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GOOD ROADS IN RELATION TO FARM VALUES.

The value of a farm is determined to a large extent by its accessibility. Given similar conditions of soil, climate and demand for produce, and the land that is favored with the best transportation facilities, whether by rail, road or river, will bring the best price per acre when put upon the market. The homestead claim of the pioneer, set far back in the virgin forest, has a value that is measurable by the daily necessities of the owner and his family. A farm which is located within a few miles of a railroad or a thriving city, where the conditions are normal, that is to say, where the rates are reasonable and the market not oversupplied, will have a value directly proportional to the condition of the wagon roads by which it is approached.

In view of these self-evident but too easily forgotten facts, the growing agitation in favor of building better roads has a deeper significance and will have a more widespread effect than is generally supposed; for, as soon as the people begin to realize that the question is an economic one that vitally affects our national prosperity, we may look for a thorough reform in the present methods of road building, so far, at least, as a large number of the States are concerned.

At the same time it must be borne in mind that the construction of good roads in this country is a very different task from that presented in the more thickly peopled countries of Europe. The vast extent of the country and the comparative sparseness of the population render it unnecessary and indeed impossible to cover the United States with a network of such magnificent roads as are found, for instance, in France, England or Germany. The same conditions which obliged the engineer to build our pioneer railroads on lines of the strictest economy have governed the construction of our country roads. It may be safely said, however, that both railroads and wagon roads were built with the expectation that they would be subsequently revised and improved in their location and construction. This revision has already taken place or is now being carried out on the railroads, and the improvements are being made as fast as the increase in the traffic will justify it; but it must be confessed that the phenomenal increase in the wealth of the country has not been followed by any proportionate improvement in the condition of our country roads. After making all due allowances for the vast extent of the United States, the large size of the farms and the great distances to be traversed, it must be admitted that our highways, taking the average throughout the country, are a distinct reproach to the otherwise highly developed civilization of the United States.

This statement is made with the knowledge that some of the States have already begun the work of reform in good earnest, and can show as the result of it a system of first-class roads that is extending every year; but of several of the States it must be admitted that they are building and repairing roads to-day according to the primitive methods which were adopted by the original settlers half a century ago—methods which were necessary and adequate then, but are wasteful and inefficient to-day.

When the level prairie lands of the West were settled and devoted to wheat raising, the roads were frequently laid out with a width of eighty feet, and the process of road making consisted in merely plowing up the soil on each side and scraping it to the center to form a raised roadbed. This provided a cheap road, sufficient for the light and infrequent traffic of pioneer days; but with the settling of the country and the increase in the number and weight of vehicles, these roads have proved to be altogether inadequate, especially in the alluvial soils which are common in the wheat raising districts alluded to. The fall and winter rains and the narrow tires of the heavily loaded wheat wagons quickly turn the so-called road into a mere mud track, with the immediate result that the hauling capacity of the teams is reduced one-half, and the cost of transport and the value of the season's crop are proportionately affected.

Now it is a question well worth consideration whether one mile of good, durable macadam road is not worth considerably more in such a district than five miles of plow and scraper road that will go to pieces under one winter's travel. There is food for thought in the fact that the cost of a few years of thistemporary work would have supplied such districts as these in question with permanent highways, whose cost of maintenance would be certainly no greater and possibly less than that of the present dirt roads. The mere turning over of the soil is an expedient of doubtful utility at the best, and it is a question whether it would not be good economy to concentrate the labor and material which are now practically wasted in patching a given stretch of road in producing permanent results on a smaller section of it.

A thoroughly well built macadam road will cost, on an average, about \$5,000 per mile, this estimate being subject, of course, to considerable variation, according to local conditions, such as are due to the nature of the country and the cost of labor and material. In the more thickly settled and wealthy Eastern and Middle

States the expediency of building all the main roads and many of the by-roads with a macadam or telford surface admits of no debate, and its effect in raising the price of farm lands or cheapening the cost of farm products, or both, would be certain and immediate.

