SCIENTIFIC AMERICAN.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. S. H. WALES. A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent on them will be promptly attended to.

☞ Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents for the SCIENTIFIC AMERICAN.

VOL. XVI., No. 15....[NEW SERIES.] ....*Twenty-first Year.*

NEW YORK, SATURDAY, APRIL 13, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK ROW, and not at No 39.

CENTRIFUGAL FORCE.

There is a power, generated by the revolutions of bodies, known in mechanics as centrifugal force, which is one of the most important products of mechanical movements. In regard to its action we think considerable misapprehension exists. In reply to a correspondent, a short time since, we incidently mentioned the fact that belts running on pulley faces were subject to this influence, and we did not limit the statement by any proviso as to the velocity of the periphery. To this statement we have received several replies, two of which we noticed in No. 13. We think that each of these correspondents assume, either in so many words or by implication, that centrifugal power can only be developed at some certain velocity of rotation. We cannot assent to this opinion, believing that all rotating bodies develope this power in some degree, however slow the velocity of their surfaces. When the revolving motion is so rapid as to entirely overcome the action of gravitation—called for convenience, when exerted on a revolving body, centripetal force—the action of the centrifugal force becomes evident to our senses; as when the water is thrown from the surface of a swiftly revolving grindstone, or the sand is projected from the tire of a carriage wheel. But we have no right to assume that the slow moving grindstone or the sluggish cart wheel does not develope this power because we do not see its results.

The idea that the tendency of a belt to work to the highest portion of a pulley, that furthest from the center, is caused solely by the stretching of one of its edges, does not appear to account for every case; as, if the belt is narrow, a mere string, it will, if it has adhesion to the pulley face, gradually work its way to the upper portion. Now if the belt, however wide, is held while the pulley turns, so that the centrifugal force cannot affect it, it will gradually slide down to the lower edge and slip off. Take the instance of a feed belt on an engine lathe. Its motion is very slow, yet every machinist knows that if he uses a belt (round) rather large for the scores in the pulleys, it will strive continually to ride the side flanges. Put the same round belt on a cone-shaped, smooth surfaced pulley and it will depart greatly from a right line in its efforts to attain the largest diameter of the pulley. It seems, therefore, pretty evident that centrifugal motion has much to do with the running of belts.

This force exhibits itself in many phases on machinery, and is put to many uses in aid of machine work. The copper-cased cartridges, now so generally used, have their heads filled with the fulminate by the utilization of this force. The head has an annular space, forming a collar, which is filled with the fulminate, but the central portion contains none of this percussion powder. The shells are held under a vertical spindle, the end of which is cut into radial scores, and revolving swiftly, throws the fulminate to the outer edge of the annular space.

All the calculations of that useful adjunct to machinery, the fly wheel, are based on the laws of centrifugal motion. The fly wheel by its aid becomes, for a time, actually a reservoir of mechanical power, apparently giving out more than it has received.

The centrifugal drying machine used in laundries is another exemplification of the employment of centrifugal force. It is an upright cylinder inclosing a smaller one, and the annular space between the two is for the reception of the clothes. A perforated bottom allows the moisture expressed from the clothes to run off. A rapid rotation being given the cylinder the clothes are compressed against the surface, so that with a rotary motion of 1,500 turns per minute the clothes are rapidly and perfectly dried.

This force is used in the drying of steel pens after being tempered, in separating ores from adulterations, and has been applied to the granulation of saccharine sirups. Its effect is very beautiful on the buff or emery wheel, where the particles of steel or iron in contact with the flinty particles of the emery take fire and burn brilliantly, being thrown off in a shower at a tangent.

THE CARE AND USE OF FILES.

A correspondent asks us for information relative to "the proper management and care of files." We can offer no facts not already familiar to practiced workmen, but may aid the tyro somewhat by a few directions. While the proper management—the use—of files is to be gained only by practice, there may be verbal suggestions made which will serve to direct the inexperienced in their proper care.

