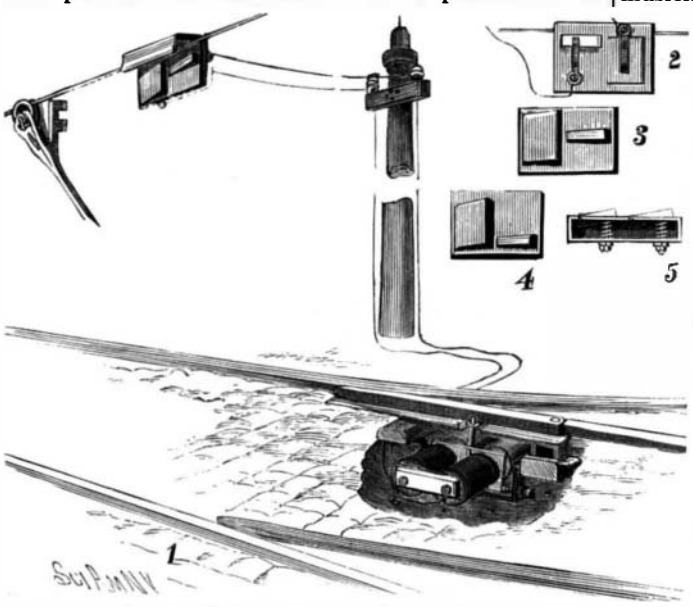
### AN ELECTRICALLY OPERATED RAILWAY SWITCH.

The illustration represents an electrically operated switch mechanism designed to automatically switch the cars from one track to another without action on the part of the motorman. The improvement has



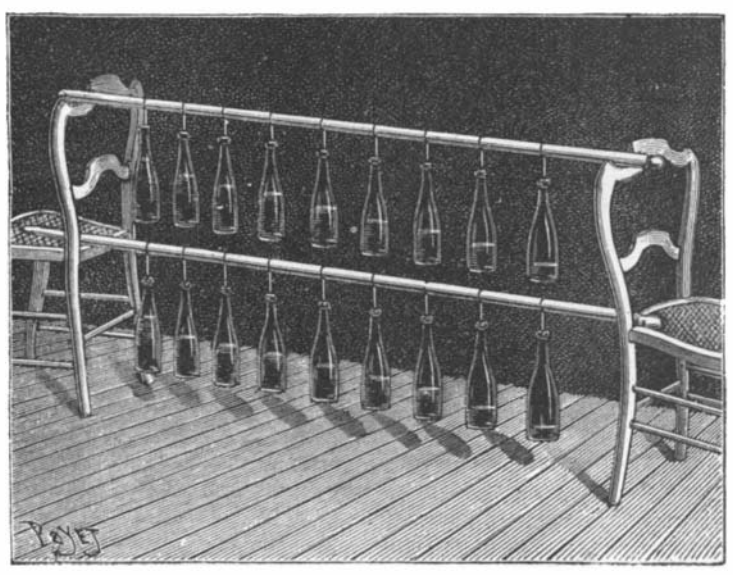

BROWNE'S ELECTRICALLY OPERATED RAILWAY SWITCH.

been patented by Walram S. Browne (Manufacturers' Paper Company), box 683, New York City. The main view illustrates the application of the improvement, and the small figures show further details of the contact devices. The improvement contemplates there being several switches on the line, and adjacent to each one are switch-operating magnets with pivotally mounted armature engaging a switch point in such way that when either of the magnets is excited the switch point will be correspondingly moved. The trolley wire is held in place in the usual way, and on it, near each switch, is a stationary contact device comprising a frame or casing with angular upper portion, and having at one edge a clamp which engages the wire, the contact plates preferably moving in recesses or openings in the casing when engaged by the contacts carried by the car. The car contacts are lugs bent outwardly from one side of a plate at the end of the trolley pole, and are in electrical communication with the trolley wheel, to utilize the trolley wire current to operate the switch mechanism. As shown in Fig. 2, the contact plates have springs to hold them normally in position to be engaged by the car contacts, and the springs are connected by circuit wires through the trolley wire supports with the switch-operating magnets. As shown in Figs. 3, 4, and 5, the casing of the stationary contacts is hollow, and the contacts are hinged at the edges of openings, with their outer faces inclined, and have stems on which are coiled contact springs. As the car approaches one of the switches, one of the car contacts engages the stationary contacts on the trolley wires to actuate the switch point and set the switch as desired, the car contacts being arranged to actuate only the particular switch or switches designed to be moved.

