Correspondence.

Remedy for Leaky Pens.

To the Editor of the Scientific American:

The stylographic pen is a great convenience, but no inventor seems to have succeeded thus far in making a joint which will prevent soiling the fingers with ink. A remedy for this leakage which has been tried, and thus far seems to be complete, is to rub the joint on which the fingers rest with the thin edge of a piece of wax. Hold the pen over a candle, lamp, or the flame of a match till the wax melts, when it will lute the joint so that no ink can escape throught it.

M. C. MEIGS.

Washington, D. C., Oct. 9, 1883.

Hearing at a Distance.

To the Editor of the Scientific American:

The notes that have been appearing in your paper of late in regard to the distance at which certain sounds can be heard have interested me very much. A writer in a late number (H. W. Hubbard) asks if the rumbling of trains can be heard farther than their whistles. On this point I would say that the sound of running trains on the Lake Shore Railroad can be distinctly heard at this place, almost any still night, while the whistle is very rarely heard. The nearest point on this road to us is about nine miles and a half. I have often heard locomotive whistles ten miles in another locality.

ORANGE COOK.

Chardon, O., Sept. 27, 1883.

Notes Taken in Sixty Years.

To the Editor of the Scientific American:

My attention has been called to a statement in the SCIENTIFIC AMERICAN SUPPLEMENT, 15th of September, 1883, to the effect that I am about to publish a book entitled "Notes Taken in Sixty Years."

As this error has been extensively copied, please correct it. Sixty years would take me back to a very early period of my infancy. The error has arisen from the fact that Mr. R. S. Elliott, formerly Secretary of the South Pass Jetty Company, is publishing an interesting book with the above title, in which my name occurs in several passages relating to the jetties and the improvement of the Mississippi River.

JAS. B. EADS.

St. Louis, October 9, 1883.

Vibration of Bridges.

To the Editor of the Scientific American:

In your issue, vol. xlix., No. 12, 22d September, you have a notice of an article which I had prepared and submitted to the American Society of Civil Engineers for criticism and suggestions. In your notice you make me say that the Harper's Ferry bridge had been moved four inches; it is thought that from this notice of yours some sensational reporter published an item saying that the Harper's Ferry bridge had been condemned as unsafe for heavy trains; this is calculated to injure our road. I am sure I did not say Harper's Ferry bridge, but Harper's Ferry trestle, which is a structure on shore, and quite a different thing from the bridge. There has been no perceptible movement of the Harper's Ferry bridge; it is too heavy to be moved by passing trains. If I said bridge, I did not intend to do so and feel sure I did not. I think to be scientific is to be exact.

JAMES L. RANDOLPH.

Baltimore and Ohio Railroad,
Baltimore, October 6, 1883.

[Our notice was from the official report of the Society's proceedings as furnished to us by the Society.—EDS. S. A.]

Making Graduated Circles.

To the Editor of the Scientific American:

In almost all pieces of apparatus for measurement, graduated circles are required; and many students of physics and mathematics who are compelled to construct their own apparatus leave valuable pieces incomplete or only roughly accurate for want of properly divided circles. In fact, many geniuses of limited means who would gladly enter into systematic experiments on different subjects never begin because of this want.

The great difficulty in constructing dividing or graduating machines is to obtain a circle with the exact number of teeth required, to which the circle to be graduated may be attached and turned by a tangent screw or by some other means. This I have accomplished in a very simple manner, which any one can easily repeat, who has access to a lathe. It is as follows:

Having obtained a brass rod, say 3/8 inch square, form it into a ring of the required size to receive the teeth, say 360, 720, or 1080, and leave the ends, without uniting, a little longer than necessary. Place in the lathe the tap with which the teeth or threads are to be cut.

By means of the tool post and carriage, press the brass ring, beginning at one end, against the tap and turn the lathe. The ring will feed itself around, which may be repeated until the teeth are deep enough. It is best to have a small roller on the tool post, but if both post and brass are smooth, they will work satisfactorily if kept well oiled.

The ends may now be joined by cutting away half of each, so that they will lap about two inches, and riveting, being careful to have the threads hit, and of the right number. This ring may now be placed as a tire around a suitable wheel to be turned by a tangent screw of the same kind as the tap with which the threads were cut.

