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Portable Gas Generator.

The proprietors claim for the gas generator, illustrated in the accompanying engravings, which they style the "Columbia Portable Gas Generator," that it is superior in cheapness, safety, economy, and durability, to any apparatus heretofore offered to the public. The machine is now on exhibition at 708 Broadway, and will, we understand, be exhibited at the coming Fair of the American Institute, commencing in the early part of September.

The machine has certainly the merit of simplicity, and we are told works well even in cold weather, without the aid of heat, consuming gasoline of the density of 85°, without condensation. In warm weather much heavier fluid may be used.

The machine consists essentially of two parts, an air compresser or forcing apparatus, and an apparatus for charging the air with the hydrocarbon vapor.

A barrel or case, A. Fig. 1, is divided by a diaphragm, B, Fig. 2, into two compartments or chambers, which communicate with each other by means of the pipe, C. The fluid is put into the case through a supply cock, not shown, and rises to a common level in both compartments. In operation this fluid circulates more or less through the pipe, C, between the compartment containing the carburizing apparatus to the chamber containing the air-forcing apparatus. The denser portions of the fluid are, by revolving drums, D, E, Fig. 2, kept constantly stirred up, mingled and vaporized with the lighter portions.

The drum, lettered E, is the air-forcing drum. It consists of a set of buckets extending spirally as shown in Fig. 3, from the hollow shaft, F, Fig. 2. It rotates in the reverse direction from that of an overshot water wheel, and in so doing carries the air which enters the chamber through the pipe, G, under the surface of the fluid. Thence the air passes through the perforations in the hollow shaft and through the shaft into the carburizing chamber, passing out of perforations in the shaft into the buckets of the carburizing drum.

This drum is similar in construction to the other, but it is smaller and has a less number of buckets. In the hollows of these buckets is placed felt, wool, or other capillary and absorbent material, which is kept constantly saturated in passing through the hydrocarbon liquid, and the air in passing out through this material becomes charged with illuminating vapor, or gas. In this state it is passed through the pipe, H, into the chamber, I, whence it is passed to the service. The chamber, I, acts as a storage for the gas, so that enough will be kept therein to supply the burners when winding up the machine.

The carburizing drum has its buckets placed in a reverse position on the shaft to those of the forcing drum or compresser.

The power used to drive the machine is a weight and cord, acting through a shaft, pulleys, and belt. The weight is wound up in the usual manner.

Patented January 1, 1870. For further information address J. C. Dial, President Columbia Portable Gas Light Company, Columbia, S. C., or E. C. Plumer, 708 Broadway, New York city.