### THE MUSICAL BOTTLES.

The accompanying figure represents a simple and easily constructed musical instrument. It consists of a number of ordinary glass bottles filled with a certain quantity of water, the height of which is varied according to the pitch of the note to be obtained. After a few tentatives, it will be possible to reproduce all the notes and their octaves, including the sharps and flats. The tuning of the apparatus, however, requires a good musical ear.

The bottles are suspended by the neck, by means of strings, from two broom handles resting upon the backs of two chairs. In order to produce the sound, the bottles are struck with two rulers, or, better, two drum sticks. With this arrangement, airs in two parts may be played; and there may be two performers, one playing on one side without interfering with the performer on the other side. In the hands of good musicians this apparatus is very pleasant to listen to. —G. Tissandier.



THE MUSICAL BOTTLES.

### Large Gifts to Libraries.

In a recent number the Critic gives detailed lists of the large gifts of money that have been made for libraries in this country. The splendid record it has to present it hopes may inspire other rich men to go and do likewise. Here are the facts collected:

New York Public Library.—Astor Foundation—John Jacob Astor, $400,000; William B. Astor, upward of $550,000; John Jacob Astor, $700,000. The value of the total endowment of the Astor Library on December 31, 1894, was $2,105,871.87. Lenox Foundation—Mr. James Lenox's gifts to the Lenox Library from 1870 to 1880 (the year of his death) were, in 1870, $300,000; 1871, $100,000; 1872, $100,000; 1874, $130,000; 1875, $85,000; 1876, $20,000; total, $735,000, besides books, works of art, etc., and ten lots for the library's site. The value of all these gifts has considerably increased—especially that of the real estate. Tilden Foundation—The amount already handed over by the Tilden estate to the New York Public Library is something over $2,000,000. The total amount the library is expected to realize from this source is set at $2,125,000.

By the will of the late John Crerar, the John Crerar Library, of Chicago, was made his residuary legatee, but with a provision that the executors of the estate should use their discretion as to the time of the payment of this bequest. Under this will the directors of the John Crerar Library have received from the trustees and executors of the estate the sum of $1,851,131, and they have been informed that the trustees still hold for the library property of an estimated value of $863,060. This would make the total amount of Mr. Crerar's bequest $2,714,191.

The bequest of Mr. Walter L. Newberry to the Newberry Library, of Chicago, was one-half of his estate, which, at the time the bequest became available and was set apart for the library, was valued in round numbers at $5,000,000, thereby making the endowment to the library $2,500,000.

The gifts made by Mr. Carnegie to the library in Pittsburg, Pa., bearing his name are $800,000 for the erection of the main building, $300,000 for the erection of branch buildings, and an endowment of $1,000,000 for the maintenance of the art gallery and museum—a total of $2,100,000. Altogether Mr. Carnegie has within the last few years given more than $4,000,000 to the cause of public education in its wider sense—for the libraries erected by him almost invariably are devoted to music, art, and science as well. The principal of these are at Allegheny ($300,000), Homestead ($400,000), Braddock, and Johnstown, Pa.; Fairfield, Iowa; and Edinburgh, Ayr, and Dunfermline, Scotland.

Mr. Enoch Pratt offered the city of Baltimore, on January 21, 1882, a library building, costing about $250,000 and an endowment of $833,333.33, on condition that the city create a perpetual annuity of $50,000, payable to a board of trustees, named in the first instance by Mr. Pratt and having the right to fill vacancies in their own number. This offer was accepted and the library founded.

The property bequeathed by Dr. Rush for the establishment and support of the Library Company of Philadelphia amounted to about $1,060,000.

The endowment which Mr. Mortimer Fabricius Reynolds made for the Reynolds Library, of Rochester, consisted of real estate, which is valued at present as being worth certainly over $500,000, and probably $600,000.

Mr. Leonard Case gave during his life to the Case Library, of Cleveland, $20,000 in government bonds, besides smaller sums from time to time, amounting in all to, say, $25,000. In 1876 he gave real estate, then valued nominally at $300,000, but now worth $500,000. The total value of the endowment of the Case Library is now estimated at $600,000.