Scarcely less important than the question of surface is that of the grades; for it is evident that the existence of but one steep hill between a farm and the railroad may reduce by one-half (no matter how excellent may be the surface of the road) the loads that can be hauled. The location of many of our present roads was determined over a century ago, when economy of first cost was a strict necessity, and, consequently, all heavy excavation and embankment were avoided. They were frequently built with excessive grades, which remain to this day a hindrance to traffic and a constant check upon the development of the districts affected.

No discussion of the cause of good roads can fail to make reference to the powerful stimulus which it has received from the development and popularity of the bicycle. Good roads are the necessary concomitant of a perfected "wheel," and the fascinating pastime is making zealous converts to the cause of better roads who would give it but little thought as a mere economic question. There is a danger, however, lest effort from this quarter should be directed merely to the construction of bicycle side paths, to the neglect of the more serious problem of building permanent highways. The profit of the farmer and the pleasure of the wheelman can both be subserved by building once and forever first-class macadamized roads, and the union of such powerful interests would materially hasten their ultimate construction.

AN INTERESTING POINT IN LOCOMOTIVE HISTORY.

A curious instance of the facility with which a serious error may find its way into the historical records of mechanical engineering is found in the celebrated Nasmyth sketch of Stephenson's locomotive, the Rocket. This engine is in some respects the most famous historical steam engine in the world, and great care has been exercised during the last twenty-five years in gathering up all possible information regarding the details of its design, and giving an exact reproduction of the engine as it appeared on the day of the famous Rainhill trials in 1829. These illustrations are familiar to the majority of our readers, and although they may vary in slight details, they all show the familiar features, such as the inclined cylinders, the lofty smokestack issuing directly from the front end of the boiler, the sloping fire box, and the rude tender, consisting of a cask of water carried on a four wheeled truck.

On July 26, 1884, Mr. James Nasmyth, who is famous as the inventor of the steam hammer, wrote a letter to The Engineer, inclosing a pencil sketch which he said he had made of the Rocket over fifty years before, as it stood on the rails in the year 1830, or one year subsequent to the Rainhill trials. Mr. Nasmyth was a good freehand draughtsman, and the sketch had evidently been made with considerable attention to detail. This fact made all the more remarkable and puzzling the astonishing change which the Rocket appeared to have undergone in a brief twelve months. The smokestack had been cut down and now projected from the top of a smokebox; the wooden driving wheels had been replaced by others of cast iron; the cylinders had been brought down to a nearly horizontal position; the sloping fire box had been entirely remodeled, and the crude tender had given place to one of a very neat and greatly superior design.

As may well be imagined, the publication of this sketch brought forth a mass of correspondence, which went to show that, between the Rainhill trial in 1829 and the opening of the Liverpool and Manchester Railway in 1830, seven other engines were constructed by the Stephensons, and that when Nasmyth went down to see the much-talked-of locomotive, he probably came upon one of these later and improved machines, and was told that that was the Rocket. The sketch was made by Nasmyth in good faith and labeled Rocket, whereas in reality it represented an improved Rocket, and probably the Phoenix, the first of the seven new locomotives above mentioned.

In order to assist its readers in clearing up the difficulty, The Engineer published a reproduction of the Nasmyth drawing and labeled it the Rocket, 1830. Subsequently, it would appear, The Engineer's engraving came to the notice of some imaginative artist, who proceeded to make a highly fanciful picture, placing in the background a typical wayside inn with the soon-to-be-superseded stage coach standing at the main entrance. The picture was published in the form of a colored plate by the Leadenhall Press, of London, and some party, thinking, doubtless, that the date 1830 was an error, changed it to 1829. The fiction was now complete.

The reproduction of this plate in the issue of the SCIENTIFIC AMERICAN SUPPLEMENT of January 30, 1897, has called forth an explanatory letter from a correspondent, in which the origin of the Leadenhall Press engraving is explained. The letter, together with illustrations of the actual Rocket of 1829 and the sup-

posed Rocket of Nasmyth's sketch, will be found in the current issue of the SUPPLEMENT.

