order that an applicant may receive letters patent for subject matter not involved in the appeal, it must be the duty of the Primary Examiner in the examination of the case made by him to point out and recommend the same thing. I do not mean by this that it is the duty of the Examiner to become an agent or an attorney for the applicant; but I think in all cases when he is satisfied or believes that the application contains patentable matter which is not claimed, but which he has reason to believe the applicant is seeking to cover, it is his duty to advise the applicant briefly and specifically, precisely as the Examiners-in-Chief and the Commissioner are authorized to do, as above stated. By acting upon this principle, all of the tribunals of the office become friendly to the applicant, and enable him to clearly see and understand the views of the office as to the nature and patentability of the invention described. Such practice would undoubtedly tend to lessen the correspondence and conflicts which arise between applicants or their counsel and the office."

LAUNCH OF A NEW TYPE OF FERRY BOAT.

On Thursday, October 25, a double-ended propeller, designed for service on the Hoboken and New York ferries, was launched at the ship yards of Thos. C. Marvel & Co., Newburg, N. Y. While not in all respects a novelty, the boat marks a distinctly new departure in naval engineering. Hitherto all the ferry boats in these waters have been driven by side wheels. These lend themselves very perfectly to double-ender propulsion, it being practically immaterial as regards the perfection of their action whether they drive the boat in one direction or the other.

In the new boat the motive power of the screw has been adopted, and has been applied to the same type of vessel. A shaft is carried the entire length of the hull, emerging at each end. To each of the ends a screw, both of identical pitch and diameter, is secured. In advance of each screw a rudder is placed, provided with the usual pin for holding it fixed when made to constitute the bow end of the boat. As seen from the outside, each end of the vessel appears precisely like the stern of an ordinary propeller.

A single engine is provided to drive the screws. Both, therefore, have to rotate together and at exactly the same speed. They propel the boat by the pulling action of the leading wheel and the pushing action of the rear one.

By their use several important results are achieved. The most obvious ones relate to the increased deck room. Her engines will be entirely under deck, a space of two feet intervening between their highest parts and the deck planks. The smoke stack is to be elliptical in section, to save width. On account of these features of construction, the central deck house will be two feet narrower than the usual ones and about two-thirds of their length. The cabins will be unobstructed by the paddle boxes. The narrow gangway leading fore and aft will be disposed of, and the area will be clear of encumbrance from front to rear. These changes, it is calculated, will give an increase of capacity of twenty per cent for trucks and carriages and thirty-five per cent for passengers.

It has been found by experience that a tug boat can cope quite effectually with the ice that packs in the ferry slips, and one has often been used for the purpose of clearing them of ice. The new boat will, it is anticipated, prove most effectual in this regard. Paddle wheels can only drive ice about twenty feet, but screws are far more effectual. As the new vessel enters a slip, her forward screw will start currents of water that will carry the ice past her sides, to be driven out into the river by her after screw.

This is not the first boat of her class, if the term is broadly interpreted. A single ended boat, with bow and stern screw, has been recently put in use at Detroit. It works, however, on a different principle from

that of the new ferry boat. The Detroit vessel's after wheel is larger than the forward wheel, and each is driven by independent engines. Normally both are turned in the same direction. When ice is encountered the forward wheel is reversed, and the vessel is propelled by the differential action of the larger and small wheels. The smaller forward wheel forces currents of water out from the bow that clear the ice so effectually that the boat can go steadily through a field of considerable thickness. Double-screwed boats, with independent engines for forward and after screws, have also been used on the Mississippi. These were not double-enders. They were found to injure the levees, and were finally discarded from regular service, and were used to clear the channels in the carrying out of Col. Eads' successful project.