The Minneapolis Public Library was built, and is at present sustained, for the most part, from the product of taxes. Of the original cost of the building ($360,000), however, about $61,000 came from private subscriptions, usually of $5,000 each. Moreover, there is combined with the library, for the term of ninety-nine years, a proprietary institution, the Minneapolis Atheneum, which has funds amounting to $200,000. This property was the gift of a certain Dr. Kirby Spencer, a citizen who died about 1860, bequeathing his estate in this way. At the time of his death, the property, which was in real estate, was far less valuable than now. It yields a varying income, sometimes above, sometimes a little below, $8,000 a year. This sum is used to supplement the funds derived from taxes, amounting during the present year to about $54,000.

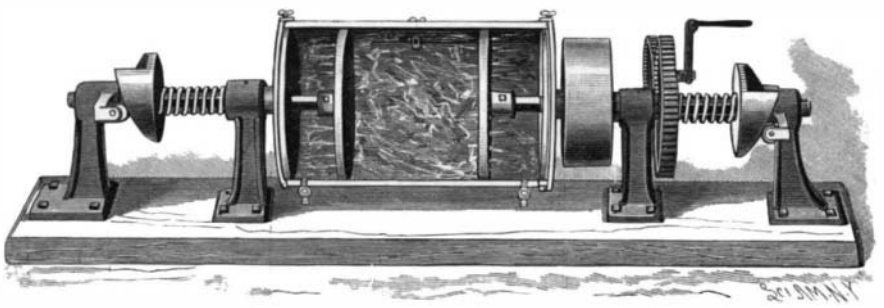
The executors received in 1881, under the will of Judge Forbes, of Northampton, Mass., $252,260. The money was suffered to accumulate for ten years, in accordance with a provision of the will and a vote of the town. In 1894 the executors delivered to the trustees appointed by the city a building and lot which had cost $128,994, $1,350 of other non-productive property, and funds amounting to $355,565. This is the real endowment of the library, and not the amount originally received.

Mr. George Peabody endowed the Peabody Institute, of Baltimore, with $1,240,000, but as the Peabody Institute, besides a library, includes a conservatory of music, an art gallery, and a course of lectures, and all of these are in part or wholly supported from the income of this endowment, it is almost impossible to state just what the endowment really is.

To the above list must be added the recent bequest to Princeton University of a library which is to cost over $600,000. The design of the building will be carried out upon the lines so common in the English universities. It is to be made the most complete and perfect university library of its kind in this country.

### AN IMPROVED WASHING MACHINE.

A machine designed to rapidly force the washing liquid many times through the clothes with the least possible expenditure of labor or power, and without danger of injury to the clothes, is shown in the accompanying illustration, and has been patented by William Acheson, of No. 2307 Penn Avenue, Pittsburg, Pa. The cylindrical clothes receptacle has in its periphery a removable cover, through which are introduced the washing liquid and the clothes to be washed, and its heads have hubs which turn in bearings on suitable standards. The water is forced through the clothes by reciprocating perforated plungers or dashers whose squared shafts slide in and turn with the hubs, there being on one of the hubs a pulley to be connected by belt with a source of power, or the machine may be operated by hand through a gear wheel on the hub, which meshes with another gear wheel actuated by a crank. The reciprocating motion is given to the plungers by double cams on the outer ends of the plunger shafts, the cams engaging friction rollers to give inward impulses, while the return motion is effected by springs coiled on the shafts. The cams being double, two full strokes are given to the plungers during each revolution of the receptacle, and therefore, with the machine running at a speed of twenty-five revolutions a minute for fifteen minutes, the washing liquid will be forced through the clothes and back again 750 times. The receptacle has outlet faucets for discharging the wash water when desired.



ACHESON'S WASHING MACHINE.

