

smooth cast iron pulley. He said that the old rule, "that the number of inches in contact, multiplied by one half the velocity of the belt in feet per minute, and divided by 33,000, would give the horse power," might give it once in a hundred times, but not oftener. The rule is that a belt holds upon a pulley as the tension (pressure) and as the square of the degrees of wrap. A belt wrapped one quarter around a pulley has only one fourth the power of a belt wrapped one half around the same pulley with the same tension.

A line around a post will give a good illustration of this. One half a turn, and a man's weight is doubled; while a full turn, and his weight is nearly enough to stop a heavy boat, and two turns and his weight will stop the boat, or the line will part.

Belts always run to the high part of a pulley when the shafts are parallel; but when they are not, the belt will always run toward the ends of the shafts that are nearest together, and this tendency is much stronger than to run to the highest part of the pulley. If you have a belt that gives trouble in this way, you can see if it is the fault of your shafting by drawing a line across the edges of the two pulleys. Sometimes the bearings may be in line; but the tension of your belt is so great as to spring the shaft, so as to throw the pulleys out of line. A stiffer shaft or another bearing is the remedy. Leather and rubber belts each have their advocates, and each party say theirs is very much better; but each kind is better in its place. Where the belt is clear, a rubber belt will transmit 20 per cent more power with the same tension, and will last as long and run perfectly straight. It can be made of any length or width, of exactly the same thickness in every part, perfectly smooth on its surface; and when in use, every part will come in contact with the face of the pulley. The greater tractile power of a rubber belt is due to its surface elasticity.

Leather belts have to be made from pieces, and as the leather is not perfectly flat, a perfectly flat belt cannot be made from it. If a belt is cut from the back of a hide, the edges are not so firm as the center, and upon a crowned pulley they will not hug as well as if they were of the same firmness as the center. If the belt is cut from one side of the back, then one edge will be less firm than the other, and the belt will be crooked, and one side will have more tension than the other. Leather belts are usually riveted at the joints. Now, if a rivet head touches the pulley, the friction is less than if the leather touched. If the head is above the surface of the belt, then a portion of the belt is not in contact with the pulley; and if the head is below the surface of the pulley, then of course there is no contact. Now every rivet in a belt is in one or the other of those positions, and leather belts would be improved by using something else in their place. Double leather belts are used more than single ones; but it is clearly a mistake, as a single leather one will transmit more of the power than a double one. If you look at the face of a leather belt, you will see when it has been used for a time, the face has a mottled appearance, light and dark, showing how much of the surface of the belt has been in contact with the pulley. If an average of one inch of width has not touched, then you have paid for one inch of belt that is of no use, but is really a detriment. Double leather belts run straighter than single ones, as the flank side of one part can be put against the back of the other. A double belt will stand a greater tension than a single one, but a single one will stand all that should be put upon any belt.

The cost of belting is increasing every year, and it is well to look out for the belt of the future. My impression is that it will be made of low steel of great tensile strength, and will run upon pulleys, with an elastic surface to give greater friction. The instance I mentioned, of a sheet iron belt running upon cast iron pulleys, is, I believe, in Pittsburgh. But we have a hundred instances of the steel belt upon an elastic surface pulley in this city, in the band saw, and one of a large saw-mill sawing logs with a band saw about three inches wide. Now a band saw is a belt, and the power to do work is all derived from the friction between the band saw and the lower pulley. In the case of the sawmill spoken of, it amounts to from 10 to 15 horse power, and this is all transmitted by the saw itself. It may be said that we cannot get belts of steel wide enough to take the place of our large belts. Whenever such belts are wanted, they will be made of any width and length asked for.

Belts of the present make are run with a strain of one fifth their strength; and as the strength of low steels is over 100,000 pounds to the square inch, a belt one foot wide and one eighth of an inch thick would have a strength of 150,000 pounds or more. One fifth of that would give us 30,000 pounds; this strain, upon an elastic surface pulley of, say, 16 feet, running at a speed of 2,000 feet per minute, would give us a belt with the power to transmit over 1,800 horse power. If the belt were one sixteenth of an inch thick, it would be able to transmit 900 horse power. We have no belts now capable of anything like this. How will this belt be joined? When the band saw first came out, that was looked upon as the stumbling block in its way, but to-day they are joined without a thought, and in about the same time that it would take to join a belt of leather. The steel belt would be joined in the same way. Whether this steel belt is the belt of the future or not, there will be wanted a better and cheaper one than we now have, and it is to the practical engineers that we are to look for it.