Fig. 1

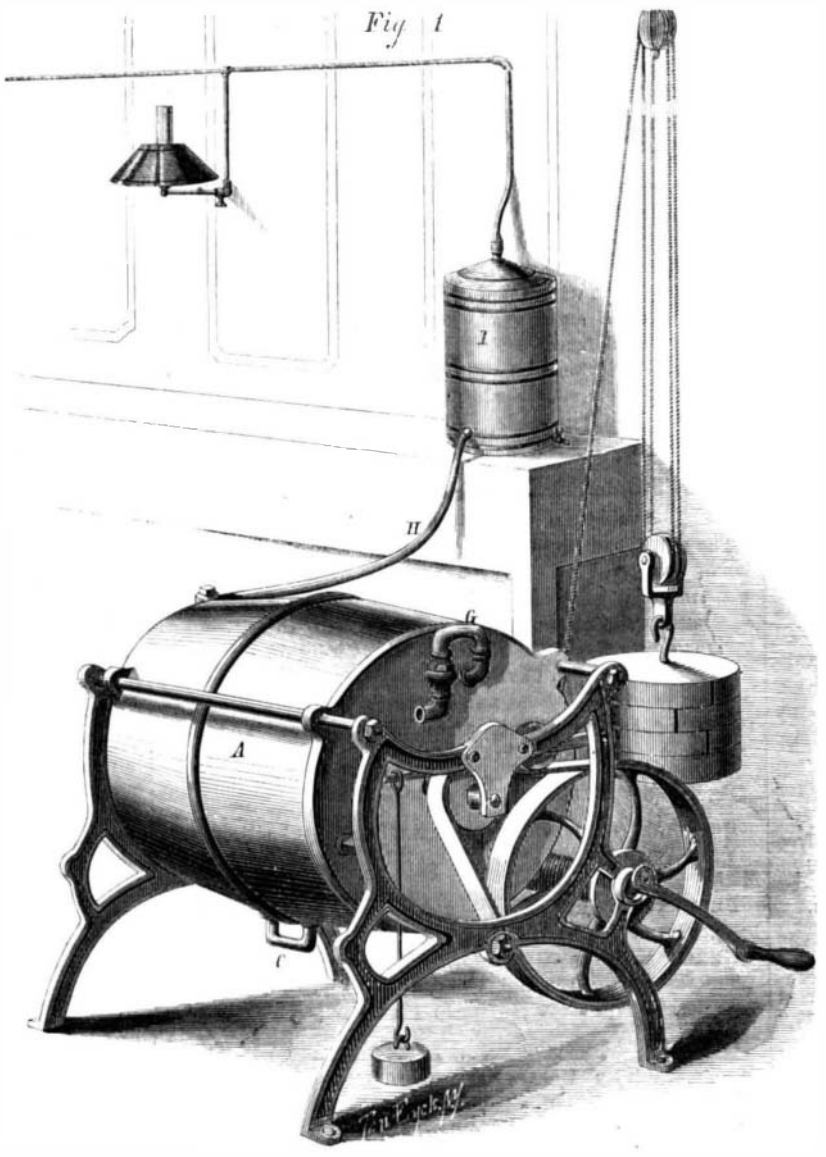
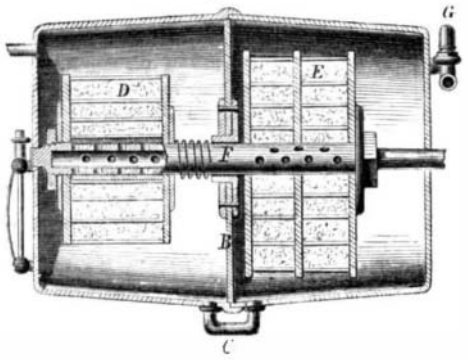


Fig. 3

Fig. 2



RICHARD AND PLUMER'S PORTABLE GAS GENERATOR.

Bleaching Shellac.

The bleaching of shellac is generally effected on a large scale by chlorine or some of its compounds, or by sulphuric acid; the bleached article costs more than twice as much as the unbleached. The bleached shellac is frequently dissolved in spirits of wine for use as a varnish by cabinet makers. This varnish is apt to stain any inlaid metallic ornament upon the furniture, or any metal attached to it, in consequence of the varnish retaining a small proportion of the bleaching compound in solution. Another process of bleaching may be adopted which renders the varnish free from this objection, and very much reduces the cost of the bleached shellac or seed lac. This process consists in the use of animal charcoal as a bleaching powder. It is prepared in the following manner:—Any quantity of yellow shellac, previously broken in small pieces, is conveyed into a flask, alcohol of 0.83 sp. gr. poured upon it, and the whole heated on the hob, or, in the summer, in the sun, until the shellac is dissolved; upon this so much coarsely powdered animal charcoal is added to the solution that the whole forms a thin paste; the flask is closed, not quite air tight, and left so for some time, exposed to the sun; and in eight to fourteen days a small sample is filtered, sufficient to ascertain whether it has acquired a light yellowish brown colour, and whether it yields a clear, pure polish on light coloured woods. If this be the case, it is filtered through coarse blotting paper, for which purpose it is best to employ a tin funnel with double sides, similar to those employed in filtering spirituous solutions of soaps, opodeldoc, etc. The portion which first passes through the filter may be preserved separately, and used as a ground or first polish. Then some more spirit is poured over the charcoal upon the filter, and the solution used as a last coating. The solution of shellac purified by animal charcoal has a brown yellow colour, but it is perfectly clear and transparent; when diluted with alcohol, the colour is so slight that it may be used in this state for polishing perfectly white wood, such as maple, pine, etc., without the wood acquiring the least tint of yellow.

"Nothing New under the Sun."

Photography only adds another instance to the many on record which prove the truth of Solomon's saying: "The thing that hath been is that which shall be, and there is no new thing under the sun."

