NEW OSCILLATING VALVE.

Our engraving represents a new form of oscillating valve for steam engines, the invention of Mr. Leonard Mangold, of Chattanooga, Tenn. The valve is shown in perspective in Fig. 1, in section in Fig. 2, and a detail of the valve packing is shown in Fig. 3.

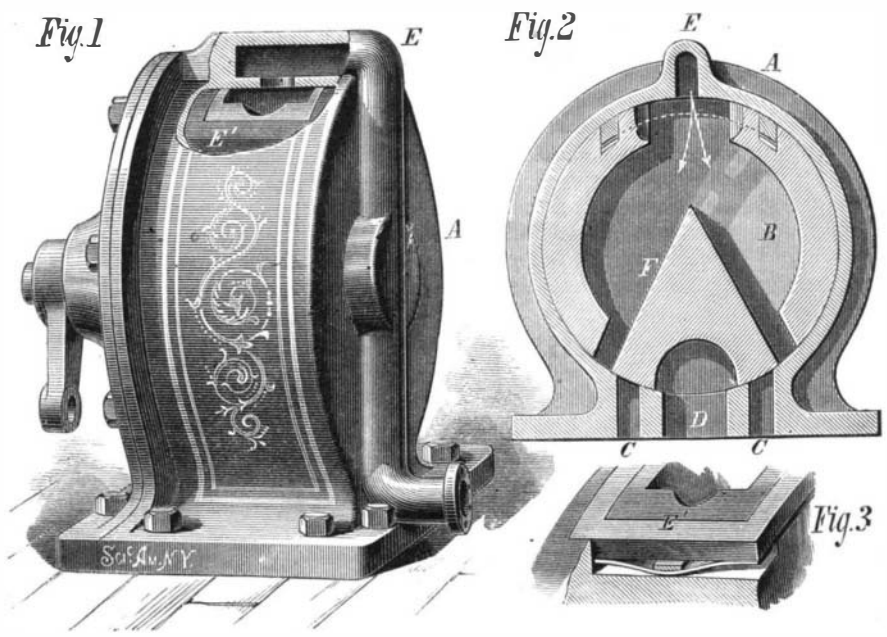
The valve casing, A, which is made in cylindrical form, contains a cylindrical valve, B, and has steam supply ports, C, and an exhaust port, D, between the two ports, C. A steam inlet, E, runs up one end of the case and enters the same at the top. The valve, B, has a steam inlet at the top, and at the bottom it has two outlet ports, one at each side of the triangular partition, F. This partition extends the entire length of the valve and upward above its center, and in its lower side there is a recess which forms a passage for the exhaust steam to the exhaust port, D.

Around the steam inlet port, in the top of the valve, there is a groove of suitable depth to receive a metal frame, E', which is curved to correspond with the curvature of the valve, and is forced outward by means of two springs placed under it in the groove. This frame forms a packing for the valve, and as it surrounds the inlet port it prevents the escape of steam in any direction.

The steam that enters the valve through the inlet port strikes the apex of the triangular partition, and is divided so that it will pass through either of the ports, C, with the same force, when the valve is turned so that one or the other of the ports, C, coincides with one of the outlet ports of the valve casing.

This valve is quite simple in its construction, and is said to be effective and not liable to get out of order.

For further information address the inventor as above.



MANGOLD'S NEW OSCILLATING VALVE.