The incident carries a special interest at the present time, when the advisability of gathering up and piecing together the all too scanty scraps of locomotive history is being strongly urged on both sides of the Atlantic.

A NEW PROCESS OF PRODUCING PHOTOGRAPHS IN COLORS.

In a paper read before the Society of Arts, February 24, 1897, by Sir Henry Trueman Wood, secretary of the society, on "The Production of Color by Photographic Methods," he describes the recent process invented by Dr. Adrien Michel Dansac and Mons. V. Chassagne and called "Chassagne's color process," as follows:

"The process, so far as we know it, is as follows: A negative is taken on an ordinary gelatine plate, which has been prepared by treatment with a solution, the ingredients of which are unknown. The negative thus obtained shows no trace of color, and appears in all respects like any other photographic negative. From it a print is taken on ordinary albumenized silver paper, which has been treated with the before mentioned solution; or if a transparency is desired, on a gelatine plate prepared in the same manner as that which was used for the negative. This print shows no trace of color either by reflected or transmitted light. The print when dry is washed over with the solution, and is afterward treated successively with three colored solutions—blue, green, and red—the operation being conducted in a bright light. As the solutions are applied the print gradually takes up its appropriate colors, the intermediate tints being, it is supposed, produced by a mixture or combination of the three primaries. That a yellow color should be produced by a combination of what are presumably green and red pigments is not in accordance with expectation, for though red light and green light when superimposed produce yellow, we do not get yellow by mixing red and green coloring matters. Probably the yellow is produced by the application of a yellow dye mixed in the green solution, and not by a combination of colors.

"It is to be noted that the process is not one for the direct reproduction of natural colors. It is rather one for treating a photographic print in such a way that it enables it, one might say, to automatically paint itself, to take up in the proper parts the colors which are required, rejecting them in the parts where they are not required. How this is effected is at present a mystery, and perhaps with the limited amount of information available it is not worth while speculating upon it. How a monochrome negative can confer on a monochrome print this power of selective absorption has yet to be explained. I can offer no suggestion on the subject. I am informed that a negative of special character is required to produce the colored positives, and that is all I know about it.

"The results certainly are produced, and there seems no reason to doubt the good faith of those who state they were produced in the manner described. Of course when we are thus asked to accept facts without receiving an explanation of them, we require, as I said before, very strong evidence that the facts are genuine. Examination and experiment, so far as they have yet gone, have thrown no doubt on the statements made, and the inventor, I wish to say most distinctly, has offered every facility for inspection so long as the secret of his materials is respected. Sufficient time has not elapsed for crucial tests to be made, but we may reasonably expect that the process will stand those tests as well as it has those to which it has been submitted.

"I have myself seen the colors applied in the way I have described, and the promised results produced. Mr. Herbert Jackson and myself took negatives on Mons. Chassagne's plates of various test objects. Mr. Jackson was afterward kind enough to make some positives from these plates, and neither negative nor positive was touched, or I think seen, by Mons. Chassagne, until we placed them in his hands that they might receive their final treatment. On the application of the coloring solutions, we saw that the proper colors were produced.

"Photographically the results we obtained were very poor; the prints were extremely thin and unsatisfactory, as was not to be wondered at, since the negatives were taken on a dull, foggy day. Nevertheless they showed a great deal more than traces of the proper colors. A blue china vase, with a piece of red ribbon tied round it, and containing a bunch of flowers, was reproduced with perfect accuracy, though the image was thin and faint. An Indian brass pot showed not only the yellow color of the brass, but also distinctly metallic luster. Altogether I can only say that the results of these experiments, so far as they went, satisfied myself, and I think the others who saw them, that the results were produced in the manner described. Were it not for the novelty of the process, and the difficulty of accounting for its results, it would be accepted without hesitation. Whatever hesitation exists is, after all, but a testimony to its importance.