With this kind of a wheel I have constructed a machine which is perfectly automatic for any size circle to be graduated on the face, edge, or bevel of any angle. The marking is sufficiently accurate for all ordinary purposes. The expense was only $5.

REYNOLD JANNEY.

Wilmington, O., Sept. 17, 1883.

[With our correspondent's kind permission we would add: The tap is held by the chuck in the ordinary way; the ring is placed in a horizontal position between the tap and tool post, so that the threads will be cut across its outer surface; the ends of the rod should be cut in a plane making an angle with the plane of the wheel, so that the riveting will be done on the side. The device is easily made and effective, and by making the number of teeth on the wheel a multiple of each number of teeth most generally needed, it will cover a wide range.—ED. SCIENTIFIC AMERICAN.]

Manufacture of Steel Rails.

During the recent meeting of the Steel Institute the members paid a visit to the steel works of Messrs. Bolckow, Vaughan & Co., at Eston—or the Cleveland Steel Works, as they are called. They adjoin the blast furnaces of the firm at Eston and South Bank, the latter range of furnaces being merely separated from the former by the Middlesbrough and Saltburn branch of the Northeastern Railway, which passes between them, and is connected with the sidings of both the works. The works are also connected by a private line with a fine jetty on the banks of the Tees, provided with ample appliances for the rapid unloading of foreign ore, etc., and for the shipment of rails.

There are now at the Cleveland Steel Works six converters, each of 15 tons capacity, devoted to the basic process. These converters are disposed in two groups of three each, the whole six converters being in one straight line, and each group having it front of it a shallow double pit in shape somewhat like the letter ω, and provided with two hydraulic ladle cranes. The section of the building containing the converters and pits is spanned by steam traveling cranes by which converter bottoms, etc., can be lifted, and by which the charges of lime are brought to the converters in suitable iron hoppers. At the back of the converters and at a convenient height runs a charging stage, along which are conveyed to the converters in ladles mounted on carriages the charges of molten iron from the blast furnaces, and from which the converters also receive the additions of hematite and spiegel. The staging is provided with the necessary hoists, and behind it again is a space devoted to the preparation of the converter bottoms, hoods, etc., the plant in this department including mortar mills for the mixing of the magnesian limestone with tar, large ovens for the firing of the bottoms, etc. The bottoms, we may mention, are rammed by hand, the men using redhot bars for rammers, and the tuyere holes for the blast being formed by iron cores inserted in the mould. The material is well rammed around these cores, and the latter are as a rule knocked out before the bottoms are fired.

Returning to the front of the converters, it will be readily understood that by the arrangement of ladle cranes above mentioned, either crane can command two converters. The processes of pouring from the converter to the ladle, and the subsequent teeming of the steel into the moulds, are the same as in the ordinary Bessemer process, but the quantity of slag to be dealt with is much greater—being about one-third the weight of the steel—and it is the practice to pour off a great portion of this slag from the converter immediately after the "after blow," as it is called (this being the name given to the part of the blowing which lasts after the elimination of the carbon), and prior to the addition of the spiegel.

The rail ingots cast are 15½ inches square, and vary in weight from 1¼ to 1½ tons, according to the section of rail to be rolled. As soon as possible after teeming they are taken from the moulds, placed on trolleys, and run off by small locomotives, running on lines of 3 foot gauge to the range of gas furnaces, where they are wash-heated, or rather where their heat becomes equalized throughout, the amount of real heating done in these furnaces being comparatively small, and there being, it must be borne in mind, no subsequent heating whatever.

After having remained a sufficient time in these furnaces the ingots are drawn out by a very simple arrangement of hydraulic gear, each ingot as drawn being received by a trolley which is at once towed off by one of the small locomotives to the cogging mill. The cogging mill is a reversing mill with 48 inch rolls, and here in the course of eleven passes the ingot is rolled down from 15½ inches square to a bloom 8 inches square. The cogging rolls have six grooves, the ingot making two passes through each groove, except the last. After the first pass through each groove is made, the rolls are screwed down for the return pass, and then released again before the first pass is made through the succeeding groove, and so on.

From the cogging mill the bloom is conveyed to a powerful horizontal shearing machine, where it is cropped and delivered on to a narrow gauge trolley placed on a line below the level of the floor of the mill. One of the small locomotives running on a parallel line of rails is then attached to this trolley and tows it up a short gradient to the mill floor level, and runs it along at great speed to the finishing mill.

