

the boat, and mounted upon a framework which is sustained upon two sliding spuds, and is made vertically adjustable as a whole. It also consists in combining with the deflecting plate a longitudinally reciprocating rake, which is made adjustable with the deflecting plate, and which is used to stir the bed whenever it is of such a nature as not to be easily disintegrated by the unassisted action of the water.

An improvement in brakes for wagons and cars has been patented by Messrs. Mathew C. Franklin and Nathaniel Landrum, of Prairie Lea, Texas. The invention consists in a peculiar arrangement of the brake bar, a cam bar, and a foot lever, which insures a powerful action.

Mr. James Montgomery, of Jersey City, N. J., has invented an improved car wheel, which consists in providing a car wheel with slots which radiate from the eye, and in reinforcements around the edges of said slots; also in the construction and application of an elastic packing to inclose three sides of the tread piece of the wheel and form a bed for the tread in the peripheral groove of the wheel.

An improvement in car couplings has been patented by Mr. Milton Logan, of Foxburg, Pa. The invention is an improvement upon letters patent granted to the same inventor, July 30, 1878, and relates to means for operating the hook-ended draw bars shown in that patent. The coupling may be readily operated from either the platform or from the ground at one side of the car. It is also connected by a rod with the short arm of the lever pivoted on the top of the car, so that it may be operated from the top.

Mr. William Loudon, of Superior, Neb., has patented an improvement in pumps, the object of which is to prevent the accumulation of sand around submerged pump cylinders and the stoppage of the inflow of water to the cylinder. The cylinder is provided with a cylindrical shield, placed so as to leave a space between it and the cylinder, so that the water can pass to the cylinder and enter the same, said shield being composed of foraminated cylindrical shells, with a layer of wire gauze between, which offers a free passage to the water, but prevents the sand from coming in contact with the cylinder.

An improved railroad switch, patented by Mr. William L. Potter, of Mechanicsville, N. Y., consists in an arrangement of movable guide bars that cause the wheels to take the track for which the switch is set and permit the passage of a train from either direction or upon either track without danger of the wheels leaving the rails and without jolt.

Mr. Joseph W. Riley, of Hollidaysburg, Pa., has patented an improvement in side trusses for bridges. The trusses are formed of the longitudinal bars, cross bars, cross rods or bolts, studs, and elliptical braces, arranged so as to secure the greatest possible rigidity and strength with the smallest expense.

An improved device for cutting railroad rails, patented by Mr. John M. Peterson, of Michigamme, Mich., consists of two arms, pivoted together at one end, and the opposite free ends adapted to receive cutters, which are applied to opposite sides of the rail, and forced against the same by a ratchet lever screwing a nut upon a shaft joining the ends of the arms, whereby the knives or cutters are made to cut through the rail.

Recent Decisions Relating to Patents.

BY THE U. S. CIRCUIT COURT—EASTERN DISTRICT OF VIRGINIA.

Sayles v. Richmond, Fredericksburg and Potomac Railroad Company.—1. Where a patent has been granted for fourteen years and extended for seven years, a suit may be brought against an infringer for profits that accrued at any time during the twenty-one years, if brought within six years after the extended patent expires.

2. The United States circuit court has jurisdiction of suits in equity relating to patents between citizens of different States. It is doubted whether the circuit court has jurisdiction in patent cases, except by injunction, where the parties are citizens of the same State.

3. Where it is sought to recover in equity profits resulting to the defendant from using, through a series of years, a mechanical invention without the owners' consent or authority, which profits do not consist in specific sums of money received by the defendant in so using the invention, but simply consist in the advantage and convenience derived from using them, and such advantage is a matter to be estimated as a whole, it is not a matter of accounts, and, therefore, a bill cannot be sustained for an account. Where there is an adequate common law remedy, equity cannot take jurisdiction of a bill for profits arising from the use of a patent solely on the ground of constructive trusteeship.

BY THE ACTING COMMISSIONER OF PATENTS.

Ex parte Holcomb.—Even though an old form of article is much improved and rendered far more salable by a certain method of making it, yet, as that method consisted in the employment of means within the knowledge or grasp of those acquainted with the business, such method does not constitute an invention within the statutory enumeration of inventions for which letters patent can be granted.