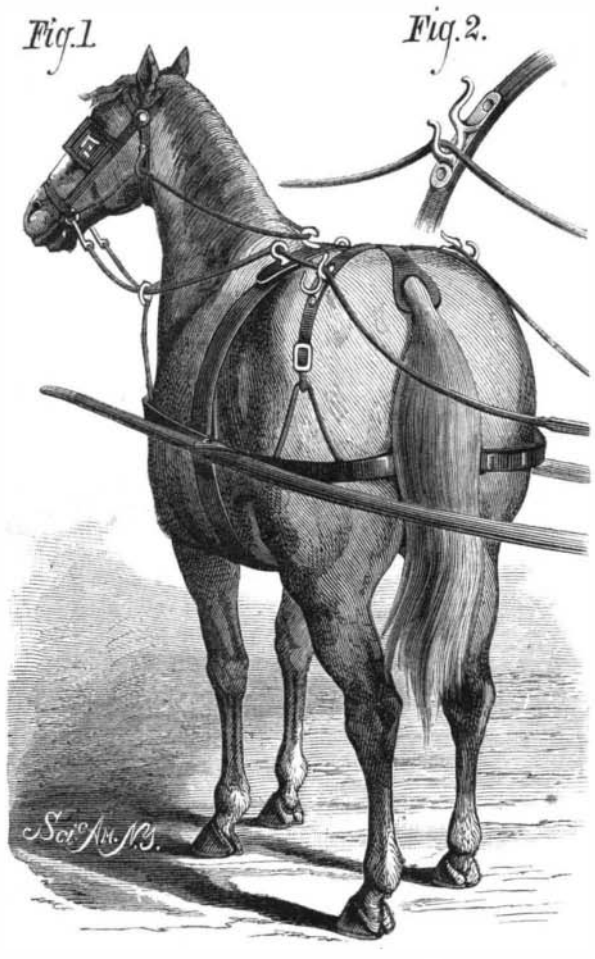
Value of a Waste Product.

For the past ten years the ammoniacal liquor produced at the gas works of Bradford, England, has been sold under contract for $4,000 a year. The holder of this contract lately bid $40,000 a year for a renewal of the contract, but failed, the successful competitor bidding $51,795. The discovery in the liquor of a substance useful in manufacturing aniline dyes was the cause of its enhanced value.

NEW REIN HOLDER.

This useful little device, which is shown so clearly in the engraving as to require little description, is the invention of Messrs. J. M. Taylor and J. Mackay, of Fredericton, N. B.

This rein holder consists of two double hooks, one of



TAYLOR & MACKAY'S REIN HOLDER.

which is attached to each of the hip straps. These hooks are placed about ten inches apart, and are equally distant from the back strap. The upper part of each hook is made quite open, so that the reins will readily drop into them when they are relaxed, and thus prevent them from becoming entangled with other portions of the harness, or getting brushed down by the horse's tail. The opening of the lower hook is smaller than that of the upper hook, so that when the reins are placed in the lower hooks by a dexterous movement of the hand, they will be retained securely. The reins are removed from the lower hooks by drawing them taut and at the same time moving them upward and outward.

This invention was recently patented in the United States and Canada. For further particulars address the inventors as above.

Iridescent Lace Work.

At the June meeting of the Society for Encouraging National Industry, of France, M. Hélouis exhibited samples of metallic threads and ribbons irisated by means of binoxide of lead, and also samples of lace work ornamented with them.

Nobili was the first to obtain such deposits as these on different metals, by electro-chemical means. He immersed a metallic plate, placed in communication with the positive pole of a battery, in a solution of acetate of lead, for example. The negative pole was fastened to a platinum wire, surrounded, except at the ends, by a glass tube; this tube dipping into the liquid in such a way that the free metallic end was placed at a distance of from 1 to 2 millimeters from the plate, the current was passed through it. It was observed that around the wire there were formed concentric rings, produced by delicate films of binoxide of lead, and characterized by varied and extremely brilliant colors, like those exhibited by soap bubbles. Becquerel made an exhaustive study of this phenomenon in 1843. By substituting for acetate of lead a solution of oxide of lead in potassa, or soda, he obtained iridescences that were much more solid, and by taking a certain number of wires as negative poles he was enabled to give objects of small dimensions uniform colorations of such tints as he wished. For certain kinds of objects his process is still in use at the present day.

But "irisation" has never before been attempted on ribbons or wires of such delicacy as to measure on an average 32,800 feet in length to the pound. M. Hélouis has succeeded in giving these delicate threads and bands uniform tints throughout their whole length, and in producing at will any color that he desires. With these irisated wires he ornaments laces, tissues, fringes, etc., which have a very beautiful effect, and the lace making industry is now making extensive use of them.

Pokeweed Paper.