This is a reversing mill driven by a pair of engines attached to it direct, and it has a set of roughing and a set of finishing rolls, each 30 inches in diameter. After the partially formed rail has made six passes through the roughing rolls, a series of chains running in grooves below the floor level, and furnished with horns projecting above that level, are brought into use, and transfer the rail laterally to the finishing rolls, through which six more passes are made. On leaving the rolls after each pass the rail is received on rollers, which are allowed to roll through a limited range on slight inclines, so that the rail resting on them has a constant tendency to feed itself down to the rolls. During the latter passes, to economize floor space, the incline receiving the rail is carried up at a considerable angle above the floor so as to allow of traffic passing beneath it. Rails up to 150 feet long or upward are dealt with at Eston with as much ease as shorter lengths, and at the time of their visit, on the 18th of September, the members of the Iron and Steel Institute were able to see rails about 126 feet long rolled off steadily rail after rail without the slightest hitch of any kind, the time occupied in making the twelve passes through the roughing and finishing rolls being 80 seconds only. This is magnificent work, yet so smoothly did all the operations proceed that it was difficult to realize that the mill was turning out finished rails at the rate of something over a ton per minute. As a matter of fact, we believe that over 400 tons of rails have been produced in a ten hours' shift at this mill.

From the finishing mill a series of live rollers convey the rail to the saw, where it is cut into lengths as required. In the form of hot saw used at Eston a massive framing carries a pair of diagonal engines from pulleys, on the raised crankshaft of which belts are led off to pulleys on the saw spindle situated a little above floor level. The whole framing, with engines and saw, is mounted on wheels and moved forward at each cut.

From the saw the rails are run forward on to the rail benches near the middle of the length of the latter, a neat arrangement, worked by a small pair of engines, enabling them to be pushed along the benches to the right or left as may be required. Running over the range of hot rail benches also is a powerful traveling crane, by which bundles of rails can be easily transferred from one part to another as may be necessary to suit the working of the men at the straightening presses.

The hot rail benches are at such a level that the rails can be readily run off from them to the straightening presses, and after being straightened they are passed on to the rail-ending machines and the drilling machines, being finally delivered at the western end of the works. Of the rail finishing plant it is unnecessary to say more here than that it is admirably arranged, and comprises first-class machinery for the several operations to be performed.

So far we have been speaking of the basic side of the works only. On the side devoted to the acid, or ordinary, Bessemer process, the arrangements are very similar. In this case, however, there are four converters of eight tons capacity arranged in the manner to which we made reference in the early part of the present article. The cogging mill on this side, also, serves either of two finishing mills, these being driven by one engine situated between them. Altogether about 5,000 tons of Bessemer steel per week are being turned out at Eston by the two processes.

The blast for the converters is supplied by four vertical blowing engines, three of these having been made by Messrs. Daniel Adamson & Co., while the fourth was constructed by Messrs. Bolckow, Vaughan & Co. themselves. The Siemens wash-heating furnaces are altogether twelve in number, and are each 25 feet long by 10 feet wide, and provided with four doors; they are both charged and drawn by hydraulic machinery. The steam required in the works is supplied by 42 Lancashire boilers, all made of steel. Of the blast furnaces we need at present only say that there are nineteen, of which ten are fitted with Cowper hot-blast stoves.

We have in the foregoing columns given but an outline description of Messrs. Bolckow, Vaughan & Co.'s magnificent works at Eston, and the space at our disposal will not permit of our at present doing more than this. We trust, however, that we have been able to give some idea of the productive power of these works, and of the skill with which that productive power is turned to the best account. In the completeness of their arrangements for the rapid handling of the material in the course of manufacture with the minimum of hand labor, the Cleveland Steel Works are probably unequaled in the world, and the impression received during the inspection last week will, we are certain, long be remembered by all who took part in the visit to Eston.—*Engineering.*

Death of Prof. Plateau.

Foreign journals announce the death, on the 15th of September, at the venerable age of eighty-two, of Joseph Antoine Ferdinand Plateau, Emeritus Professor at the University of Ghent, and one of the most eminent of modern physicists.

