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THE ILLUMINATING POWER OF ARC LAMPS.

Within the last year some discussion has arisen concerning the true candle power of arc lamps. In the majority of contracts for street lighting entered into with electric light companies, the contract specifies 2,000 candle power lamps. For many years it has been understood that the lamps seen lighted upon the streets purported to be of this power. But it has been equally obvious to those who were at all experienced in photometry that they did not give anything like such a light. Their actual candle power is slightly in excess of one-third the nominal amount. The stated candle power has no more direct reference to their actual than the nominal horse power of a boiler has to its real capacity.

The subject was recently treated in a report by a well known scientist, who took the ground that, in stating electric illuminating power, two thousand nominal was to be taken as a synonym for about eight hundred actual candle power. Although this seems a rather broad generalization, it expresses the true state of affairs pretty accurately. The arc lamps are always greatly overrated.

As for the cause of the discrepancy, some engineers were uncharitable enough to ascribe it to a new system of stating the observed results. If a lamp were photometered in four directions at once, as on the cross photometer, and the results added together, then it was claimed the fictitious result given to the public would result. This would indicate a statement of a candle power four times greater than the real.

One of the leading authorities on the subject of electric lighting has recently assigned a cause for the anomaly. At the present time the ends of the carbons in arc lamps are maintained opposite to each other, and the two carbons are kept accurately in line. Hence an equal or nearly equal light is given in all directions. The first use of the arc lamp was for purposes of projection. For this purpose the carbons were kept slightly out of line with each other, so as to concentrate the light in a determined direction. The crater formed in the lower carbon faced in one direction, and in that line most of the light was emitted. At the back of the lamp the light was far less. If the same carbons were placed in alignment, a more even distribution of light would result, but it would be far less, in the ratio of 2/83 to 1, than it was in the former arrangement in the most favorable point. Thus a lamp which, with the old arrangement of carbons, would project a light of 2,000 candles in one direction, with the same carbons aligned would only give 2,000/83, or a little over seven hundred candles. The old type of lamps were photometered in the most favorable direction.

It would seem advisable that the nominal method should be changed, and that new contracts should specify lamps of so many actual candle power. This would put the whole question of supply upon a basis of fact, and would benefit both the electric light companies and the consumers who use arc lamps.

A NEWLY PATENTED MODE OF PRESERVING LIVE FISH.

An interesting and curious invention has been lately patented, which bids fair to be useful and important in the transportation of live fish. It was discovered by Mr. Walter G. Murphy, of New York City, the patentee, that fish could be kept alive for some considerable time without change of air or water by placing them in a receptacle partly filled with water, and hermetically sealing the same. To test the invention, experiments were carried on, some of them by the favor of Professor Blackford, of the New York Fish Commission, at Fulton Market, New York City. In order to make the test as thorough as possible, young fish and fish as delicate as could be obtained were used. These were striped bass. The latter to the number of about two dozen were placed in a glass jar, filled nearly to the top with water, and the jar was hermetically sealed. The fish were kept for several weeks in the jar without opening it, and did not appreciably suffer. Upon opening the jar and placing them in fresh water, they appeared as lively and well as before being placed in the jar. Another similar experiment being made, it was found after several weeks' confinement, the time being extended beyond that of the former experiment, that the deep black lines in the bass began to fade and disappear and a white fungus made its appearance on the fish, which was speedily followed by their death. Experiment with the jar wholly filled with water showed that the fish quickly died. Another experiment with the fish as in the first mentioned case was made, and a second jar the same as the first, with a like number of fish, and similarly filled with water, was placed beside the sealed jar. The second jar was left uncovered and the water was unchanged. The fish in the closed jar were apparently as well as ever at the end of three weeks. The fish in the open jar all died within forty-eight hours. While changes of temperature were known to be a serious question as affecting the conditions of keeping fish alive, and while the changes of heat and cold, to which the jar and contents were unavoidably sub-