### How Piling is Driven in Bavaria.

Henry A. Carpenter, United States commercial agent at Furth, Bavaria, writing of the opening in that country for American manufacturers, says:

"The manner of driving piling here would indeed make an American contractor smile. The method is as follows: A simple block and fall arrangement is rigged over the pile and to the end of the rope running on the pulley, and fastened to the weight are about twenty-five smaller ropes with hand pieces. Twenty-five men grab these and at a signal from one of their number, all pull together. The weight goes up about eighteen inches or two feet, when the men relax their hold and the weight drops. It is unnecessary to state how long it takes by such a method to drive a pile, or how much more effectively a small dummy engine would do the work. In the erection of buildings the same tedious process is employed; for every stone to be raised requires the strength of a pair of horses and about fifteen men tugging away at the ropes. The machinery manufactured and used in America for such purposes would do away with this clumsy method."

### The Spitting Habit and Spread of Consumption.

In England and Wales, according to Dr. W. Murrell, from 50,000 to 60,000 people die annually from consumption; and another 50,000 from other tuberculous diseases. From 1848 to 1880, 1,702,002 deaths were registered due to phthisis, the majority being young adults. No other disease claims an equal number of victims. Its infectious nature being well recognized, every effort should be put forth to minimize its communicability. Among the many means by which this dread disease may be disseminated, one of the most prevalent arises from the consumptive's expectorations. This sputa, as bacteriologists have shown us, carries the tubercle bacillus in varying quantities. When dried, these germs are taken up by the atmosphere, then inhaled by the well and sick.

By this means there is no reason to doubt that phthisis is often conveyed directly to individuals. It has been proved beyond a reasonable doubt that these diseased germs are also given off by the consumptive's breath and that husbands have taken it from wives and wives from husbands. We have here a source of infection to which enough attention has not been given. Of all the filthy habits to which a considerable portion of our people are given, perhaps the very worst is the spitting habit.

No place is too sacred for them to pollute. On the street, on cars, boats, in stores, in our homes, we are constantly reminded of the passage of the spitter. Ladies trail their gowns through this filth, bring it into their homes, when, having dried, the bacteria are given off with every movement of their garments. That the consumptive may cause a health resort to become a place to be shunned is exemplified in the case of the Riviera. Its climate is most salubrious, and when consumptives first went there this disease was an unknown quantity; now it has become as firmly established there as in any consumptive country. The air and soil have become so contaminated that the natives have fallen victims to this disease. The washerwomen in particular have been attacked. The Riviera is no longer a health resort, but a place to be avoided by weak lunged persons. California's beautiful climate has brought thousands of consumptives there for their health. In the southern portion of the State in particular there are evidences already that this disease is spreading to those who have heretofore felt that there was no danger in living among consumptives. In a word, may not foci for the spread of phthisis be already established in various towns, due to the contamination of soil and air? If so, how long will it be before these towns will cease to send out alluring advertisements welcoming the consumptive to come and make these places their homes? Not very long we believe after the masses have learned the truth concerning a disease which carries off more persons annually than any other single disease. The danger of dissemination can be greatly minimized by regulating the care of consumptives. Indiscriminate expectoration must not be tolerated. Hotels should have some disinfective fluid to be daily put into the cuspidors about the offices and halls. The same method should be carried out in all public buildings. The handkerchief should be used, as a rule, by every person when it becomes necessary to expectorate. Consumptives should have pieces of cloth or paper which can afterward be burned. What a travesty this is on our boasted civilization to see signs with these words, "No spitting on the floor," meeting us at every turn.—Pacific Medical Journal.

### Animal Antipathies.

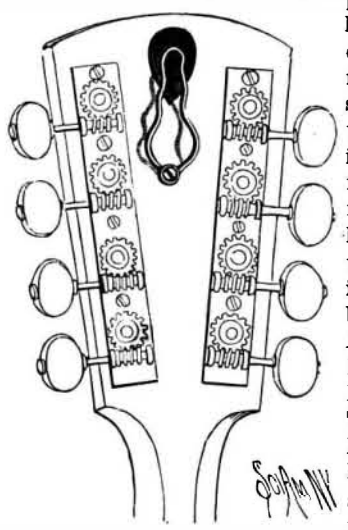
A correspondent of the London Spectator describes a curious scene witnessed at the Zoological Gardens. He had for companion a gentleman, now dead, who was a dwarf, and walked with crutches. "As soon as the tiger saw him he lashed his tail, and finally stood up on his hind legs against the bars and remained in a state of great excitement. We who saw it at the time were much struck by the sight, though whether its behavior was due to alarm or intense curiosity we could not tell." Probably the tiger's excitement was due to neither, but to the latent antipathy which many animals feel for anything abnormal, either in their own species or even among others with which they are well acquainted. It is the feeling which prompts storks or rooks to destroy at once the young of other birds which are hatched from eggs placed in their nests, and dogs to bark at cripples or ragged beggars, or, as in this case, roused the dislike of an observant Zoo tiger who saw men of normal size and proportions pass every day before its cage.