American Institute Exhibition.

The forty-eighth exhibition of this Institute will open September 17th, in this city. Parties having novelties which they intend to bring to public notice should at once address the General Superintendent for blanks and information. The medals, it is said, have been increased, and special awards will be made upon a number of articles.

Correspondence.

Magnetization of Molten Iron.

To the Editor of the Scientific American:

In your issue of July 5th I notice a report of "Magnetizing Molten Iron," the experiment having been made by Mr. Chernoff and reported by Dr. C. W. Siemens. I do not know that it is a matter of much importance, but believe I was the first person to try the experiment, which I did in the foundry of the Fall River Iron Works in 1872. I had never thought it important enough to report in the scientific press, though I at the time reported it to some of my friends, among them Prof. John H. Appleton, of Brown University; Prof. Barker, of Pennsylvania University; and afterward Prof. Farmer, of the U. S. Torpedo Station.

I had two objects in view, one of which was the production of powerful permanent magnets, the other the production of malleable iron by a polarization of the atoms in the direction of the current, during the change from a molten to a solid condition. In the first I failed, as I believe every one else will; for, since heat destroys a magnet, heat will also prevent permanent magnetization. In the second I succeeded to a certain degree, and samples of the iron I made, heated to a cherry red, and drawn under the hammer to chisel points, are now, or were at one time, in the possession of Mr. A. A. Pope, President of the Cleveland Malleable Iron Co., and of Dr. W. W. Keen, Philadelphia.

If it would be of sufficient interest, I will send you a sketch of my apparatus and description of my experiments. I made use of the 60 cup Bunsen battery, of Brown University, kindly loaned me by Prof. Appleton, and was unable to carry the experiment to the end I would wish, because of the evolution of nitrous acid from my battery, which nearly suffocated the workmen at the foundry. I would like to try it again with a powerful Brush machine, for the results were very interesting.

My bars of iron came out of the mould solid, and if hollow ones were produced by some one else, the reason must be sought in some defect of making the mould or pouring.

SPENCER BORDEN.

Fall River, Mass., July 11, 1879.

Edison's Dynamometer.—An Improvement Suggested.

To the Editor of the Scientific American:

Noticing in your last issue the dynamometer invented by Mr. Edison, it occurred to me as rather odd for him to adopt such coarse devices for measuring power, however effective they may be. Why did he not apply the principle of the tasimeter to this purpose? It seems feasible enough to a layman. Suppose the driving and driven shaft to be placed axially in line, but not connected; provide each with an arm, allow the arms to overlap each other at the ends, and place between the ends of the arms a carbon button having electrical connections as in the tasimeter. The button would be pressed more or less, according to the power consumed by the driven shaft, and its electrical conductivity would be changed with every variation of pressure.

To insure accuracy in the indications of the galvanometer, another tasimeter arranged to receive a variable amount of pressure should be connected with a switch, so that it could at any moment be thrown into the electrical circuit in place of the button carried by the arms.

If the tasimeter is so sensitive and so accurate for exceedingly small pressures, why should it not be more accurate in indicating heavy pressure? X.

The Edison Dynamometer.

To the Editor of the Scientific American:

In your issue of July 26th, you remark that Mr. Edison's new dynamometer is "in principle something like other dynamometers." Are you aware how much it is like one devised by Mr. Horatio Allen and used in the government experiments on steam expansion in 1865?

As described by Prof. Fairman Rogers, at a meeting of the Franklin Institute, March 16th, 1865, and published in my report as secretary, it appears as follows (see *Journal of the Franklin Institute*, vol. 49, page 281):

"The shaft being cut between the engine and the first fan, a grooved pulley is keyed upon the engine shaft and one exactly similar upon the fan shaft. An endless rope is laid over these two pulleys in such a way that the bight of the rope hangs down before and behind. In these bights are hung two grooved pulleys of a diameter equal to the distance of the large pulleys apart, and to these smaller pulleys equal weights, so that the rope is held tightly in the grooves of the large pulleys. The engine pulley being turned by the engine, sufficient extra weight is added to the hanging pulley on the driving side of the rope to equal the strain on the rope, which represents the resistance of the fans, when the whole system will be in equilibrium, and the amount of power to drive the fans will be measured by the tension of the rope, and consequently by half the extra weight which has been added.