Les Mondes says that Dr. Eugene Robert, of Segaune, France, has suggested that an advantageous utilization might be made of the common poke or pigeon berry (*Phytolacca decandra*) in the manufacture of paper. This common weed grows almost everywhere, is very hardy, and according to Dr. Robert yields an abundance of ligneous fiber extremely suitable for paper making. As the material is one that is so readily procured, it would be well for our manufacturers to try it.

A Tomato Disease.

M. Garcin has called the attention of the French Academy to a disease which has, during this year, attacked the tomatoes in the Maritime Alps. The malady made its appearance in the form of a whitish efflorescence on the surface of the fruit. Suspecting it to be due to the presence of a parasitic fungus, M. Garcin examined some of the matter with a high power of the microscope. It was seen to be composed of a mycelium of white, septate threads, finely granular at certain points; and the terminal joint of each of the ramifications was swollen and filled with spores. Free spores mingled with the mycelium; and the presence of zoospores of still larger dimensions showed the fungus to be in full fruit. M. Garcin believes, therefore, that he is correct in referring the parasite to the genus *botrytis*, several species of which are already well known. He calls attention to the fact that this season, for the first time in many years, the *muscardine* has made its appearance in many silk worm nurseries of the department. Now the *muscardine* is due solely to the development of *botrytis bassiana* in the body of the silk worm. Is there not, he asks, more than a fortuitous coincidence between this appearance of the *muscardine* and the epidemic development of the tomato disease? It is possible, he suggests, that sulphur applied in time, or sulphurous fumigations, would succeed in arresting the disease, since such means have always been successful in analogous cases, as in the oidium of the vine, peach mildew, etc.

THE NEEDHAM MUSICAL CABINET.

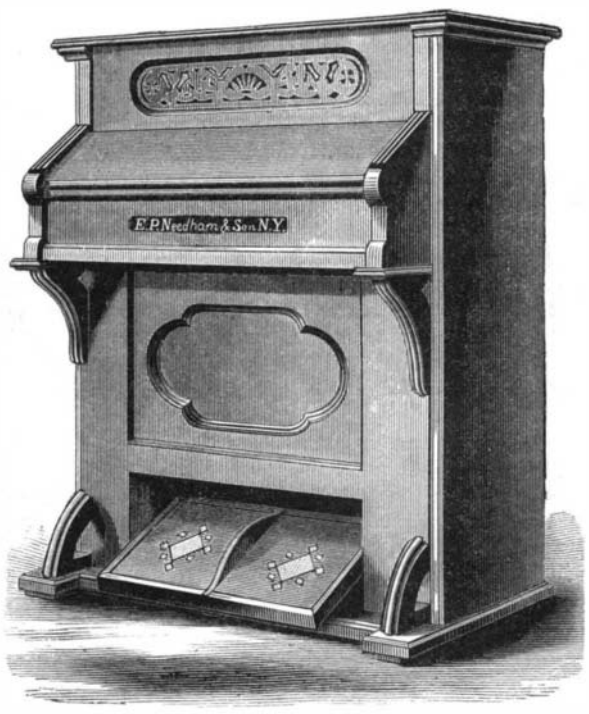
The accompanying engraving represents a musical invention which is perhaps one of the greatest novelties in this age of mechanical surprises. It is nothing less than a parlor organ on which any one can play the most difficult music, no matter whether he has a knowledge of music or not. All that is necessary is to put the music one desires to play inside the organ, and blow the bellows with the feet, when the music will be correctly executed; consequently any one, even a child, who has the ability of working the pedals of a sewing machine can produce all kinds of music as correctly as the most skilled professional performer, and it is done to such a degree of perfection that we may consider this instrument as a musical educator that may teach people in out-of-the-way localities the style in which various kinds of music have to be performed, whether vocal or instrumental, sacred or secular, operatic or classical.

The instrument always plays in correct time, and the most difficult passages are rendered as fluently as the more easy strains. The retardations and accelerations in time intended by the composer, and which are so beautifully observed by superior performers, are perfectly rendered on this instrument, entirely independent of the person working the pedals, who has only to keep in rotation a small fly wheel.

From the above it will be seen that to play this organ the use of the hands is dispensed with, and that the player may not have a musical ear; he may even be absolutely deaf and still execute the music perfectly.