Prof. Plateau was a foreign member of the Royal Society of London, a member of the Academy of Sciences of Berlin, and a corresponding member of the Academy of Sciences of Paris. To those who are interested in that department of science upon which he shed so much luster, his many labors are familiar.

Stereoscopic Portraits by a Single Camera.

We have just taken, by means of a single 4 x 5 camera, some stereoscopic portraits of so excellent a quality and by means so simple as cannot fail to interest our readers and cause many of them to do likewise after they read our description.

Every one is, of course, aware of the existence and nature of an office chair, the seat of which rotates upon a central axis—usually a screw—of the same nature as that of a piano stool. Now if a sitter be posed in a chair of this nature, it stands to reason that when a camera is placed at a distance of a few feet away, the mere act of rotating the chair upon its pivot, and with it the sitter, will cause the latter to be presented to the lens under circumstances of horizontal displacement extending to 360 degrees, or equal to the entire circle.

Having posed the sitter according to taste, and being provided with a double dark slide containing two plates, the first exposure is made and the sitter enjoined to remain perfectly still while the chair is rotated to an *exceedingly slight extent*—an extent, indeed, that shall not be more than is barely appreciable—and another exposure made on the second plate. When developed and printed from, these negatives will yield proofs which shall be truly stereoscopic.

Care must be taken that the rotation of the sitter be not carried too far, else will the effects obtained be vulgarized by the exaggeration of the relief. It is so very easy to produce this artificial relief, and the temptation to do so is so great, that the photographer must be on his guard against indulging in this trick, which, while calculated to startle the spectator, is as "untrue in nature as in art."

It cannot, however, be denied that some exceedingly funny and grotesque effects can be obtained by indulging in an excess of this movement of the sitter in azimuth. We have witnessed immoderate laughter being elicited when the portrait of a person whose nose was naturally rather large was presented for examination in the stereoscope, which showed it to project at least three or four inches in advance of his face. This effect was produced by bringing the camera within five feet of the sitter, and causing the chair to be rotated two or three degrees more than it ought to have been. In like manner may an individual whose face is rather thin be presented as decidedly hatchet faced, while the likeness otherwise remains so good as to cause ready recognition.

While experimenting in this direction, the photographer will not fail to notice what striking and novel effects can be obtained when a back view, either wholly or partially, of the sitter is focused upon the ground glass. If any readers who adopt the practice of photographic portraiture as *dilettanti* rather than as professionals will occasionally deviate from the regular habit of photographing their friends full or three-quarter face, and try instead, say, a full or three-quarter *back* view, it will afford an agreeable modification in the routine of their practice.

The method which we have just described of rotating the sitter in relation to a single lens camera, is one equally sound in principle as easy in practice for producing true stereoscopic effect in portraiture. But it must be noted that the stereoscopic effect is confined to the sitter only, and has no relation to him (or her) and the background. For this reason, the practice of stereoscopic portraiture by the means described should be confined to busts, and the backgrounds should be quite plain.—*Photo. Times.*

The Bitumen of Judea.

An interesting investigation of the nature of this natural product of Judea and the Dead Sea has been made by M. B. Delachanal, who has communicated his results to the French Academy of Sciences. It is employed in Palestine as an insecticide on the vines, and hence the recent attention it has attracted in France, where *savants* are still engrossed with the problem of fighting the phylloxera. Some kilogrammes of the bitumen were procured from the French consul at Jerusalem by M. De Lesseps, and on this M. Delachanal has operated. He finds the presence of a considerable quantity of sulphur in its composition. It is a deep brown color, nearly black, and of a friable nature. It contains 27 per cent of oil, which is nearly colorless and of the nature of petroleum. A solid paraffine can also be extracted from it. The result of these experiments is that the bitumen of Judea, if it prove efficacious as an insecticide, may also be turned to good account by the manufacturing chemist in the production of sulphur and illuminating oils. The presence of sulphur in its composition appears to assign to it a mineral, not organic, origin. Should the Dead Sea Canal be constructed, it is probable that profitable trade may arise from this natural product.

NEW GAS ENGINE PUMP.