"If the resistance of the fans increases by any means, the weight rises; if the resistance diminishes, the weight falls, and a spring balance is fastened to the weight and to the floor to take up these irregularities.

"A rod attached to the weight and carrying a pencil, moving over the surface of a cylinder running from the shaft, serves to register the power required to run the fans.

"By the apparatus the friction of the fan shaft can be measured and any change in the resistance from varying density of the air is immediately indicated."

HENRY MORTON.

Stevens Institute of Technology,
Hoboken, N. J., July 18, 1879.

Ocean Currents at St. Paul's Rocks.

These rocks are about 540 miles distant from the coast of South America, and 350 miles from the island of Fernando do Noronha. The group of rocks is scarcely more than half a mile in circumference, and their highest point is only 64 feet above sea level.

Their smallness is the striking feature in their appearance as they are approached. They show themselves as five small projecting peaks, which are black at their bases and white with birds' dung on their summits. A yellowish white band shows out about tide mark.

The sea was dashing up in foam at the southeast end of the rocks, and a long line of breakers stretching from the opposite end marked the course of the equatorial current. The birds were to be seen hovering over the island in thousands. Only three kinds inhabit it—two noddies and the booby. The noddies (*Anous stolidus* and *A. melanogenys*) are small terns or sea swallows, black all over, with the exception of a small white patch on the head. The booby (*Sula leucogaster*) is a kind of gannet. The full grown birds are white on the belly, with a black head and throat, the black ending on the neck, where it joins the white in a straight conspicuous line. The back is dark. The younger birds are brown all over. Some few of both birds soon came off to have a look at the ship.

We moved gradually up to the islands, sounding as we went; the Captain and Lieutenant Tiyard mounted into the foretop and steered the vessel from thence, looking out for rocks. The water is deep right up to the rocks, and a hawser was sent on shore in a boat and made fast round a projecting lump of rock, and the ship was moored by means of it in about 100 fathoms of water, although not more than 100 yards distant from shore.

Such an arrangement is only possible under the peculiar circumstances which occur here. The wind and current are constantly in the same direction, and keep a ship fastened to the rock always as far off from it as the rope will allow. I never properly realized the strength of an oceanic current until I saw the equatorial current running past St. Paul's Rocks.

Ordinarily at sea the current, of course, does not make itself visible in any way; one merely has its existence brought to one's notice by finding at midday, when the position of the ship is made known, that the ship is 20 miles or so nearer or farther off from port than dead reckoning had led one to suppose she would be, and one is correspondingly elated or depressed.

But St. Paul's Rocks is a small fixed point in the midst of a great ocean current, which is to be seen rushing past the rocks like a mill race, and a ship's boat is seen to be baffled in its attempts to pull against the stream.—*Mosely, Notes by a Naturalist.*

NEW AGRICULTURAL INVENTIONS.

Mr. Joseph S. Noyes, of Ransom Center, Mich., has patented an improved gate, which is supported on a hinged bar, so that it may be raised or lowered by the simple movement of a lever. It is also provided with a peculiar arrangement of latches.

An improved implement for leveling and smoothing the ground in preparing it to receive seed, has been patented by Mr. Charles A. Meeker, of Green's Farms, Conn. The invention consists in the combination of two sets of rollers and disks, the disks of the rear set being placed at a less distance apart than those of the forward set. The implement is provided with a scraper.

A device by which the sides and tops of hedges can be trimmed accurately and quickly, and with much less labor than by other trimmers now in use, has been patented by Mr. Henry Unkrich, of Fairfield, Iowa.

An improved machine for trimming hedges, which is so constructed as to trim the top and one side of the hedge at one operation, and which may be adjusted to work upon level or inclined ground, is the invention of Messrs. Albert G. Rogers and Harlow M. Freeman, of Lathrop, Mo.

Mr. Morris C. Pennock, of Alliance, O., has invented an improvement in churns, which is provided with a novel form of rotary dasher, and with slotted journal bearings and other new points, which render it convenient and efficient.