All mechanical organs that have been built heretofore have been very complicated and expensive contrivances, on which only the pieces could be played for which the cylinders were arranged, while the length of the piece was limited. In the Needham musical cabinet, having the special sheets of music, any piece may be performed. And the way in which this is accomplished is beautiful for its simplicity.

The organ has neither keyboard nor valves, but consists of a set of bellows worked by the pedals, a set of reeds, to which the bellows furnish the wind, and a simple arrangement of mechanism which carries the music paper over the reeds. This music paper is the most essential feature of the



THE NEEDHAM MUSICAL CABINET.

instrument, and constitutes the artistic part of the same. The notes are holes punched in the paper, the length of the holes corresponding with the length of the notes, and when holes of the proper length are punched at proper distances, the paper, while passing over the reeds, will shut the wind off from some of the reeds while it permits others to sound. The pedals perform the double duty of blowing the bellows and carrying the music paper over the reeds.

The sheets of music paper, which are very strong, are 18 inches wide, and from 40 to 100 feet in length. Music sheets of this kind do not cost much more than ordinary sheet music, the perforations being made rapidly by means

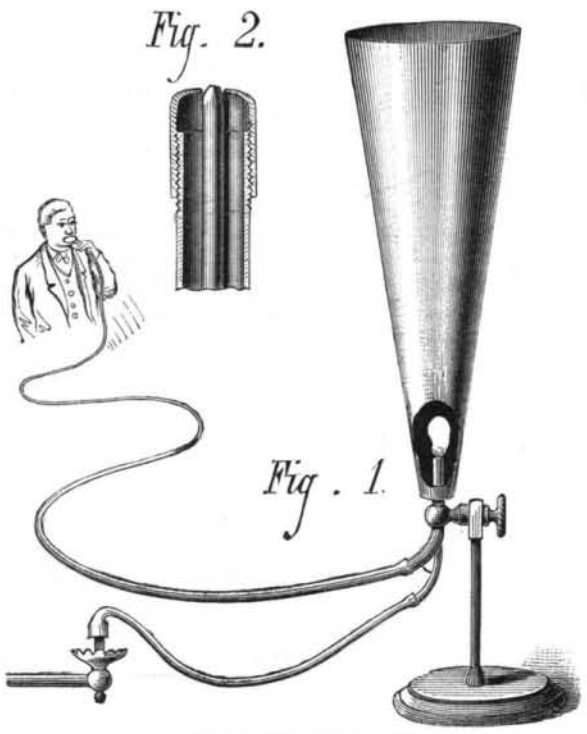
of special machinery. During the performance the music paper is unrolled from one cylinder and rolled upon another; and as music does not sound well when played backward, the mechanism is arranged so that while one piece is being played another is re-rolled.

Few persons are aware of the great number of notes in a musical composition; the number of holes in the music for this organ gives a striking illustration of this; for example, the music for the overture of "William Tell" contains 6,000 notes or holes. This is one of the 400 pieces contained in the present catalogue of Messrs. Needham & Son, and the number of pieces is being daily augmented.

THE SPEAKING FLAME.

BY GEO. M. HOPKINS.

During some of my recent experiments in acoustics, having occasion to investigate the characteristics of sonorous waves, I constructed a manometric flame apparatus after the plan of König, which, although it worked admirably and gave in the revolving mirror those well known and striking effects, did not possess the requisite qualities, although a very delicate diaphragm was employed; I therefore devised a peculiar form of annular burner, similar to those sometimes used in producing the oxyhydrogen light, but provided with an adjustable tip on the end of the outer tube, as shown in Fig. 2.



THE SPEAKING FLAME.

After connecting a mouthpiece with the outer tube, by means of a piece of rubber tubing, and connecting the inner tube with a gas burner in the same way, by making sound in the mouthpiece I succeeded in producing in the rotating mirror the clear, sharp-cut flames shown in Fig. 5, which were entirely satisfactory, and which will be treated further on.

In testing this apparatus I observed that the burner emitted low tones, like those made in the mouthpiece. By carefully adjusting the cap to the outer tube of the burner I succeeded, without a great deal of trouble, in getting the flame to reproduce distinctly any tone made in the mouthpiece. These tones were evidently produced by the minute and rapid explosions of the gas as it was relit after being extinguished by the round waves emerging from the annular orifice of the burner. This flame should not be confounded with the well known singing flames, as they each have an individual tone, whereas this flame will produce any note in the scale.