Encke's Comet.

The return of Encke's comet to our heavens has been for some time expected, but its immense distance (182,000,000 miles) rendered all search with ordinary instruments useless. The large equatorial at the Naval Observatory, Washington,

D. C., was recently put into service, and the comet was seen through this superb instrument by Professor Holden and Paymaster Tuttle of the U. S. N. Its distance rendered the use of the micrometer impossible, and it will scarcely be observable under ordinary conditions for several weeks.

It is known to our readers that the equatorial telescope above mentioned is one of the finest in the world. It is Alvan Clark's masterpiece, and has an objective 26 inches in diameter. Its power is now demonstrated in a remarkable manner

THE POST OFFICE A CARRIER OF MERCHANDISE.

Since the adoption of postal cards for cheap communication by mail, there has been no modification of our postal laws which so greatly accommodates the public as the one permitting the sending through the mails of nearly all classes of merchandise, in packages not exceeding four pounds in weight, at the low price of one cent for every two ounces. The following are some of the articles officially named as belonging to the class of merchandise that can be mailed at this low rate:

We copy from the *Post Office Guide*, which gives this provision of the law:

Rates of postage on third class matter: Mailable matter of the third class embraces all pamphlets, occasional publications, transient newspapers, magazines, handbills, posters, unsealed circulars, prospectuses, books, book manuscript, proof sheets, corrected proof sheets, maps, prints, engravings, blanks, flexible patterns, articles of merchandise, sample cards, phonographic paper, letter envelopes, postal envelopes and wrappers, cards, plain and ornamental paper, photographic representations of different types, seeds, cuttings, bulbs, roots, scions, and all other articles not above the weight prescribed by law, which are not, from their form or nature, liable to destroy, deface, or otherwise injure the contents of the mail bag or the person of any one engaged in the postal service.

All packages of matter of the third class must be wrapped or enveloped, with open sides or ends, so that their contents may be readily and thoroughly examined by postmasters without destroying the wrappers; but seeds and other articles liable, from their form or nature, to loss or damage unless specially protected, may be inclosed in unsealed bags or boxes which can readily be opened for examination of the contents and reclosed; or closed bags, made of material sufficiently transparent to show the contents clearly, without opening, may be used for such matter.

No writing will be permitted on articles of this class, or their wrappers or envelopes, except the address of destination. Any other writing in or upon any package or article of this class will subject it to letter rates of postage.

Matter of the third class inclosed in sealed envelopes notched at the ends or side, or with the corners cut off, cannot be mailed except at letter postage rates.

The following, and some other articles unnecessary to specify, are unmailable: Packages containing liquids, poisons, glass, explosive chemicals, live animals, sharp pointed instruments, sugar, flour, or any other matter liable to deface or destroy the contents of the mail, or injure the person of any one connected with the service.

Persons living at a distance can send small models much cheaper by mail than by any other means; and if properly packed, they usually arrive at their destination in good condition. We receive a number of models from various parts of the country by every mail; and the only trouble we have with packages so sent arises from the sender not following the official rule, which requires that the package shall not be sealed, and shall not contain any writing; and that the full postage on the package shall be prepaid. When the sender does not observe these requirements, we are obliged to pay full letter postage, which makes the cost by mail greater than by express.

By observing the law's requirement, inventors can avail themselves of the mail, for transmitting their models from distant places to this office, to great advantage. But one thing which we would forcibly impress upon our clients is that, by the same mail in which they forward the model, they should announce the sending in a separate letter, giving description of the invention, time of sending model, name of post office and State, and full name of inventor. Observing these rules will save us much trouble, and insure a prompt answer to the sender.

Spiritualism to be Medically Considered.

Dr. G. M. Beard lately read before the Medical Society of the County of New York an extensive paper on "The Relation of the Medical Profession to Popular Delusions, Spiritualism, Mind-Reading, Clairvoyance and Animal Magnetism." He reviewed the many delusions which have appeared in this country on this subject. He looked upon them as a species of epidemics which from time to time immemorial have periodically made their appearance.