Thus the new vessel is of distinct type. As seen on the ways, her model was characterized by fine lines, her ends being very sharp, giving good entrance and run. She is two hundred feet long, sixty-two feet over the guards, thirty-two feet width of hull, seventeen feet deep, and will draw from nine and a half to ten feet of water. She is of steel throughout. She is to have two tubular boilers, eight feet diameter by twenty-three feet long, to work at 160 lb. pressure. Her engine is of twenty-four inch stroke, triple expansion, with eighteen and one-half, twenty-seven, and forty-two inch cylinders. The shaft varies from 8 1/4 to 8 3/4 inches. The screws are of eight feet diameter and nine and one quarter feet pitch. They are alike on both faces, so as to cut both ways with equal efficiency. She was christened the Bergen.

Col. E. A. Stevens and Capt. C. W. Woolsey, of the Hoboken Land and Improvement Company, were the originators of the idea, and anticipate a better winter service from the Bergen than any vessel now afloat can render. Our thanks are due to them for their courtesy in giving us all the information attainable about their new and yet unfinished vessel.

A Saratoga Spring over 3,000 Feet Deep.

A dispatch from Saratoga says: A company has purchased the Seltzer Spring and will utilize its waters for the purpose of liberating and storing, in liquid form, the carbonic acid gas with which it abounds. To do this, extensive arrangements are being made upon a large amount of invested capital. The establishing of the plant is under the supervision of Mr. Oscar Brunler, a German expert.

This Seltzer Spring, located on Spring Avenue, was developed by Dr. Haskins less than three years ago. The drill was put down to the depth of 500 feet. At this depth an abundant supply of water was found flowing from a crevice in the rock bottom. A few days ago, to assure himself of the depth of the spring, Mr. Brunler sounded it with a line and plummet; but instead of resting at 500, the weight sank the whole length of the line, 900 feet. Other soundings have since been made, the weight used being a piece of inch gas pipe filled with lead and weighing thirty-four pounds, until a depth of 3,300 feet has been reached, and yet without touching bottom or any obstacle. No further soundings will be made until instruments expressly designed for the purpose can be procured.

Prof. Brunler admits it as possible that the line and weight could have been carried away by some powerful current, but he holds to his original belief in the existence of a subterranean sea of greater or less extent, and that there is undoubtedly some connection between it and the water of the ocean. In other words, that Saratoga is over a vast water-filled cavern, the roof of which is about 500 feet thick. He also thinks it probable that at a given depth and temperature carbonic acid gas may be found in a liquid form. The specific gravity of the liquid gas is about nine degrees lighter than water, which would readily cause the water to climb 300 feet above the ocean level. Should the existence of a subterranean sea be established, it would put to flight many theories and scientific speculations as to the source and course of the many mineral springs here.

Causes of Fire.

In regard to spontaneous combustion, the fires of the year in Boston have furnished some new observations of considerable importance. In one case, says the American Architect, a quantity of feather dust in a bedding manufactory took fire without apparent reason. It was found, however, that a piece of thick glass had been lying on the feathers, and the sun's rays, concentrated in some way by the glass, had set fire to them, although the day was a cold one in the month of March. In another case, a number of tarpaulin hats were lying, packed together, in a window. The high temperature, with, perhaps, the close packing of the hats, caused them to burst into a blaze. Two other fires were caused by putting paraffine paper, such as candy is wrapped in, into a refuse barrel which contained a little sawdust; and a third, which destroyed twenty thousand dollars' worth of property, was occasioned by putting greasy paper, which had been used to wrap lunches in, into a wooden refuse barrel, which contained some sawdust and sweepings.