Humboldt, in his *Cosmos*, states that the Chinese had magnetic carriages with which to guide themselves across the great plains of Tartary, one thousand years before our era, on the principle of the compass. The prototype of the steam engine has been traced to the æolipyle of Hero of Alexandria. The Romans used movable types to mark their pottery and indorse their books. Mr. Layard found in Nineveh a magnifying lens of rock crystal, which Sir D. Brewster considers a true optical lens, and the origin of the microscope. The principle of the stereoscope, invented by Professor Wheatstone, was known to Euclid, described by Galen fifteen hundred years ago, and more fully in 1599 A. D., in the works of Baptista Porta. The Thames Tunnel, thought such a novelty, was anticipated by that under the Euphrates at Babylon; and the ancient Egyptians had a Suez Canal. Such examples might be indefinitely multiplied, but we turn to photography. M. Jobard, in his "*Nouvelles Inventions aux Expositions Universelles*," 1857, says a translation from German was discovered in Russia, three hundred years old, which contains a clear explanation of photography. The old alchemists understood the properties of chloride of silver in relation to light, and its photographic action is explained by Fabricius in "*De Rebus Metallicis*," 1566. The daguerreotype process was anticipated by De la Roche in his "*Giphantie*," 1760, thought it was only the statement of a dreamer.

In Dr. Hooper's Rational Recreations," 1774 is the following method of writing on glass by the rays of the sun. "Dissolve chalk in aquafortis to the consistence of milk, and add to that a strong dissolution of silver. Keep this liquor in a glass decanter, well stopped. Then cutout from a paper the letters you would have appear, and paste the paper on the decanter, which you are to place in the sun, in such a manner that its rays may pass through the spaces cut out of the paper, and fall on the surface of the liquor. The part of the glass through which the rays pass will turn black, and that under the paper will remain white."

In 1802, Thomas Wedgewood and Sir Humphry Davy contributed to the *Journal of the Royal Institution* a paper on "An Account of a Method of Copying Paintings upon Glass, and of making Profiles by the Agency of Light upon Nitrate of Silver." Let us take an extract or two from this paper, first reminding our readers that Daguerre did not announce his invention till 1839. "White paper or white leather," says the memoir, "moistened with solution of nitrate of silver, undergoes no change when kept in a dark place; but on being exposed to the daylight speedily changes color, and, after passing through different shades of gray and brown, becomes at length nearly black. The alterations of color take place more speedily in proportion as the light is intense. When the shadow of any figure is thrown upon the prepared surface, the part concealed by it remains white, and the other parts speedily become dark. For copying paintings on glass, the solution should be applied on leather; and in this case it is more readily acted on than when paper is used. The copy of a painting, or the profile, immediately after being taken, must be kept in an obscure place." The instruments Wedgewood and Davy used were the camera obscura and the solar microscope; the images produced, however, by the former, were "found too faint to produce in any moderate time an effect upon the nitrate of silver." Davy says: "Nothing but a method of preventing the unshaded parts of the delineations from being colored by exposure to the day is wanting, to render this process as useful as it is elegant."—*Eclectic for September.*

Boiler Explosion.

The boiler of a steam tug, the *Carrie*, went off on the 11th instant, scalding the engineer severely. On inspection, it was found that a soft patch had been inserted, that the iron was quite rotten, and in many places corroded down to a sixteenth of an inch in thickness.

The unusual capability of this boiler, as a means of scattering death and destruction, will be obvious to our readers; and they will feel sure that it had been declared safe by a government inspector. This was the fact; the examination took place in August, 1870, and the boiler was certified as being capable of carrying sixty pounds of steam. This is an additional testimonial to the value of our system of boiler inspection, and to the capability and knowledge of the inspectors. A few more such occurrences will convince the New York public that the question is really worthy of consideration and attention.

The Reading Room of the British Museum.

[Condensed from *All the Year Round.*]

Over the entrance of the great reading room of the British Museum is appropriately placed the bust of the late Mr. Panizzi—the founder, as he may be called. The huge domed hall behind him, his work and monument, is one of the wonders of Europe, now reaching to a considerable number.

The entrance to this hall is beset with difficulties. At the gate of the museum, on a day when the reading room only is open, the policeman and warders challenge the visitor with a "Reader, sir?" Allowed to pass, he crosses the open space, ascends the steps, enters under the portico, and finds himself at the great hall, with more police and warders. Any signs of indecision, and he is sure to be challenged, "Reader?" If he crosses boldly, and makes for the glass door, where there is another janitor with a list, he is stopped once more, and made to show his passport, unless he have what is called at the theatres "a face admission." Down the long passage he goes, gives up great coat, stick, umbrella, parcels; passes through glass swinging doors, past other detectives, and finds himself in the monstrous cathedral dedicated to learning, and, as some say, also to idleness.