jected, could not be well regulated, yet the fish in the closed jar were not affected thereby. Experiments were also tried in which the air in the jar containing the water and fish was compressed, and it was found that the fish were benefited thereby. It would appear from the above mentioned experiments that grown fish and hardy fish could be transported from one distant locality to another with little trouble and expense, and that in the case of deep-sea fish compression of the air would aid in effecting the result. The advantage to sportsmen in carrying live bait would seem to be great, and the value to the U. S. Fish Commission to be inestimable almost, in view of the great expense now incurred in building special cars and apparatus to transport and keep fish alive. The scientific reason for the result of this invention has not been explained. The late Professor Baird, of the United States Fish Commission, when the invention was brought to his attention, suggested that by reason of hermetically sealing the jar, water did not undergo the rapid change that took place when the jar was left open, and which bred a parasite which destroyed the fish. Whatever be the reason, it would seem that the invention was one of great benefit and value, and that while the fish so treated will eventually die if not taken out after a certain time, yet practically, for the purpose of transporting fish alive, the result attained is a complete success.

SURVEY OF THE ROUTE FOR THE NICARAGUA CANAL.

On Wednesday, November 30, the steamer Hondo sailed for Greytown, Nicaragua, carrying with her a party of engineers who are to make the surveys for the Nicaragua canal. They were accompanied down the bay by an excursion steamer, carrying many well-known representatives of the two countries.

In 1884 an attempt was made to negotiate a treaty with the United States government for the construction of the canal, but it fell through. The Nicaraguan government then opened negotiations with Mr. A. G. Menocal as representative of the Nicaragua Canal Association of New York. The result of the negotiations was the formation of a contract between the two parties. Nicaragua confers upon the canal association the exclusive right of way and other privileges. In addition to these concessions, the present contract required on the part of the American company the fulfillment of certain pecuniary obligations within sixty days of its signing. This placed the contract at once on a business basis. The obligations were duly met, and the present company of engineers are to execute the first field work and perform the final survey.

The chief engineer of the company is Mr. A. G. Menocal, Civil Engineer, U. S. A. The party that sailed on the Hondo is under command of Mr. R. E. Peary, C. E., the chief assistant. It includes eighteen engineers and an equal number of assistants and a surgeon. The party are to locate the route definitely, and it is expected that they will execute the final surveys. A large body of workmen are to accompany them.

The country has already been pretty thoroughly explored by the officers of the U. S. navy. Based upon the knowledge already possessed, a long letter of instructions was prepared for the guidance of the survey. Two general plans are to be examined. Both are identical for the greater part of the route, utilizing the Lake of Nicaragua and San Juan River. The divergence occurs between the lake and the northern shore. Both routes follow the San Juan River until within about fifty miles of the coast. From this point one route goes in a nearly straight line to Greytown, while the other diverging follows a line about eleven miles greater in length. The short or so-called upper route will be awarded the preference in the surveys, although the capabilities of both will be determined.

The production of a good harbor at Greytown is considered one of the most important engineering works in connection with the enterprise. On reaching Nicaragua, a hydrographic survey is to be at once commenced, to determine the capabilities of the harbor and the best way of dealing with the sand bars. Owing to the tides, to wave action, and possibly to river sediment, the harbor has of late years become much deteriorated. The principal cause is considered to be the transportation of sand from east to west by the waves striking the coast obliquely. To determine the extent of the deposits made in a given time, two hydrographic surveys are to be executed, one at the beginning and the other at the end of operations. The changes in the bottom in the interval will disclose the amount of drift and deposit in a given time. A southward littoral current has been reported, and this is to be carefully investigated, to ascertain if it cannot be utilized as a factor in preserving the harbor. The San Juan River is to be gauged, and the inner harbor is to be sounded. All these data will indicate the amount of dredging to be done and the general system of jetties or breakwaters that may be needed to secure an available harbor on the Atlantic side.

The land surveying parties, in five divisions, are to carefully survey the ground and determine the axis of the canal. Then an exact survey of the canal line, including cross sections, level points, location of slope

lines, etc., is to be completed. This is designed, as far as possible, to give a correct idea of the amount of excavation required.