**Premiums or Gifts with Sales.**

G. was convicted of selling food and giving away, as part of the transaction, a premium, in violation of the statute (Sec. 335 a, New York Penal Code) which provides a penalty against "any person who shall sell, exchange, or dispose of any article of food, or offer or attempt to do so, upon any representation, advertisement, notice, or inducement that anything other than what is specifically stated to be the subject of the sale or exchange is or is to be delivered or received, or in any way connected with or a part of the transaction, as a gift, prize, premium, or reward to the purchaser." In this case—*People vs. Gillson*—on appeal, the Court of Appeals of New York reversed the judgment. Judge Peckham, in the opinion, said:

"Here the offense, as set out in the warrant, was the delivery of a tea cup and saucer by the Great Atlantic and Pacific Tea Company to one A., on a purchase by him of two pounds of coffee from it, the company having announced or advertised that such a gift would be made to a purchaser of two pounds of coffee. The defendant contends that the statute is void, as it interferes with his 'liberty' as secured to him by the constitution. 'Liberty,' in its broad sense, as understood in this country, means the right not only of freedom from servitude, imprisonment, or restraint, but the right of one to use his faculties in all lawful ways, to live and work where he will, to earn his livelihood in any lawful calling, and to pursue any lawful trade or avocation. It is quite clear that some or all of these fundamental and valuable rights are invaded, weakened, limited, or destroyed by the legislation under consideration. It is, evidently, of that kind which has been so frequent of late—a kind which is meant to protect some class in the community against the fair, free, and full competition of some other class, the members of the former class thinking it impossible to hold their own against such competition, and, therefore, flying to the legislature to secure some enactment which shall operate favorably to them, or unfavorably to their competitors, in the commercial, agricultural, manufacturing, or producing fields.

"By the provisions of this act a man owning articles of food which he wishes to sell or dispose of is limited in his powers of sale and disposition. It is lawful to sell coffee, and the defendant here may be satisfied to take a less profit upon a single sale by making the gift, because he can thereby increase his sales and have a greater income by reason of a greater business at the end of the year. This statute, if valid, steps in to prevent his adopting such a course to procure trade, and from it to secure an income and livelihood for himself and his family. It is contended here that the statute should be upheld on the ground that its enactment is a proper exercise of the police power of the State:

"1. Because the transaction is in the nature of a lottery, indeed, the statute is placed in the penal code under the head of 'lotteries.' 2. That the sale of impure, unwholesome, and adulterated food is thereby hindered. We are of opinion, however, that the words of the statute cannot be construed to have been intended to defeat a lottery or to declare that the sale of bad food would thereby be interfered with. The conviction must be reversed, and the defendant discharged. All of my associates concur in this judgment."

**Completion of Another Line of Railway between the United States and the City of Mexico.**

At 5:45 P.M., on Saturday, September 29, the last spike was driven on the main line of the Mexican National Railway, thus completing the line of track, 825 miles, between this city and Laredo, Texas. It is stated that, in less than a year, 800 kilometers of line have been built. Much of course remains to be done to prepare the line for regular traffic, but it is believed that the road will be open for business between the 15th of the present month and the 1st of November next. The completion of the road, which was formerly generally known as the "Palmer-Sullivan" line, has been delayed four years after the completion of its rival, the Central, owing to financial troubles. The work of the present year has been to build the missing part of the main line, 352 miles, between Saltillo and San Miguel de Allende, in the State of Guanajuato. Under a reorganization of the company, English capital was brought into the enterprise, and an effort made to get the road, so far as possible, under control of the English party in the company. There has been a general rearrangement of the official staff, and the English party keep a close eye on the finances of the company. The present company took possession in July, 1887, and work began on the main line at the northern end in October, and on the southern end in December. Since that time construction has gone on actively, subject to inspection on the part of engineers appointed to oversee the work in the interest of the English bondholders; and a special report on the construction work has been prepared by Mr. Robert Moore, vice-president of the American Society of Civil Engineers, which has created some controversy, owing to its severe criticism of methods, etc.

The new line going south from Laredo crosses the northeast corner of the State of Coahuila, the western

part of Nuevo Leon, the southeast corner of Coahuila, the center of San Luis Potosi, the center of Guanajuato, the northeast corner of Michoacan, and the northern part of the State of Mexico. The ascent from the Rio Grande to the table land occurs principally between Monterey and Saltillo, the latter place having an elevation of 5,240 and San Luis Potosi of 6,090 feet.