An improvement in the class of machines that are adapted for both distributing guano, or other fertilizer, and depositing and covering seed simultaneously, has been patented by Mr. John W. F. Gilreath, of Cassville, Ga. The improvement consists in the arrangement of parts by which the guano and seed conducting tubes or sprouts, and also the furrow-openers and seed-coverers, are simultaneously raised and lowered by the same means.

M. DE LESSEPS has issued the prospectus of the Darien Canal Company. The capital is fixed at 400,000,000 francs. Only 125 francs per share will be called up in the first instance. Interest at the rate of five per centum will be paid on the actual money received during the course of construction. M. De Lesseps estimates an income of 90,000,000 francs from the canal.

The Future of Texas.

A recent traveler in Texas, after visiting every section of the State reached by railroads, comes to the conclusion that the possibilities of the State have been vastly overrated. Toward the end of a very intelligent series of letters to the *Tribune* he says:

Texas contains 274,356 square miles. It would make five States as large as Illinois, but no just inference can be drawn from its size alone as to its capacity for sustaining population. Illinois contains fully as much first-rate agricultural land as Texas. The whole of Eastern Texas, embracing a territory larger than Ohio, consists of pine barrens, with a little arable land along the valleys of the streams. Out of the valleys the soil is sandy, and would not pay to clear and cultivate. This region will never be thickly settled. It now supports a scanty population of lumbermen and very poor farmers, who cultivate little patches along the creek bottoms. The larger streams are bordered by narrow tracts of good soil where there are some large cotton plantations. This part of the State is not a new country, and except on the opening of the lumber industry by the building of railroads, it has had no growth in recent years. Something might be done with fruit culture—a few peach orchards at Palestine have proved remarkably profitable, their product bringing high prices in the St. Louis market; but the population lacks enterprise to develop any new branch of industry.

West of the pine barrens is a broad belt of rich, black, rolling prairie country, stretching from the Red River southward almost to the Gulf, and having an average width of about 200 miles. This region may be roughly compared in area to the State of Illinois. It contains some scrub-oak forests, where the soil is poor, but fully nine-tenths of the surface is first-rate land, as good as the best prairie land in the Northwest. Rich and inexhaustible as is the soil, however, this section shows little tendency toward dense settlement. The northern portion is being subdivided into small farms, and is filling up with a good, industrious white population, but the central and southern portions naturally run to large cotton plantations. Cotton is the best crop in this whole region. Central Texas is the best cotton country in the south, and is now producing one-sixth of the whole cotton crop of the United States. It is not nearly as good a corn country as Illinois and Kentucky; and for the production of wheat, no part of it can compare with Minnesota, Iowa, and Kansas. Root crops do not succeed, the tubers being large, coarse, and watery. Some fruits do tolerably well, particularly peaches and pears, but little attention is given to raising them. Apples are brought from the north.

Further west is a broad belt of hilly or rolling country, consisting of prairies and post-oak or black-jack openings, that is too dry for agriculture, but is well adapted for grazing. This is the great cattle region. It stretches from the Red River to the Rio Grande and the Gulf. Some portions of it may eventually be cultivated, if the rain-fall should increase by climatic changes which are said to be going on along the eastern border of the whole arid region from Montana down to Mexico, but nine-tenths of its surface will always be devoted to pasturage, and will consequently support only a scanty population of herdsmen. Still further west is an immense arid region, comprising about three-fifths of the whole surface of the State. Some of it is valuable for grazing; a little, lying close to streams, can be cultivated by irrigation. A great deal is absolute desert, growing nothing but cactus and chaparral. Veins of copper and iron have been discovered in the mountainous districts, and when they are opened, as they will be when the Texas Pacific Railroad is completed to the Rio Grande, considerable population will be brought in. With all the resources of mining, agriculture by irrigation, and grazing possessed by this immense region, its population will, however, always be inconsiderable.

As a whole the State is regarded as unlikely ever to have a population greater than Ohio. A moderately dense farming population in the center, flanked by a sparse population in the east and a still sparser one in the west, grading off to a region with no inhabitants worth mentioning, is all Texas can look forward to.

Bank of England Notes.