The examination and survey of the port of Brito, on the Pacific coast, is also provided for, and is to be performed toward the end of the season's work.

A dispute as to the boundary line between Costa Rica and Nicaragua is now in the hands of President Cleveland for arbitration. This affects the canal quite seriously, as Costa Rica claims some rights in territory through which the canal, near its northern end, would normally pass. Recognizing the importance of having its whole length included within the one republic, a third deviation, bringing it all within the undisputed territory of Nicaragua, is to be one object of survey. This third route very probably will not be used, but it is to be located so as to provide for any contingency that may arise, owing to the international dispute.

The total length by the shorter line is calculated at 169.8 miles. Lake Nicaragua is the summit level, and is 110 feet above tide water. On each side of the lake a number of locks will be required to overcome this difference. The canal is to vary in bottom width from 80 to 120 feet, and in upper width from 80 to 288 feet. Its depth is to vary from 28 to 30 feet. Of the route, 120 miles are included in the river San Juan and in the lake, and will be available for rapid navigation. The total cost is estimated at \$64,036,197. For tonnage dues, at \$2.50 per ton (the Suez Canal rate), a total of over sixteen millions of dollars for the year 1892 is assumed as possible.

The latter date marks the possible era of completion. At present Mr. Menocal is still in this country, but during the winter he will go to the field of operations.

#### THE CELESTIAL WORLD.

##### SATURN AND THE CLUSTER PRÆSEPE.

The constellation Cancer, through which Saturn is now traveling, contains a cluster of stars called Præsepe. It is visible to the naked eye on a clear, moonless night as a nebulous mass of light resembling the nucleus of a comet, for which it has sometimes been mistaken. A small telescope will resolve it into stars, the largest of which are of the seventh or eighth magnitude. This cluster lies about two degrees west of Delta and Gamma Cancri, two conspicuous stars of the fourth magnitude.

During the month of November, Saturn passed less than a degree south of Præsepe, and, on November 17, was very near Delta Cancri, moving at that time eastward or in a direct course. At that point in his apparent path, he remained stationary for a few days, and then, making a curve, began to move backward or retrograde, his returning path lying north of his advancing one. This retrograde movement will bring him within the precincts of the cluster, and during the first half of December he will be found traversing the southern border of Præsepe. This aspect of Saturn will repay telescopic observation. A good instrument will reveal the wonder of our planetary system surrounded by his belts and moons, and will also separate the cluster into tiny stars through which the planet of peerless beauty slowly makes his way.

Saturn rises soon after 7 o'clock, about the middle of the month, and may be readily recognized, as there are no bright stars in his vicinity, and also from his position southeast of the twin stars, Castor and Pollux.

##### THE APPROACH OF VENUS AND JUPITER.

The most interesting planetary observation of the month is the approach of Venus and Jupiter on the celestial pathway. The morning sky will be made brilliant with their presence among the stars that twinkle in the east, and observers who command a view of the southeastern-sky, and are willing to waken early from their slumbers, will be rewarded for their pains when they behold the beauty of the spectacle. The reason for the approach of the two planets may be easily explained. Venus, on the 2d, reached her greatest western elongation, or greatest distance west of the sun. She then arrived at her western limit, and began to retrace her steps toward the sun, moving eastward. Jupiter is receding from the sun, and traveling westward. If Venus is moving east and Jupiter is moving west, on the same side of the sun, the approach between them is inevitable. The student of the stars will see this for himself, and will not fail to pay a tribute of admiration to the exceeding beauty of the starlit December sky, among whose glittering hosts the two peerless planets of the sun's family of worlds wend their shining way. On the 1st, Jupiter rises about two hours and a half after Venus. On the 31st, he rises only thirteen minutes after his fair rival.

##### THE TOTAL SOLAR ECLIPSE OF AUGUST 19.

There were a few bright spots in the clouds of disappointment that overshadowed the observers of the last total solar eclipse.