By an unfortunate accident, the train coming down from San Luis Potosi recently, bringing a party who had witnessed the driving of the last spike, was thrown from the track at Zirizicuaro in the State of Michoacan, but, luckily, no person was injured, with the exception of a brakeman.

The connection of San Luis Potosi and Monterey with this capital by rail, and the opening of mining regions formerly inaccessible, like the Catorce district, is certain to have an important effect on the commerce of the country. It is understood that the management intends to make especial efforts to secure a large share of the tourist traffic the coming winter and spring, and there is talk of a reduction in rates between the United States and this city, *via* this line. —*Mexican Financier*.

**Small Caliber Projectiles.**

The *Horse Guards Gazette* says: "At 1,070 yards the percentage of hits was very much in favor of the rifles, and something more than an accident to the gun's training gear is necessary to account for the small number of hits recorded for it. An explanation will, probably, be found in the fact that correction of range is a much more difficult operation in the case of artillery—and a machine gun must for scientific purposes be so classed—than for infantry. It requires long training of a special kind, in which only artillery officers are at present proficient, and the gun in this case was manipulated by an infantry lieutenant. Whatever may have been the cause of comparative inaccuracy at the first stage was speedily corrected afterward, until at the extreme distance there was a difference of 63 60, as against 43 88 per cent of hits in favor of the gun. At this range, however, only 250 rounds were got off from the mitrailleuse, while the rifles fired 335, so that either rapidity would seem to have been sacrificed for the sake of accuracy or smoke must have hung longer in front of the gunner than it did before the riflemen. As to the necessity for special training on the part of any person who handles the Maxim gun, there is emphatic evidence in the report furnished by Major Meehan, the District Inspector of Musketry, who also lays stress on the importance of a smokeless powder for such weapons. Especially in the defense of positions he adds valuable testimony; but, on the other hand, he apparently agrees with a view often expressed by us that no kind of machine gun can ever supersede or even lessen the utility of infantry fire. It is a splendid auxiliary weapon, but nothing more, and the sooner we adopt a system of tactics based on that supposition the better.

"The most conclusive evidence against rifles of small caliber is furnished by an officer who watched the effect produced at the butts. Lieutenant Addington reports that at 1,900 yards the bullets from the rifle fell with little energy as compared with those from the gun (M. H. ammunition). Many of the bullets picked up were almost perfect in shape. The wind carried whole volleys clear of the position. This is a very serious objection, and one that seems to have been quite overlooked by advocates of the small bore. The force of gravity tells when that of powder is beginning to be exhausted, and the energy with which a bullet falls is its own weight multiplied by the square of the distance, and plus what remains of the initial velocity. This weight of metal must be of great importance at long ranges, and for machine guns, therefore, light projectiles would be obviously undesirable; but difference of ammunition is a still more serious drawback, and in view of this fact tacticians will probably hold that we have been somewhat premature in yielding so readily to the craze for small caliber."

**Meteorological Notes.**

The Canadian *Weather Review* records a fall of 2.02 inches of rain in 2½ hours at Richmond, Province of Quebec, on June 14. It is the heaviest rainfall ever recorded there. The 6th of June was a day of many thunderstorms. At Minden large pieces of ice fell, stripping forest trees.

The United States *Monthly Weather Review* publishes monthly now a list of heavy rainfalls within its territory for the month. It is of very great interest, and we hope to have something farther to say about it when the year is completed.

The same journal contains monthly much valuable matter in the form of long time records of meteorological elements. For instance, the issue for May gives the annual mean temperatures at Philadelphia for 110 years, and the coldest days at Thompson, Conn., for 100 years.

*Appropos* of a change of climate in the West, we take the following extract from J. B. Harrison's "The Latest Studies on Indian Reservations." Mr. Harrison

says: "It is evident that in all that region the earlier unfavorable estimates of the agricultural capabilities of the Indian country have been considerably modified. The tendency now is toward extremely sanguine judgments and expectations. The white people say that the rainfall has increased to a surprising extent, and they are confident that during the next few years it will increase in still greater proportions."