The belief in permanent antipathies among animals is very ancient. It appears in all the monkish tertiaries. There the otter is always the enemy of the crocodile, and the unicorn of the elephant; while the dragon is hated by the hart, and in turn dislikes all beasts, including the panther, whose exquisite perfume, so agreeable to all other animals, disgusts the dragon, who runs away the moment he smells it. Turning from legend to facts, we find that animal antipathies have a range as wide or wider than the instinctive dislikes of men. They are in part exactly the same in kind as the latter, one animal exciting in another exactly the same disgust that a baboon or a black beetle does in the minds of many human beings; but the list of hereditary enemies—of one species which is the sworn foe of another, and has left in the weaker species an inbred and ancient sense of horror and fear—is far longer than the list of hereditary enemies of the dominant species—man.

Instances of purely instinctive, inexplicable antipathy are naturally the least common, but they are very marked and definite examples. It is quite impossible, for instance, to account for the intense disgust which the camel excites in horses. They have been associated in many countries for centuries in the common service of man, and early training makes the horse acquiesce in the proximity of the creature which disgusts him. Otherwise it is far more difficult to accustom horses to work with camels than with elephants, precisely because the repugnance is a natural antipathy, and not a reasoned fear. They get used to the sight of an elephant, but the smell of a camel disgusts and frightens them. English horses which have never seen a camel refuse to approach ground where they have stood. Recently a traveling menagerie was refused leave to encamp on a village green in Suffolk, not because it was not welcome, for a wild beast show is always vastly popular, but because the green was also the site of a market, and the farmers' gig horses invariably refused to be driven across it after camels had stood there. Yet recently two bears were being exhibited in Harley Street, and no horse showed any fear of them. One horse almost touched the larger bear, but neither it nor the team of a four-in-hand which passed showed any nervousness.

### A MUSICAL INSTRUMENT ATTACHMENT.

The illustration represents an attachment for mandolins, guitars, etc., played by the use of a pick or plectrum in the hands of the performer, whereby the pick may be conveniently supported and always at hand with the instrument while not in use, while readily removable from its holder for playing when required. The improvement has been patented by Adam G. Mahler, of No. 107 East One Hundred and Twenty-fifth Street, New York City. The holder is formed of a single piece of spring wire, bent as shown in the engraving, and having its ends formed into segmental eye parts adapted to be engaged by a small screw and washer, by means of which the holder is attached to the neck of the instrument. The holder may, if desired, be secured to some other part of the instrument, and is equally well adapted for holding other forms of picks.



MAHLER'S PICK HOLDER.

### Well Water.

The drainage into wells is often very bad, with the result of typhoid fever and many other germ diseases. On account of this danger, Dr. Koch suggests that an iron tube two or three inches in diameter—with its lower end perforated—be placed in the center of the well, and the surrounding space filled with fine gravel up to the highest point of water level. This is then covered with sand to the top of the well; and a pump attached to the end of the tube makes a very effective tube well. All water in passing through the layers of sand and gravel is effectively filtered, and the nitrifying organisms change the filth into harmless nitrates. A filter bed like this removes, too, from 80 to 90 per cent of the bacteria, and greatly, very greatly, lessens the danger to which all are subjected who drink shallow well water.—Popular Science News.

### Counting and Tying Postal Cards.

Two of the most interesting automata now working within the limits of the United States are those used by the government for counting and tying postal cards into small bundles. These machines were made in Connecticut, and the two are capable of counting 500,000 cards in ten hours and wrapping and tying the same in packages of twenty-five each. In this operation the paper is pulled off a drum by two long "fingers" which come up from below, and another finger dips in a vat of mucilage and applies itself to the wrapping paper in exactly the right spot. Other parts of the machine twine the paper around the pack of cards and then a "thumb" presses over the spot where the mucilage is, and the package is thrown upon a carry belt ready for delivery.—The Argosy.