It would be hard to give an idea of the first *coup d'œil;* for there is literally nothing like it. It has the look nearly of a cathedral, with all the comfortable, furnished air of a "snug" library. Coloring for the sides is furnished by rows of the books themselves, which run round the walls to a hight of some forty or fifty feet, and are reached by two light galleries. In the center of the room is a round counter, within which sit the officials, and which communicates with the library outside by a long avenue shut in by glass screens. Outside this counter is another, which holds the enormous catalogue, reaching to some hundred volumes; and from this second counter radiate the desks for the readers. Nothing more comfortable or convenient can be conceived. You have a choice in seats even: hard smooth mahogany or softly cushioned; both gliding smoothly on castors. In the upright back of the desk is a little recess for ink and pens, steel and quill; and on each side a leathern handle. One of these pulls out a reading desk, which comes well forward, and swings in any direction, or at any hight: the other forms a ledge on which books can be piled up and be out of the way. A blotting pad, paper knife, and convenient pegs under the table for putting away hats, etc., complete the conveniences. There are over five hundred of these, each having a number and letter. There are, besides, a number of what might be called "research" tables—small, low, flat, and broad, which an antiquarian may have all to himself; and the lid of which lifting up, he finds a convenient repository, where he can store away all his papers, notes, and books until he returns the next day. Some of the more retired of the long benches are reserved "for ladies only;" but they do not seem very much to care for such seclusion.

Round the room, and within easy reach, is a sort of free library, where every one can help himself. This, as will be imagined, consists of books of general reference, and is very judiciously chosen. It comprises dictionaries of all languages, the best, newest; encyclopædias of every conceivable sort; long lists of the old magazines, like the "Gentleman's," "Annual Register," etc.; ambitious collections of universal science and knowledge, such as the "*Panthéon Litteraire,*" and "Didoret's Encyclopædia;" histories of towns and counties in profusion, and the best and most favorite text books in the respective classes of law, theology, medicine, mathematics, physiology, etc. The only weak place is the class of English *belles lettres* and biography, which is ordered after a very random and arbitrary fashion, comprising such poor books as "Beattie's Life of Campbell," but not "Moore's Life of Sheridan," having "Twiss's Life of Eldon," and no "Life of Sterne," and being without Mrs. Oliphant's remarkable "Life of Irving." In fact, it would be hard to say on what principle the choice is made.

Having chosen a seat—and if you come late in the day you have to take a long, long walk seeking one—go to the catalogue for your book. And here we may pause to survey this wonderful catalogue, a library of folios in itself Every volume is stoutly bound in solid blue calf, with its lower edges faced with zinc, to save wear and tear from the violent shoving in of the volumes to their places. On every page are pasted about a dozen neatly lithographed entries, and between the pages are guards, so as to allow fresh leaves to be put in, as the catalogue increases. As the guards are filled up, the volume is taken and rebound with fresh guards, so it becomes an illustration of the famous Cutler stocking, with this difference, that the stocking is gradually increasing in size. Nothing can be fuller than the arrangements for this catalogue, as it even refers you for a biographical notice of a well known man to some of those little meagre accounts prefixed to collections of their poems, and to biographical notices and reviews. It also, to a great extent, helps the student to the real names of those who have written under assumed ones. This is the new catalogue, but there is an old one partly in print and partly in manuscript, and both must be consulted if you wish to make your search exhaustive. Periodical publications make a department in themselves under the letter P, filling some twenty folio volumes, to which there is an index, also in many folio volumes. London has nearly one folio to itself, Great Britain and France each several. Every entry is complete, title in full, date, place of publication, and a press mark, such as $\frac{645 \text{ a } 10}{3}$, which is to be copied on a little form containing the rules to be observed, with blanks for name of book, date, etc.

Having given in the ticket, the reader may return to his place, certain of having to wait at least half an hour, and he may amuse himself by watching the smooth running carts laden with volumes, which arrive every moment, and the attendants who are seen hurrying along through the glass screen, each with his pile of books, with their labels fluttering. Considering that some of these have to walk three quarters of a mile along passages and up steep stairs to fetch some remote book, and that often the forms are imperfectly filled, the delay is not surprising. A more intelligent, willing, and obliging class of men cannot be conceived, always ready to volunteer assistance, even outside their special duty. It is pleasant to see how they exert themselves for novices, or for certain old veterans, filling up their forms for them.