The newspaper reporters often use glowing language concerning the great phenomena of meteorology, such as tornadoes, blizzards, and thunderstorms; but the following is the first of the sort which we have seen in which the thermometer is misused. We clip it from the *Downington Review*, as we have not the pleasure of exchanging with the paper in question: "The advent of summer in the South is described by an editor in appropriately glowing language: 'The mercury, like a cringing sycophant, quick to do homage to the coming queen, bounded up toward the nineties, and the glowing sunshine showered upon the woods and fields and sweltering mortals like wavering sprays of molten gold.'"

One of the interesting features of the approaching French exhibition is to be a model of the earth, made on the scale of one-millionth. It is to be accurately constructed, and will rotate on its axis. Even on this scale it will be an enormous object, nearly 21 feet in diameter.

Major Powell, head of the National Geological Survey, lays down the proposition that "the cutting power of a stream increases rapidly with the increase of sedimentary load." It is a text from which many sermons might be preached, and Major Powell has preached one in applying the principle to the control of the lower Mississippi River.

The activity of Lieutenant Finley must be very great, and is effective in results. We have on our table a new publication on tornadoes by him, which we will notice more fully at another time. And now we are in receipt of a circular advising the public of the publication of a set of 15 storm track charts for the North Atlantic Ocean. A resolution before the House of Representatives recommends their publication for public distribution.

Important publications for seismologists are the two lists of earthquakes in Mexico and California. The former runs through several numbers of the *Memorias de la Sociedad Científica "Antonio Alzate,"* of Mexico, and is edited by Don Juan Orozco y Berra. It begins with Aztec records in 1460, and includes many hundred earthquakes, in some cases in much detail. It ends at the current year. The difficulties of deciphering the Aztec records are unknown to us, but we have noticed in the year 1507, when an earthquake is said to have accompanied an eclipse of the sun, no such eclipse could have been visible in Mexico. The nearest one we can find is in 1496. The California list is by Dr. Holden, director of the Lick Observatory. The territory covered includes also Lower California, Oregon, and Washington Territory, and the list is published by the State. This list begins in 1769. It includes many hundreds of earthquakes, of which, however, only twenty-four have been serious since 1800. Dr. Holden makes some interesting studies of their relations to the seasons, etc. It seems that earthquake records make part of the regular work of the Lick Observatory.—*American Meteorological Journal*.

**A Barrel of Flour Made into Bread.**

The *American Analyst* thus sums a baker's profits, or what a barrel of flour is worth when made into bread. A baker will toss a barrel of flour into a trough. Then he tosses 104 pounds of water on top. A quantity of yeast is added, and then the jolly baker has 300 pounds of dough to operate on. The 300 pounds cost him \$5. In short order the dough is turned into "twists," high loaves, pan loaves, and other styles of the same quality. The oven's heat reduces the 300 pounds of dough to 260 pounds of bread. The baker sells his bread at the rate of four cents a pound, or at an advance of over 30 per cent over what it cost him. There are 1,400 bakers, great and small, in this city, and to them is committed the trust of supplying bread for 1,300,000 persons. There are many bakers in this city who make 1,300 loaves of bread per day and sell it for from \$80 to \$150, or at a net profit of \$40. Little money is lost in the business, and most bakers do a cash trade. It is very seldom that bakers fail. The business is steady, reliable, and attended by a very few risks, unless incompetent workmen.

**A Toad in Solid Coal.**

The correspondent of the *Colliery Guardian* reports a case which, if true, must be interesting to geologists. In the Coleford district of the Forest of Dean a small colliery has recently been opened, and while a collier was engaged in breaking up a fall of block coal, he found a toad in the center. It seemed firmly embedded in the coal, and it was alive. Its form was imprinted upon the face of the mineral, and the animal is still living. The incident has occasioned much interest in the neighborhood.