The top of the jaws of the vise should not be higher than the bent elbow of the workman. Our rule for setting a vise is the hight from the floor to the elbow when the arm is bent at right angles. We have, by experience, found this much better than raising it nearer the eye; it allows the forearm to traverse a horizontal plane, which is absolutely necessary to do correct work.

In selecting files those which are warped or sprung should be rejected; the mechanical eye can readily detect them without the use of any instrument, even when, as in the bastard file, the faces are convex. The handle is also another important matter. A chisel handle often used for a file is graceful in form, and, for a chisel handle just the thing, but is entirely unfit for a file handle. We do not prefer handles of beech, birch, maple, or hickory for files. Those are the best which are made of what the country people call "popple"—poplar—softer than the hard woods and harder than pine. Chunks of wood, pieces of broom handles, etc., are not proper handles for files, although often used by workmen who ought to know better.

Never put a new file on a casting until the scale has been removed, nor upon a forging of iron or steel. A very convenient and useful habit is to chalk one side of a new file and preserve that side intact until the other is pretty well worn. New files should be first used on brass, then cast iron, then wrought iron and steel. The scale of cast iron may be removed by grinding on the ordinary grindstone, when its form will permit, or by an old and worn file. The grand first requisite in filing is to learn to draw the file, both point and heel, in a right or straight line. No one can do this at the first trial nor until after long practice, generally. The two hands must be educated and trained to move in unison. Beginners always describe an arc of a circle when first attempting to file. Files are tender tools, especially some of the finer and smaller sorts, and it requires much experience and care to graduate the pressure to the strength of the file. No rule can be laid down for this; it is the result alone of practice.

Draw filing is quite an art and it is very important. It is moving the file transversely across the work. The file is taken in both hands, the handle in the right and the toe in the left, holding the file across the body. The drawing motion must be equal with both hands or the file marks will be "slashed" or diagonal. The proper style of draw filing is also the result only of practice. The beginner's right hand will tend to travel faster than the left. In file finishing and also in draw filing oil is often used on the file, as it produces a much better surface and prevents scratching.

Files are ordinarily cleaned by a piece of card, such as is used in cotton and woolen mills, tacked to a proper handle; but often in filing wrought iron small chips of the iron lodge in the teeth, producing scratches and refusing to be dislodged by the card. A simple implement for this purpose is a stout wire of soft iron, six or seven inches long, with a ring turned at one end for a handle, and the other flattened on the anvil, when cold, to a chisel point. To use it rest the toe of the file on the bench, hold the handle in the left hand, and with the right strike the wire's edge across the file in the direction of the teeth. Sometimes the file becomes clogged with oil and filings and cannot be perfectly cleaned by either of these methods. In that case hold it over the forge fire until pretty well warmed, then card it clean.

Cross-cut files are unfit for cutting the soft metals, as copper, Babbitt, and lead. Only single cut or "float" files are adapted to this work, and they should be quite coarse. As to recut files we do not recommend them. We have rarely seen a recut file which was worth half as much as a new one, and if this were generally the case the diminished cost is more than counterbalanced by the vexation of having a file break in the midst of a job. Better sell your worn-out files and buy new.

Inventors' Institute.

The inventors of Milwaukee County, Wis., have organized an association for mutual protection and scientific advancement, and propose to establish spacious and central rooms in the city for fortnightly meetings of practical and scientific discussion, and also for the collection of models, apparatus, books, etc. This is a movement of the right sort, and capable of great utility. The amount of error commonly cherished in regard to the first principles of mechanical science, and of ignorance as to the teachings of experience in every department of invention, is quite incredible to those who have not by considerable investigation learned how little they naturally know. The first and most valuable result of inventors' meetings would be to supply correct principles and habits of reasoning, and teach the necessity of consulting the experience of predecessors in whatever may be attempted. After these lessons are achieved, the application of truth to practice opens a limitless field for mutual suggestion, correction and assistance. "Union is strength," and intellects united are many times multiplied.

CITY PAVEMENTS.