A committee of five, consisting of the following gentlemen, Dr. J. C. Peters, Dr. Fordyce Barker, Dr. Ellsworth Elliot, Dr. Austin Flint, and Dr. A. B. Crosby, was appointed to consider, and report on, the following questions:

1. Is the state or condition of mind known generally as the mesmeric state a reality or a deception?
2. If it is a real physiological state, what are the conditions necessary to its production, and what the phenomena attending it?
3. Is it a state to which one mind can subject another, or does it depend on some conditions voluntarily submitted to by the individual?
4. Is it possible, while in this so-called mesmeric trance, or at any other time, or in any other condition known to man in his mundane experience, for one person to divine what is passing in the mind of another, except through the medium of signs?
5. Is there any such faculty known to our race as perceiving, by some mysterious second sight, what is transpiring in

places far beyond the reach of ordinary human vision, or what is written on a paper when an opaque object lies between it and the person attempting to read?

6. Is there any evidence that the well known law of gravitation is ever overcome by a force hitherto unrecognized by scientists?

The members of the committee are all of them eminent physicians in this city, and will doubtless be glad to receive statements of evidence and experience from all who can supply such information.

In no case in general practice should the pressure, on even the slowest moving journals, be allowed to exceed 1,000 pounds per square inch of longitudinal section with steel journals, or about 600 on iron, in well-worn boxes.

APPLES should be stored in cellars where there is a thorough circulation of air.

DECISIONS OF THE PATENT OFFICE.

NEW PATENT RULE CONCERNING REJECTED CASES.

In the matter of the application of George E. Rouse and M. W. Stoddard for a patent for an alleged "Invention in Wheels," filed May 18, 1874. On appeal from the Examiner-in-Chief.

Two claims are left in the application which the examiner rejects for want of novelty, citing as references the patents of P. Murphy, August 12, 1873, and the application of Charles Spofford filed August 3, 1874, and rejected the 8th day of the same month. The Examiner-in-Chief has affirmed the decision of the Examiner below, on the ground that the patent of Murphy is a known and sufficient answer to the claims of applicants. They have not discussed the pertinency of the rejected application of Spofford, as a reference.

After a careful examination, I have come to the conclusion that the Murphy patent is not a sufficient answer to the claims of Rouse and Stoddard, which are limited to the special construction shown and described by them. It is admitted, however, that the construction of wheel hubs shown and described in the application of Spofford is almost identically the same as that of applicant. More than two years elapsed since the final rejection of Spofford's claim; his application is regarded as abandoned under the 32d section of the patent act.

It is insisted on the part of the applicants that, in view of recent decisions of the courts, a rejected and abandoned application does not constitute a bar to the grant of the patent sought by them. It becomes necessary, therefore, to examine this question and determine the practice of the Office in view of the decisions referred to.

Within a few years, several decisions have been rendered in the United States Circuit Courts, in which the effect on patents of prior rejected applications has been discussed; but the question did not receive the attention of the Supreme Court, until the case of *Brown vs. Gould* came up on appeal during the October term of 1873. One of the defenses set up against the Brown patent was an old application filed by Remy and Kelly in June, 1830, which was rejected and withdrawn the August following. The evidence showed that the only one machine was ever made by them, and this merely for experiment, in the year 1849. In discussing the effect of this application on the validity of Brown's patent, the court uses the following language:

"The experiment made in 1849, when Remy worked it by hand, was a mere experiment which was never repeated. It may have presented one or two ideas in advance of other machines, but it can hardly be said to anticipate the machine which we have described as Brown's. Were it not for the application for a patent, it would justly be regarded as an abandoned experiment, incapable of being set up against any other claim. Can the fact that such an application was made and afterward voluntarily withdrawn, and never renewed make any difference? We think not. Had a patent been actually granted to Remy and Kelly it would have been different. The case would then have come directly within the seventh section of the act of 1836, which makes a 'patent,' or a 'description in printed publication' of the invention claimed, a bar to further patent therefor. But a mere application for a patent is not mentioned as such a bar. It can only have a bearing on the question of prior invention or discovery. If upon the whole of the evidence it appears that the alleged prior invention or discovery was only an experiment, and was never perfected or brought into actual use, but was abandoned and revived by the alleged inventor, the mere fact of having unsuccessfully applied for a patent therefor cannot take the case out of the category of unsuccessful experiments." *Brown vs. Gould*, 6 *Off. Cas.*, 32.