The financial editor of the Philadelphia *Ledger* states, on the authority of official report, that the notes of the Bank of England are made from pure white linen cuttings, never from rags that have been worn. They have been manufactured for nearly two hundred years by the same family, the Portals, Protestant refugees. So carefully is the paper prepared that even the number of dips into the pulp made by each workman is registered on a dial by machinery, and the sheets are carefully counted and booked to each person through whose hands they pass. The printing is done by a most curious process in Mr. Coe's department within the bank building. There is an elaborate arrangement for securing that no note shall be exactly like any other in existence. Consequently there never was a duplicate of a Bank of England note except by forgery. According to the *City Press* the stock of paid notes of seven years is about 94,000,000 in number and they fill 18,000 boxes, which, if placed side by side, would reach three miles. The notes placed in a pile would be eight miles high; or if joined end to end would form a ribbon 15,000 miles long; their superficial extent is more than that of Hyde Park; their original value was over \$15,000,000,000, and their weight over one hundred and twelve tons.

A NEW OPTICAL DELUSION.

Mr. Sylvanus P. Thompson, Professor of Physics at University College, Bristol, England, presented a very peculiar optical delusion at the last meeting of the Société Française. Upon examining the discovery of Mr. Thompson it will be seen that it consists of two distinct phenomena, verified by the annexed engravings.

The first stroboscopic circle consists of a series of concentric rings about one twentieth of an inch in width and about the same distance apart (Fig. 1). It is not positively necessary to adhere to these dimensions, for the same can be varied in size in proportion to the audience that is to view the experiments. If the illustration is moved by the hand in a small circle without rotating it, or if it is given the

FIG. 1.



same motion that is required to rinse out a pail, the circle will revolve around its center in the same direction that the drawing moves, and will complete a revolution as the drawing completes its circular motion.

For the second experiment a black circle is drawn, the interior of which is provided with a certain number of equidistant teeth (Fig. 2). The drawing being moved in the same manner as above described, the toothed circle will also revolve, but in the contrary direction.

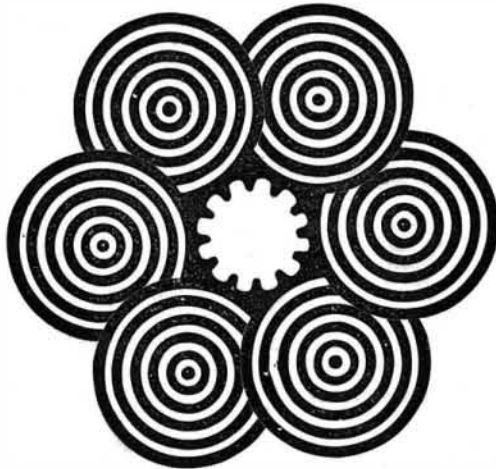
FIG. 2.



The movements are especially interesting and entertaining when the figures are combined as shown in Fig. 3.

The same result is obtained with other concentric curves as well as with circles. By means of a photographic transparency Mr. Thompson was enabled to throw the figure on a screen on a very large scale. The glass plate being moved as before described, caused the figures on the screen to rotate. In this case, also, each circle appeared to rotate around its own center.

FIG. 3.



No explanation can as yet be given for these curious and interesting facts. Mr. Thompson does not believe the property of the retina to retain images for a certain time can account for this, and we are of the same opinion. Without intending to produce a new theory, Mr. Thompson thinks it best to compare this with some other well known phenomena, from which a new property may be attributed to the eye.

Brewster and Adams have described phenomena which are equally curious and are analogous to those of Mr. Thompson. They say the eye has the property of "compensation;" that is, if an object or a movement acts upon the eye for a certain time, a sensation complementary to the real action is produced. For instance, if we gaze at the rocks in a cascade and then at the cascade alternately, for a short time, the rocks will appear to move upward; or if we examine a stream below a cascade or waterfall, we will notice that the water flows much faster in the middle than at the sides of the

stream. If we look at the middle and sides alternately the water will seem to flow backward.

These are a few of the phenomena that might be compared with those of Mr. Thompson, and which may arise from a common cause.—*La Nature*.

New Curiosities at the Smithsonian Institution.