Our engravings represent the "Crown" gas engine, adapted for pumping purposes, now being manufactured by the National Meter Company, of 51 Chambers Street, this city. The smallest size is here shown, capable of pumping 200 gallons of water 50 feet high per hour, at an expense of one and three-fifths cents, estimating gas at $2 per thousand feet. Fig. 1 is a perspective view, and Fig. 2 is an elevation, showing the valves in section. The engine frame is supported upon two legs above the base to make room for the pump, *b*. The power cylinder is placed horizontally upon one end of the frame, and the motion of the piston is communicated to the pump through the rocking arm, *c*, and the vertical rod operating the piston of the pump. The crank, *a*, is connected to the lower end of the rocking arm by a connecting rod. In the back of the power piston are two springs which are furnished with a central guide ring, into which the end of the piston rod enters. This end of the rod is convex and made of tempered steel, and rocks upon the face of the tempered piece. The piston rod is held against its seat by a spring bearing upon the end of a steel pin inside the rod, so that it is held in its place by the pressure of the spring. There is no sliding motion in this connection, but a rocking one; and the whole makes a flexible and frictionless connection. All bearing journal pins are made of tempered steel, and are ground to size. The pump cylinder is of composition, the valves being of the best rubber composition for water valves. The water is forced or lifted through the upper part of the pump, thence through a cored passage in the frame to the chamber, *l*, in the cylinder. The air chamber serves to equalize the flow, and the water escapes through the outlet, *k*, on the opposite side of the engine from that shown in the engraving. A flywheel, which is not represented, in Fig. 2, gives steadiness to the motion.

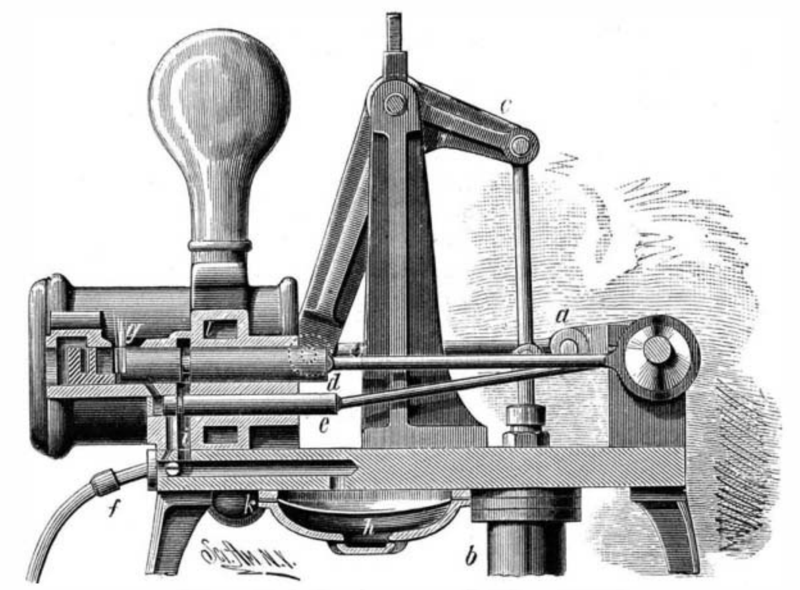

Fig. 2.—NEW GAS ENGINE PUMP.