If there is any one part of a city in which all the people are interested more than in another it is that part on which they travel. The streets belong to all, and their proper condition is a matter of importance even to the visitors whom the transaction of business or the pursuit of pleasure brings within its precincts. The main requisites of a good street pavement are evenness of surface, good foothold for horses, resistance to rolling pressure, and durability. In no one of these requisites are the streets of New York what they should be. Evenness of surface is impossible either with cobble stones or Belgian pavement; neither of them give a secure foothold for horses; they allow stones or blocks to become misplaced—sunk below the surface,—and they are not durable if by that term we consider good condition involved. Now if all these requisites can be attained by some other form and material of pavement there seems to be no adequate reason why it should not be adopted. Is there such a pavement?

From an examination of a compendium of facts now on our table—a pamphlet entitled "The Nicolson Pavement"—and from our own observations we incline to the opinion that there is. The Nicolson pavement has been in use in Chicago over ten years. So well satisfied are the authorities and people of that city with it that no other is laid there. None of it has yet worn to such extent as to need replacing, notwithstanding on some of the streets the heaviest loads are continually passing. On Wells street in that city, laid with this pavement, twenty-five barrels of flour is the ordinary load for a pair of horses, weighing, with the team, over three tuns, and some loads of pork and other merchandise are much greater; yet the pavement appears to have suffered no extraordinary deterioration during the nine or ten years it has been in constant use.

This pavement is much less noisy than the stone pavements, which is a feature of considerable importance in a crowded city. It affords a good foothold for horses, and if its durability, facility for removing and replacing when necessary, and first cost are as satisfactory as is claimed by its advocates, it should be tested on some of our principal streets, as well as on a portion of two or three, more or less removed from the center of vehicular business.

THE PATENT BILL PASSED.

The bill to increase the efficiency of the Patent Office, noticed in our last number as having passed the House, soon after came up for action in the Senate, and was amended by striking out the sections relating to a Solicitor for the Patent Office, Disbursing Clerk, etc. The House promptly adopted the amended bill, and the Commissioner is now clothed with ample authority to increase the examining force of the office. We understand that he intends to fill all new positions by promotions, which is certainly very commendable: therefore the crowds who are daily hanging about the hall in front of the Commissioner's door may as well disperse.

We earnestly hope that the Commissioner will act promptly and energetically in carrying the new measure into effect. The business of the office is suffering very much from the delay which attends the examination of cases, and now that the Commissioner has the power, we hope that he will employ it to infuse new life and vigor into the Department.

THE DAY LINE.

The question of the beginning of the day, which we started in our issue of March 2d, has attracted a great deal of attention. It has been discussed in the newspapers, in debating societies, and at private gatherings all over the land. The question has appeared to be many-sided, for the opinions on it are very far from being harmonious. Some persons have gone so far as to contend that there was nothing in it at all, and even to hint that it was intended on our part as a kind of practical joke aimed at our readers!

But on reviewing the whole subject we find that we and our correspondents have expressed all the facts and opinions about it that seem of importance, and therefore we conclude that it is time to dismiss it from the paper. To the many correspondents whose letters have not been printed we tender our thanks for their kindness, and our regrets that space will not admit a continuation of the discussion.

British Art Schools.

A published government directory gives a list of ninety well established and sustained schools of art in the United Kingdom, which in the year 1865 taught no less than 16,621 pupils. The first of these schools was established in 1842, and already there is not a commercial or manufacturing town in the British isles that is not thus provided. Parliament annually appropriates a large sum of money to this system of schools, with a view to foster British manufactures by giving them the advantage so long possessed by the French, of beauty, finish and taste in design. The whole is a regularly organized department of science and art, of which the Duke of Buckingham is President, with a large staff of secretaries and clerks, and two divisions of professional inspectors, examiners and organizers, to aid in organizing schools, to supervise them while in operation, to test their efficiency, and to judge when they are entitled to aid from the fund in charge of the department. A project is on foot to establish an American University of Art.