In Irkutsk, Eastern Siberia, the sky was cloudless and the atmosphere serene through the whole day. An observer succeeded in getting three good photographs of the sun during the eclipse, one taken toward its commencement at 11 h. 10 m. A. M.; the second, dur-

ing totality, at 0 h. 25 m. P. M.; and the third, toward the end, at 0 h. 55 m. P. M.

##### THE INFERIOR CONJUNCTION OF VENUS.

The inferior conjunction of Venus occurred on September 21, at 11 o'clock in the morning. She then passed between the sun and the earth. If under these conditions she is at her node, she passes directly between the sun and the earth, and makes a transit over the sun's face, as in 1882. If she is in her ascending node, she passes above the sun, and if she is in her descending node, she passes below him. At the last inferior conjunction she was 8° below the sun, being then in her descending node. Although invisible to the naked eye at that time, her entire course was followed by several observers with the aid of a small telescope. In Paris, M. Flammarion used a small telescope, following closely the course of the crescent as it grew more and more slender until on the 21st the middle of the crescent measured 1". The points were very fine and did not extend beyond the semicircle. The crescent was regular in its whole extent. At Marseilles, M. Bruguere followed the crescent of Venus without interruption from the 17th to the 23d. At Rouen M. Gully, and at Soissons M. Guiot, followed the planet during the same period.

##### VENUS VISIBLE IN DAYLIGHT.

This peerless planet was seen as evening star in daylight for an unusual length of time during the past year. M. Bruguere at Marseilles observed her during the day, with the naked eye, from March 26 to September 16. M. Guiot, at Soissons, observed her in full daylight and with the naked eye from April 2 to August 18. She has been equally observable as morning star, under the same conditions, being visible in full daylight to the unaided eye through October and November.

##### Cholera and Cold Weather.

In a letter to the editor of the *New York Medical Record*, Dr. Reginald H. Sayre, of New York, quotes a number of instances to show that cholera is one of those scourges whose march is not stopped by heat or cold, high or low altitude, dryness or dampness, or any other condition of the weather. He says:

"In 1830 the cholera appeared in Moscow in the month of October, and continued its ravages until the end of December, in spite of the severities of a Russian winter, and caused the death of 8,130 persons out of a population of 250,000, or about 1 in 30. From Moscow it went north to Yarasy, thence to Rybinsk, sixty leagues north of Moscow, where it appeared on March 19, 1831, in spite of the ice and snow which covered the ground.

"In October, 1831, the cholera appeared in Great Britain, and continued there until March, 1832, doing most of its destruction in December. About one-third of the people affected died.

"On March 27, 1832, the disease appeared in Paris, and the mortality was so frightful that 861 people died in ten days.

"In 1848 the emigrant ship *New York* left Havre on the 9th of November, having no sickness on board, and no cholera being then in Havre. During the voyage the weather became bitterly cold. There were some German emigrants on board, from a town where cholera had prevailed, who had a trunk which had belonged to a man who had died of cholera. They opened the trunk, took out the clothing, and wore it. On November 22 a child died of cholera, and seven persons in all succumbed to it before reaching New York harbor. They were strictly quarantined, and the disease limited to those who died on Staten Island in the quarantine.

"About this same time another vessel from Havre, bound for New Orleans, developed the cholera on the twenty-seventh day out, and, owing to imperfect quarantine regulations, the disease spread rapidly through the town soon after the arrival of the vessel, there being then no other cases in the United States except those in the quarantine on Staten Island. From New Orleans the disease traveled to Memphis, appearing there toward the end of December, and at St. Louis in the first week of January, 1849. Toward March several places in the Upper Mississippi valley were affected, and then gradually the disease moved east through Chicago, which it reached in May, to New York, which became infected then, and not till then, although the disease had been imported to the city six months previously, but had not been allowed to land; and the city in this way kept free from infection until the cholera effected a flank movement, by the way of New Orleans, and attacked her in the rear, having made its progress in spite of the winter, and having attacked the cities through which it passed in the cold weather.