"I have been taken to task by some of my friends for accepting results so remarkable without evidence more

substantial. I can only say that I think any of you who saw the process carried out would have arrived at the conclusions at which I arrived. All evidence is a contest of opposite improbabilities. It seemed to me more probable that the colors were produced in the manner stated than that the prints were first painted by hand, then bleached and then the colors restored under my eyes by the application of some mordant; or that the operator, who seemed to be sluicing and dabbing his color all over the print, was really painting it on in the proper places. I can think of no other alternative. Still I freely admit I shall myself like further proof. I look forward shortly to being supplied with the materials, and I shall not be absolutely happy until I have myself produced something which—however inferior it may be to the very beautiful examples we have here to-night—shall yet show the colors of an original subject taken by myself.

"In a secret process such as this it does not seem worth while to speculate. Because it is a waste of time guessing how results are produced that we may expect to have fully described to us in a short time."

PROF. CROOKES ON THOUGHT TRANSFERENCE.

No man of science has contributed anything to the recent discussion of scientific subjects which will appeal more plausibly and more entertainingly to the public imagination than has Prof. William Crookes, F.R.S., in his recent presidential address delivered to the Society for Psychical Research. Prof. Crookes occupies so distinguished a position in the scientific world that he is entitled to the most serious consideration, even though the mind, filled with preconceived theories, seems to reject his arguments. His logic is strong and he makes an excellent point in devoting great attention to clearing away the "scientific superstitions" which may act as stumbling blocks to possible coadjutors who might otherwise trust themselves on the new and illimitable road which the society is endeavoring to open.

Psychical science was, he said, the embryo of something that might in time dominate the whole world of thought. Human ignorance beset research in this direction with many difficulties, but conscious ignorance was a healthful stimulant if it led to the conviction that one could not possibly lay down beforehand what did not exist in the universe or what was not going on in the world. One of the greatest thorns in the path of the society was the fact that very many people started with certain presuppositions depending upon a too hasty assumption that we knew more about the universe than really was known.

Addressing those who not only took too terrestrial a view, but who even denied the possibility of an unseen world existing at all, Prof. Crookes said he would like to point out to them the difference in the apparent laws of the universe which would follow upon a mere variation in size of the observer of them. Following this idea out, he imagined, first, a homunculus of microscopic size. Prof. Crookes puts his imaginary homunculus on a cabbage leaf and speculates as to what would be the Lilliputian philosopher's conception of the shape of the world, the laws of nature, and the scheme of the universe. The notes dancing in the sunshine would be to him "cumbersome objects like portmanteaus flying through the air." He would be terrified by the tiniest insects. Next the professor gives as an example a human being of enormous magnitude, showing by familiar illustrations how the supposed laws of matter and of the universe would appear to such beings to be quite different from those now accepted. Was it not possible, he asked, that we also, by the mere virtue of our size and weight, might fall into misinterpretations of phenomena; and that our boasted knowledge might be simply conditioned by accidental environment, and therefore liable to a large and hitherto unsuspected element of subjectivity?

Having cleared the way by means of ingenious speculations for his invasion from the domain of physics into the region usually regarded as that of metaphysics, Prof. Crookes discloses his wave law theory. It is an extension of the well known natural law under which sound is conveyed by vibrations of the atmosphere and light by the vibrations of the thinner ether. He presents an interesting calculation of the number or rapidity of these vibrations.

Was it inconceivable, he said (after making an elaborate calculation as to the vibrations which produce sound and light), that intense thought, concentrated by one person upon another with whom he was in close sympathy should induce a telepathic chain along which brain waves should go straight to their goal without loss of energy due to distance? Such a speculation was, he admitted, new and strange to science; it was at present strictly provisional, but he was bold enough to make it, and the time might come when it could be submitted to experimental tests.

ANY dealer in calcium carbide would do well to advertise the article in the columns of this paper. Letters of inquiry for it come to this office every day, and some days several are received.

RECENT PATENT AND TRADE MARK DECISIONS.

Adams v. Kinzer & Jones Manufacturing Company (U. S. C. C. A., 3d, 76 Fed., 800.