A number of interesting specimens have, according to the *Washington Republican*, been recently added to the ethnological division of the Smithsonian Institution, among the most important of which are the following: A carved figure of a man's head, made from iron pyrites. It was found in Southwestern Mexico, and is supposed to have been an amulet, belonging to a great cazique, during the reign of the Aztecs. The work is highly polished, and presents a beautiful green and gold appearance. The eyes, nose, and teeth are brought out in bold relief, the former being composed of opals, which gleam like sparks of fire. The features are of the most pronounced Aztec type. In a large cave, about two miles from Silver City, Col., there were found some specimens of ancient remains, which are supposed to have been made by the Pueblo people. They consist of arrows, which still have remnants of their sinew shaftings, rain gods, and fetiches in carved and painted wood, tribal totems, and bundles of straw bows and arrows. All these articles are in a remarkable state of preservation, and it is thought that the cave in which they were found was formerly used as a burial place. The entire collection was presented to the Smithsonian, and will be placed on exhibition in a few days. Probably the most important relic that has been added to the museum in a long time is an obsidian vase, made from itztle, or volcanic glass. The workmanship on this vase is perfect, not a flaw having been discovered in the work. It represents a monkey in a sitting posture, with his head bent slightly forward. In the back and shoulders are apertures in which articles for ornament were placed. The carving is exquisite, and shows what perfect lapidaries the semi-civilized people who made it were, as the material of which it is composed is considered the hardest to work in, owing to its brittleness. This relic was also found in the Aztec country of Southwestern Mexico.

On the first floor, in the main hall, stands another curiosity which deserves particular attention. It is a large case, 9 feet by 4½ wide, containing numerous species of snakes, all of which are alive. Through the top, which is covered with glass, the movements of the reptiles can be plainly seen. The cage is filled with stumps of trees, grasses, ferns, and sand, and an artificial lake keeps the ground continually moist. There the reptiles have full sway, and, although somewhat repulsive, their cage is always surrounded with curiosity lovers. Some of the varieties are: coachwhips, indigo or gophers, chicken, black and garter snakes. A king snake is also among the collection, and has to be carefully watched, as he is fond of hugging his companions, and very frequently kills them, after which they make a meal for his highness. This snake is the mortal foe of the rattlesnake, who always comes out second best in their fights.

The work on the annex to the Smithsonian, in which are to be stored the Centennial exhibits and contributions from foreign governments to the United States, progresses rapidly, a large force of workmen being employed. The brick work on the lower story is nearly completed, and the beams for the floors will be placed in position during this week. Nearly two and a quarter acres will be covered by the new building, and when completed it will be a great ornament. A visit to the Smithsonian will well repay all lovers of interesting and curious relics.

Hygienic Effects of Sea and Mountain Air.

This is the time of year when many families leave their homes in the city, for the more invigorating mountain or seashore air, anxious to go where they may derive the most health giving benefit, and still are undecided which way they will go, to the mountains or seaside. To such persons the following extract from a recent work by Dr. C. Alberto, a celebrated Italian physician, may be an aid in helping them to decide:

"The marine air," says the learned doctor, "produces the same benefit as that of the mountain, but each has a different *modus efficiendi*; the former acts more forcibly and energetically on the constitution which retains some robustness and internal resources to profit by it, while the second acts more gently, with slower efficacy, being thereby more suitable to the weaker and less excitable organizations. From this important distinction, the conscientious physician, who takes the safety of his patient much to heart, ought to be able to discriminate whether the alpine or the marine atmosphere is the better suited to the case he has before him."

MM. BANCEL and Husson have communicated to the Academy of Sciences observations on the phosphorescence of the flesh of the lobster. They consider it due to a fermentation in which carbo- and phospho-hydrogens are liberated, and which is destroyed by putrefaction, just as the bacteria of carbuncle are destroyed by the vibriones of putrefaction.

NOVEL USE OF ETHER.—A prisoner, named Uhlmann, recently barricaded himself in his cell at Vevey, Switzerland, and defied the gendarmes to take him before the judges. It was not thought advisable to shoot him, and the court would not wait till he was starved into surrender, so ether was thrown into the cell until he became sufficiently stupefied to be harmless.