### Science Notes.

At the recent B. A. meeting Prof. S. P. Thompson suggested, says the Electrical World, that X rays may be the ordinary means of optical communication among fire flies, and that, for that reason, Providence had not found it necessary to furnish the insect's eyes with a lens.

Sir John Eric Erichsen, who died recently, was born at Copenhagen in 1818, but was brought up in England. He became professor of surgery and surgeon to University College Hospital in 1850, and was elected president of the College of Surgeons in 1880. It is not too much to say that the name of Erichsen is known to every surgeon throughout the civilized world.

Prof. Lewis Swift, of the Mount Lowe Observatory, California, discovered a bright comet just about sunset on Sunday, September 20. The comet was only one degree from the sun. The next evening he observed the comet again, and found that, in consequence of its recession from the sun, it had diminished in brightness.

Nature records the death of Mr. W. C. Winlock, known for his contributions to astronomy. Mr. Winlock was assistant in charge of the office of the Smithsonian Institution. The death is also announced of Dr. J. P. E. Liesegang, a voluminous writer on photographic matters, and the founder of the Photographische Archiv; and of Dr. J. A. Moloney, who took a prominent part in the Stairs expedition to Katanga.

Experiments show that a light of one candle power is plainly visible at one mile, and one of three candle power at two miles. A ten candle power light was seen with a binocular at four miles, one of 29 at five miles, though faintly, and one of 33 candles at the same distance without difficulty. On an exceptionally clear night a white light of 3·2 candle power can be distinguished at three miles, one of 5·6 at four, and one of 1·2 at five miles.

M. Peres has investigated the cause of the severe gastric troubles which occasionally follow the eating of pâte de foie gras, and finds that they arise from the presence of an excess of oxalate of potassium in the goose liver. It appears that the producers of these diseased livers are wont to shorten their period of development and to produce larger livers by administering to the bird salt of sorrel, otherwise called binoxalate of potash. This process has, heretofore, been kept carefully secret, says the American Druggist.

M. Moissan has found that when acetylene is allowed to impinge upon pyrophoric iron, which has been reduced by hydrogen at the lowest possible temperature, the gas is decomposed with incandescence into its constituents. At the same time condensation takes place, and a liquid hydrocarbon, rich in benzine, is produced. The same result is obtained if pyrophoric nickel or cobalt is substituted for the iron. No gaseous compound of either metal is obtained, and he concludes that the decomposition is due to physical causes.

There is a means of physical investigation known whereby we may ascertain how many atoms there are in the molecule of a solid substance dissolved in a liquid, says the Progressive Age. This is to find out how much a given quantity of the substance dissolved raises the boiling point of the solvent liquid. This alteration in the boiling point depends on the number of molecules dissolved; and the number of molecules depends, of course, on the number of atoms in the molecule. Orndorff and Terrasse, applying this method, have found that sulphur dissolved in boiling bisulphide of carbon, or benzol, or toluol, has nine atoms in its molecule; while in boiling carbolic acid or naphthalene it has eight. In boiling monochloride of sulphur it has only two.

In a letter to the editor of Nature, Prof. A. E. Munby says the cheap production of acetylene has come as a great boon, and is now in regular use for laboratory blowpipe work. The apparatus in use consists of an aspirator holding about fifteen liters, permanently connected with a water supply, and possessing a quarter inch aperture exit tap—the water flows in from below to minimize absorption; at the top a three hole rubber cork carries an upright pipe, passing through the table, which serves for filling the aspirator with gas or using the gas on the table, a second pipe goes to the blowpipe, and a third carries an open mercury manometer. For filling the jar the calcium carbide is placed in a four ounce bottle, closed by a cork carrying a small separating funnel from which the water drops; the gas passes to the aspirator through a wide glass tube, which acts as a reversed condenser, returning most of the water vapor to the bottle. With the large exit to the aspirator the gas can always be collected under a reduced pressure of several centimeters of mercury, which quite provides against any sudden rushes of gas; the operation takes some ten minutes, and requires practically no attention. In using the gas the water is turned on with all taps closed for a few seconds, to correct any reduced pressure caused by absorption, as shown by the gage—this is very slight indeed—and then the gas tap fully opened and the flame regulated entirely by the water entrance. To bring the gas into use takes hardly any longer than with an ordinary gas blowpipe.