Moulds for Casting Tubular Articles.—The Adams patent, No. 465,771, for moulds for casting tubular articles, consisting in the use of a runner extending through the sand into which the metal is poured so that it wells up into the mould from below, does not cover a device such as is shown in Fig. 3 of that patent, which is designed for a pattern that is straight or tapers toward the lower end and can wholly be drawn from the upper end.

Edison Electric Light Company v. Kaelber (U. S. C. C., N. Y.), 76 Fed., 804.

Suit for Infringement Against an Agent.—In this case Kaelber was sued in New York as the agent of the Western Electric Company, a non-resident corporation, upon the theory that a contract for the installation of an electric plant within the jurisdiction had been awarded to the Western Electric Company, which, if performed according to the specification, would involve infringement. Kaelber in his answer upon oath denied infringement, and there was no proof that the plant had been installed. All that was proved was the statement of a witness that the contract was awarded to the Western Electric Company, through its agent, Mr. Kaelber. The court held that there was not sufficient proof of infringement, as the experts on either side were equally positive in asserting and denying that the performance would involve infringement, and also that there was not sufficient proof that Kaelber was connected with such infringement.

Dodge v. Post (U. S. C. C., Ohio), 76 Fed., 807.

Separable Pulleys.—The Dodge and Phillion patent, No. 260,462, for a separable pulley, in which the meeting ends of the rim are in contact and the meeting faces of the spoke bar and hub are slightly separated, so that they may be compressed by clamp bolts upon the shaft, has been held valid and infringed.

Evidence of Prior Use.—The defense of prior use must be established beyond a reasonable doubt, the proof must be as explicit and convincing as that required to convict a person of crime, and a fair doubt of the reliability of the testimony or an inherent improbability in the story told is sufficient to dispose of the defense.

What Amounts to Invention.—In determining whether an alleged improvement is an invention, a fact tending to show invention is that the device, when first presented to those skilled in the art, was pronounced inoperative and its adoption was refused until the inventor overcomes such distrust and disfavor by actual test and use. In addition to this, the fact that the device went into general use and the demand for it steadily increased until they were manufactured in very large numbers is evidence tending to show the presence of invention.

Mast, Foos & Company v. Iowa Windmill and Pump Company (U. S. C. C. A., 8th), 76 Fed., 816.

Pumps.—The Bean reissue patent, No. 8,631, is void for laches in applying for the reissue, which enlarged the claims so that they included a subsequent construction.

Delay in Applying for a Reissue Patent.—A delay of nearly three years in applying for a reissue enlarging the claims of a patent renders such reissue void, where in the meantime a new device has come into use not covered by the original claims but which is brought within the claims of the reissue.

Baldwin v. Kresl (U. S. C. C. A., 7th), 76 Fed., 823.

Cigar Moulds.—The Miller & Peters patent, No. 258,940, is void for want of invention, in view of the prior art and as being for a mere change of degree without change of function.

Pleading of Defense of Want of Invention.—The defense of want of invention, including the right to show the prior state of the art, need not be set up in the answer, as it is always open for the defendant.

Rowlett v. Anderson (U. S. C. C., Ind.), 76 Fed., 827.

Lawn Mowers.—The Rowlett patent, No. 383,829, for a ratchet mechanism in lawn mowers, has been construed as to claims 2, 3, 4, 5, and 8 and limited to the specific combination claimed or its fair equivalent.

Extensive Use as Evidence of Invention.—The fact that a machine or device has met with general favor and acceptance by the trade is not of persuasive force in favor of a broad construction, when, in view of the prior art, there is no doubt about the limitations that must be placed upon the claims.

LUTHER HENRY TUCKER.

The agriculturists throughout the country will regret the death of Mr. Luther H. Tucker, senior editor and proprietor of the Cultivator and Country Gentleman, of Albany, N. Y., on February 23. For many years he conducted this eminently popular paper devoted to the interests of farmers and stock breeders.

Mr. Tucker was born at Rochester, N. Y., in 1834, and graduated at Yale College. At an early age he adopted journalism as his profession, and pursued it to the end of his life.