The readers are a very singular and motley class. And here it is that some reform is wanting. A great deal of the time and trouble of the staff is taken up with supplying the wants of young boys and girls, and general idlers, who come to read novels and poetry, and take up the places of others who have real business. It cannot be supposed that the nation meant to pay for books and attendants, merely to wait on this useless class. A reform in the way of classification would be useful, the putting these drones in a department of their own, and with one attendant only to wait on them all. Every book ought to be procured within ten minutes, and by a system of speaking tubes and small lifts, the matter could be much simplified. The Museum would run fewer risks from the abstraction of books, by limiting the number of readers. There are many traditions in the Museum of these robbers, some of whom were always suspected, but to whom the matter never could be brought home: while there was a "gentleman" who was not suspected, but was at last discovered. A Museum book is fortunately very unmarketable, it is so stamped all over; and if a volume had two hundred illustrations, every one would bear this mark. To all libraries come people with a mania for cutting out prints, and at this one, on a stand made purposely, are exhibited two maimed and defaced books, thirty or forty leaves torn out, with an inscription explaining how they were placed there as a warning, etc. This exhibition is a little undignified, and it seems quite purposeless. The evil doers would only chuckle at it, while the well conducted have no need of such reminders.

American Association of Science.

The recent meeting of the Association at Indianapolis was one of considerable interest, so far as the discussion of papers was concerned, and quite enjoyable for other reasons. The members were very hospitably entertained by the citizens of Indianapolis. Some 250 of the members went on an excursion to the Mammoth Cave in Kentucky.

We give in our present number, under separate headings, an outline of some of the papers that were read, and shall from time to time present others.

The following officers were appointed for the ensuing year:

PRESIDENT—Prof. J. Lawrence Smith, of Louisville, Ky.

VICE PRESIDENT—Prof. Alex. Winchell, of Ann Arbor, Mich.

PERMANENT SECRETARY—Prof. Joseph Lovering, of Cambridge, Mass.

GENERAL SECRETARY—Prof. E. S. Morse, of Salem, Mass.

TREASURER—William S. Vaux, of Philadelphia, Pa.

AUDITING COMMITTEE—Messrs Eustis and Wheatland, of Massachusetts.

The Perturbation of Forces.

This was the title of a paper read before the Association by James D. Warner, of Brooklyn, N. Y. He thought that time was an important element in effecting the change in the character of force. The impact of bodies in motion, if little or no time was expended in changing the direction of that motion, changed its character instead, and made it heat. He believed that the attraction and repulsion of atoms were not the *plus* and *minus* of the same force, but two distinct forces having opposing lines of direction. Having explained how a continuous vibratory motion of atoms was obtained under his theory, he gave an opinion as to the change in those vibrations, which, he thought, brought about heat, light, or sound; and he considered that light was made manifest to the senses by a change made by the eye in the perturbations of force or vibration of atoms, whereby a motion is communicated to the nerves.

These views are criticised and opposed in a brief discussion. One member regarded the opinions advanced by Mr. Warner as being liable to the well known summary once made by a critic that what in them was true was not new, and what was new was not true. That the question whether motion should be resolved into heat in case of the impact of moving bodies had nothing to do with time; it was equally true of the slow heating of a railway axle and the instantaneous flash when a projectile struck an iron target. The question was, did the impact destroy cohesion in one of the striking bodies? If so, motion became heat.

Ancient Dentistry.

Dr. Reid, of Terre Haute, read a paper upon ancient dentistry. Among the ancients great success was obtained in this art. Casselius was a dentist in the reign of the Roman triumvirs, and gold was used for the filling. But nearly 500 B.C., gold was thus used, and gold wire was employed to hold artificial teeth in position, and it does not seem then to have been a new art. A fragment of the tenth of the Roman tables, 450 B.C., has reference to preventing the burial of any gold with the dead except that bound around the teeth. Herodotus declares that the Egyptians had a knowledge of the diseases of teeth and their treatment 2,000 B.C. In Martial, Casselius is mentioned as either filling or extracting teeth; but he specified that he would not polish false teeth with tooth powder. Lucian mentions an old maid that had but four teeth, and they were fastened in with gold. These facts cover a period of 600 years.