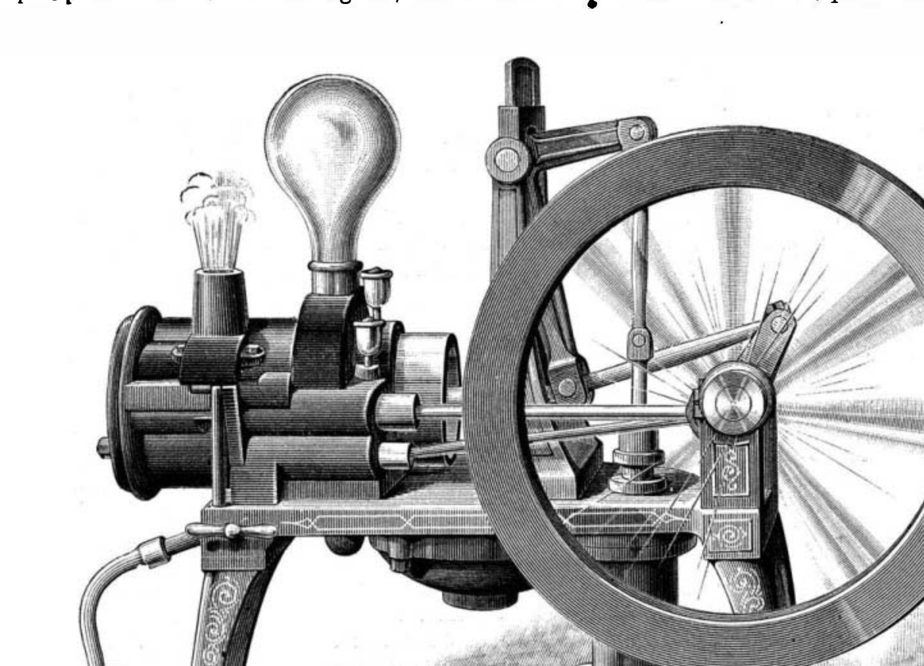

Fig. 1.—NEW GAS ENGINE PUMP.

The valves, *d* and *e*, are solid, and are fitted so accurately as to need no packing, the work to which they are subjected is so light that they will not require it. Air is admitted to the cylinder by the valve, *d*, while gas is admitted by the valve, *e*, to supply the charge, this valve also regulating the flow of gas to the lighter jet at *g*. At the instant the flow of gas and air to the cylinder is stopped, the valves close and the charge is exploded. The gas supply is received through the pipe, *f*. The action of the combined valves is positive and simple, and there are no loose working parts to get out of adjustment. The valves are operated by independent eccentrics on the main shaft. The engine occupies a floor space 8 x 21 inches, is 17 inches high, and weighs 100 pounds.

The company also manufacture engines for general use from a size suitable for driving a sewing machine, up. The engine can be seen in operation at Chase's, No. 12 Cortlandt Street, this city.

A Green Colored Sun.

A remarkable phenomenon has been observed lately at several places in the Madras and Bombay Presidencies, and has caused much interest, mingled with not a little alarm among the superstitious. For some days the sun presented a distinctly green color. Several explanations have been put forward, of which the most plausible appears to be that offered by the Government Astronomer, that it is due to the passage across southern India of clouds of sulphurous vapor from the Java volcanoes.—*London Times.*

New United States Magazine Gun.

The Chaffee-Reece magazine gun is one of the three species of arms that were not long ago approved after thorough trial, by the United States Army Commission. This gun is now being manufactured at the United States works, Springfield, Mass. We have lately seen the original arm which formed the pattern for the manufacture. Prior to approval it was fired 8,000 times, and subjected to all the required tests of rust, sand blast, etc.; but it still looks almost as good as new. One of the peculiarities of this gun is the facility with which its magazine is loaded, the cartridges being simply dropped in at the breech, and the ease with which it is changed from magazine firing to the ordinary hand inserted cartridge. This is done by simply moving a small button. A single motion removes the discharged shell and inserts the new cartridge ready for firing. Altogether it is a remarkably effective weapon.

In the use of novel arms like this the modern soldier is required to exhibit on the battle field qualities of a totally different nature from those of the ancient warrior. The latter was valiant and effective in proportion as he worked up his nervous system to a condition of excitement and frenzy. But the soldier of the present day, using the repeating gun, must be thoroughly drilled in self-control. He must be extremely calm and collected in the presence of the enemy, take careful aim, fire no random shots; otherwise his superior arms count for nothing, his ammunition becomes rapidly wasted, and he has no recourse except flight.

Chronic Lassitude.

There are certain characteristics connected with a lazy man which are admirable. They excite in the twanging, jingling breasts of the nervously fidgety a feeling which borders on respect and is akin to awe. Your double geared fidgety man will spin all day like a top and run down in the cool of the evening on the identical spot on which he started off after breakfast. The man suffering from chronic lassitude will keep still, keep cool, keep in the shade, put in a full day's work resting himself, and arrive on time at sundown, cool, calm, and collected, without having once sweat under the collar or laid a hair.

The professional lazy man seems to eat, drink, and sleep with as much gusto and *sang froid* as his fidgety brother with the high pressure anatomy and patent double cylinder, fast, perfecting, hygienic apparatus, who gets hot in the box, and wears and grinds and cuts his life away like a piece of misfit machinery. The fact of the business is, the man of bustle wears his life away for the want of the oil of rest. The lazy man just soaks along like a handful of cotton waste in the oil cup of a box car axle.

BEES taken to Florida become lazy, and make only as much honey as they need from day to day.