"These facts in regard to the prevalence of cholera in spite of cold, and the well-known futility of a quarantine on land, make any attempt to lull the medical profession into a false sense of security fraught with great danger to the country, and I have therefore wished to call attention to the fact that cholera is not stopped by cold, and that to be quarantined effectively it must be arrested in our ports, which can only be done by having a general quarantine under the direction of the federal government."

#### DECISIONS RELATING TO PATENTS.

##### U. S. Circuit Court.—Southern District of New York.

##### MONTROSS v. MABIE.

##### IMPLIED LICENSE TO USE.

BROWN, J.:

The extent of an implied license to make and sell patented articles is to be construed according to the presumed intent of the parties, as inferred from the circumstances.

A firm having been largely engaged during several years in manufacturing and selling stoves upon designs patented by one of the partners, and accounts between them having been repeatedly settled embracing such sales and the profits thereon, as firm business, held, without regard to the question whether the patent was equitably the exclusive property of the patentee, (1) that a license by the patentee to the firm to make the stoves and to sell those manufactured was implied; (2) that such license, by necessary implication, was co-extensive with the business of the firm, and continued until the copartnership affairs were wound up by any lawful agencies for that purpose; (3) that, consequently, the copartner of the patentee had the same authority after dissolution as before to sell for the benefit of the firm the stoves manufactured for sale before dissolution; and (4) that a receiver of the partnership effects, appointed by a State court in a suit brought for winding up the affairs of the partnership, had a similar authority to sell the stoves remaining on hand, both as the representative of the parties and as a lawful agency for closing up the partnership business, and was by necessary implication included in the implied license. An application for an injunction to restrain him from selling was therefore refused.

##### U. S. Circuit Court.—Northern District of Illinois.

##### TOEPFER v. GOETZ et al.

##### MALT KILN PATENT.

BLODGETT, J.:

This was a bill in equity to restrain the alleged infringement of a patent granted April 27, 1880, to the complainant, Wenzel Toepfer, for a malt kiln.

It is wholly irrelevant to inquire whether the patentee was obliged to limit himself by the ruling of the Patent Office. It is enough to say that he did so limit himself.

Although the patent may show features which were patentable and which, if properly patented, would render the defendants liable as infringers, such matters are abandoned to the public by the act of the patentee in accepting a claim which fails to comprehend the same.

Round rock shafts in tilting malt kiln trays are old and now common property, and it is an old expedient to tilt frames by square rock shafts; but where the patentee sees fit to limit his claim to a square rock shaft, the defendants who use a round shaft cannot be held liable. Also, while a patent may cover a new hook, it cannot prevent the use of an old door latch.

##### U. S. Circuit Court.—Eastern District of Pennsylvania.

##### GOOD v. BAILEY et al.

##### HEMP COMBING MACHINE.

BUTLER, J.:

Letters Patent No. 95,462, granted to John Good, dated October 5, 1869, for improvements in machinery for drawing and combing flax, construed strictly.

Where all the elements employed in forming the combination are old, and the combination alone is new, and this differs but slightly from that of machines previously manufactured or described, the claim for it can only be sustained in connection with the special mechanical devices employed in forming it.

The employment of other devices, though a combination of the same general character, yet producing a more perfect combination, one better adapted to the contemplated use, is not infringement.

##### Insect Remedies.

The report on entomology made by W. B. Alwood to the Columbus Horticultural Society, last winter, states that many remedies were employed on the two described cabbage worms, consisting of alum water of different degrees of strength, tansy water, tomato water, benzine, coal oil emulsions of different strengths, Hammond's slug shot, Cayenne pepper, half a dozen remedies from England, several preparations of tobacco soap and pyrethrum. None proved of any value except the tobacco soaps and pyrethrum. The tobacco soaps prepared with potash were quite efficient, the value of which was ascribed to the potash. Pyrethrum is recommended as the best remedy, being perfectly safe, easy of application, and more deadly on the worms than any remedy used. Powder of good quality, mixed with three times its bulk of flour, was found perfectly effective, applied with a dusting bellows. One pound, costing fifty cents, was enough to cover an acre if properly handled.