Intermarriage of Blood Relations.

Prof. Richard Owen, LL.D., A.M., of the Indiana State University, stated an important fact which cannot be too widely disseminated, namely: That the intermarriage of blood relations is a physiological error, and he might almost say, with our knowledge of such matters, a crime. Speaking from a close observation of this subject for many years of all the families of his acquaintance where close intermarriage had been permitted, the children were either deaf mutes or were afflicted by some deficiency. He knew a young man whose father was a physician, and who should have known better than to marry a double cousin, but the consequence was, as the last portion of the osseous system developed, the young man, from the intermarriage of those in whom the same material was deficient, was prevented from having a single tooth at any period. His sister had but two or three small stubs of teeth, and their brother was altogether deficient in his mental faculty. He insisted that it was a great crime for parents to allow their children to grow up with the idea that they might ever intermarry with blood relations. It should be a thing never to be thought of, the intermarriage with those connected by ties of consanguinity.

Mr. Ferguson knew of a case in Ohio where some thirty families had married and intermarried until they could no longer tell their relationship. Most of the progeny were deaf mute, and the remainder a little above idiotic.

The Mental Capacity of Races.

A paper was read. by the President, from Mr. Renas Davis, of Bennington, N. H., on the causes of the "Difference in Mental Capacity of Races." The hypothesis is this: 1. The principle that we call mind in contradistinction from matter is simply a force or power like electricity, etc. 2. This force or power is precisely the same, whether it runs the machinery of a fish, bird, monkey, or man. 3. The different mental phenomena of organized animal life are in the material or machine, and not in the power or force that operates it. 4. The difference in mental capacity between a high or low race of men, or between men and other animals, or between other animals, is simply in the quality of the material of which they are composed, and in the simplicity or complexity of organization which the material assumes. 3. The basis of the material of which animals are composed is plants. 6. As to the two million or more varieties of plants that grow on the earth, the rule holds that the greater the number of these plants represented in the animal, the greater his mental capacity; but as there is a great difference in the value of plant material, ten of some kinds might be worth more than 100 of others, and this modifies the rule.

It was pointed out that the motive power or force could not be considered as an intelligent identity, from the fact that it is very feeble in the commencement of life in each individual throughout the animal scale, and when the material part becomes diseased or enfeebled, the mental capacity usually declines; if the mental force were an intelligent identity, there is no apparent reason why a child one day old or a decrepid old man should be wanting in the intellect of maturity. That the intellectual force is the same in kind in men as in other animals is obvious from many reasons which were alleged. A contrary supposition would involve as many different forces as there are species of animals, and a system as complex as the Ptolemaic cycles and epicycles.

In regard to his theory of variety of plant food, Mr. Davis thought that in the geologic eras variety was unattainable and hence the forms of life were of a lower order. He exemplified the progress of various races *paripassu* with the increased variety of their food, a variety of animal food being equivalent to a variety of vegetable material to whatever extent the animals used for food were fed on a variety of plants. He believed that from ninety five to ninety-seven per cent of mental power was inherited, and that it was hence only on three to five per cent of mental force that changes were effected in the individual; hence the many generations required for improvement. He believed that civilization kept to the line of the grasses upon the earth's surface, and that its development was largely aided by beef and mutton; but it might have begun in a fruit bearing locality—a Garden of Eden; it would come to a standstill in a forest, in a desert, or a South Sea island.

Tremolo for Reed Organs.

This invention consists in the use of a rotary prism applied to organs or melodeons in such way that the sound waves can strike it at different angles, to be reflected in different directions, and thus produces the desired tremulous effect. If preferred, however, a quadrangular or rhombic prism may be used. It is made of thin wood or other light material, preferably hollow, so that it can be revolved with little power. Its ends have projecting pins which are hung in a stationary frame. One of the pins is provided with a crank or cam, whereby it is connected with the shaft of the wind wheel, which, when revolved, will impart rotary motion to the prism. The wind wheel is arranged and moved in the ordinary or other suitable manner. When the sound waves strike the revolving prism at different angles, they are reflected with greater or less force, according to the differences of angles, on the same principle as waves of light are reflected, and thus produce the desired tremulous effect. The prism is to be placed in a position where the sound waves can strike it directly after they leave the reeds. John R. Loma , of New Haven, Conn., assigner to B. Shoninger, of the same place, is the inventor of this improvement.