There can be no mistake as to the meaning of this language; the doctrine is distinctly announced that a mere application is not a legal bar to the grant of a patent to a subsequent applicant. This decision must be heeded by the Commissioner of Patents, and govern him in regulating the practice of the Office. I have had frequent occasion to state my views on the necessity of harmony between the practice of the Patent Office and rulings of the courts. There can be no question about the propriety of this course. The Commissioner ought not either to issue patents which the courts will declare invalid, nor to refuse the grant on grounds which have already been considered judicially and declared insufficient. But it will be noticed that the Supreme Court does not entirely ignore abandoned applications, for it is stated that they have a bearing on the "question of prior invention or discovery," and the effect of the application is made to depend on the question of actual use of the invention described therein.

It has been urged in argument that, if no objection appears to the grant sought by Rouse and Stoddard except the abandoned application of Spofford, the Commissioner should issue the patent and allow the question of public use to be determined hereafter by the courts. The suggestion must have its origin in a misconception of the duty of the Commissioner of Patents, whose function is to issue letters patent simply for the asking. The Commissioner is made the guardian not only of the rights of inventors, but also of the interests of the public. It is just as solemnly his duty to refuse to issue a patent which clearly ought not to be granted, as to grant the issue when the applicant shows an unimpaired right to the invention.

In this case, if without further inquiry the Commissioner should issue a patent to Rouse and Stoddard, and it should afterwards appear that the invention of Spofford was put into public use, it would be invalid, as I understand the decision which has been quoted.

It is his duty, therefore, to inform himself on this question, if possible, and the application of Spofford indicates the direction in which inquiry may be made. The only question in my mind is how to prosecute the investigation. The law restricts interferences to unexpired patents and pending applications.

An interference, therefore, cannot be declared with an abandoned application. I have no doubt whatever, however, that the Commissioner of Patents has ample authority to institute an *ex parte* inquiry at any time, for the purpose of determining whether or not a statutory bar exists to the grant of a patent for which application is pending. This is necessary to enable him to comply with the statute. A satisfactory answer to the question must, however, be the only source of information open to the Commissioner in cases like the present, without further legislation; and I do not believe that in a single instant a patent should issue for an invention shown in a prior abandoned application without an attempt, at least, to settle the question of public use.

The decision of the Examiner in Chief, affirming the Examiner on reference to the patent of Murphy, is reversed. The application of Rouse and Stoddard is remanded to the Examiner, who is instructed to forthwith dispatch letters of inquiry to the applicant Spofford, and to his attorney of record, for the purpose of ascertaining whether the invention of the former has been brought into actual use. At the same time, they will be informed that an application is now pending for the same invention, and that the inquiry is made for the purpose of determining the right of subsequent applicants to a patent therefor. Information furnished by them should be in the form of affidavits, clearly and fully setting forth the facts in the case. Counter affidavits will also be received from applicants if they so desire. The issue of a patent will be determined by the information thus received.

Until otherwise ordered, this will be the rule and practice in the Patent Office in like cases. J. M. THURCKER, Commissioner of Patents. Jan. 28, 1875.

NEW BOOKS AND PUBLICATIONS.

DIGEST OF PATENTS RELATING TO BREECH LOADING AND MAGAZINE SMALL ARMS (except Revolvers), granted in the United States from 1836 to 1873, inclusive, Classified according to the Movements for Opening and Closing the Breech. By V. D. Stockbridge, Examiner in the U. S. Patent Office (Class of Fire Arms). Price \$25. Washington, D. C.

The author, in undertaking a work requiring very laborious and patient research, has done good service to a large class of inventors. Over 700 patents are here fully described and illustrated, forming a complete history of the art during nearly 40 years. The illustrations are very clear and elaborate, and the work is sure to be much referred to by inventors and patent solicitors. The author states, with apparent justice, that the high price of his work is justified by the limited sale which such a production can attain.

REPORT OF THE TOPOGRAPHICAL SURVEY OF THE ADIRONDACK WILDERNESS FOR THE YEAR 1873. By Verplanck Colvin. Albany, N. Y.: Weed, Parsons, & Co.

The important survey of the Adirondack region covers nearly 5,000 square miles, and was commenced by Mr. Colvin at his own expense; but it was found to be so important that State aid was, in 1872, granted for the extension and continuation of the work. It is not possible here to describe the scenes of grandeur and the picturesque traveled, or the many valuable results in meteorology and topography achieved, by the investigators; but if any of our readers are interested in this region, the volume now before us will well repay them for the trouble of perusal.

THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC AND PHOTOGRAPHER'S DAILY COMPANION. Edited by J. Traill Taylor. New York city: E. & H. T. Anthony & Co., 591 Broadway.

This volume is replete with information on the latest discoveries in photography, written in a pleasant and readable style. We have read the book with