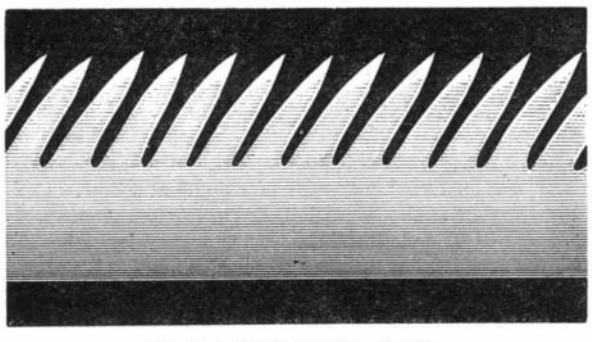
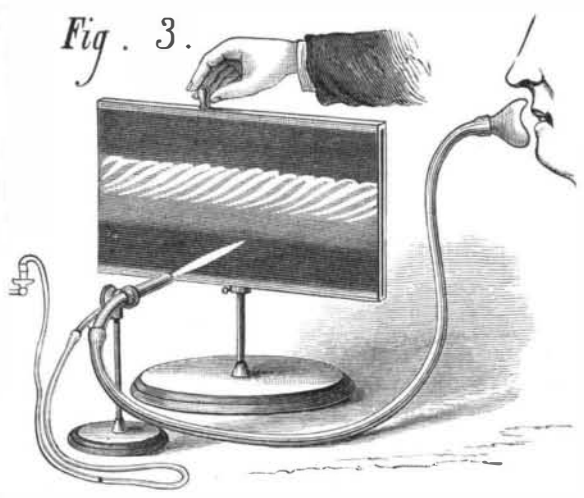


Fig. 5.—MANOMETRIC FLAME.

While sounds can be clearly heard without a resonator of any kind, yet they can be greatly re-enforced by applying a long funnel to the burner, as shown in Fig. 1. After having nicely adjusted the burner, I was greatly surprised to hear the flame reproduce a melody as loudly, clearly, and beautifully as the singing telephone, and with the characteristics of the singer's voice plainly distinguishable; but what was my astonishment when the flame made articulate sounds as words were spoken into the mouthpiece. Scarcely believing my own ears, I placed between the burner and mouthpiece thirteen feet of rubber tubing, and carried the tube through two walls, so that none of the sounds could possibly be heard from the mouthpiece; still the flame talked in an intelligible way. By a preconcerted signal I was most happily assured that at least three fourths of the sentences uttered in the mouthpiece and reproduced by the flame were understood.

To determine whether the articulation was wholly due to the flame, the gas was turned off, but no sounds from the



MANOMETRIC FLAME APPARATUS.

mouthpiece could be heard at the orifice of the burner. On relighting the gas, sounds were produced as before. The flame has a peculiar appearance when singing or talking; its ghastly blue and its weird sounds are suggestive of the supernatural.

Since discovering the sound-producing capabilities of the flame, I have observed many peculiarities, and some difficulties to be surmounted. All of the breath used in producing the sounds must enter the mouthpiece and be propelled through the tube and burner. An explosive sound at first extinguished the flame entirely; but a short slit cut in the rubber tube near the mouthpiece afforded an escape for the overpressure, so that a word beginning with an aspirate or a consonant could be pronounced without extinguishing the flame. Much depends on the direction of the wind as it escapes from the annular orifice. It should pass from all sides diagonally across the tip of the inner tube or gas burner.

When this burner is employed in producing manometric flames, the ordinary two-sided revolving mirror, shown in Fig. 3, is used. When it is revolved behind the burner, as shown in the engraving, it may be made to exhibit all of the phenomena of König's apparatus, and in addition to this some effects may be produced which are peculiar to this apparatus. Defects in the vocal organs show themselves in the character of the flame. While a clear voice or a musical instrument will produce the clear-cut flames shown in Fig. 5, a hoarse voice will produce a small extra flame be-

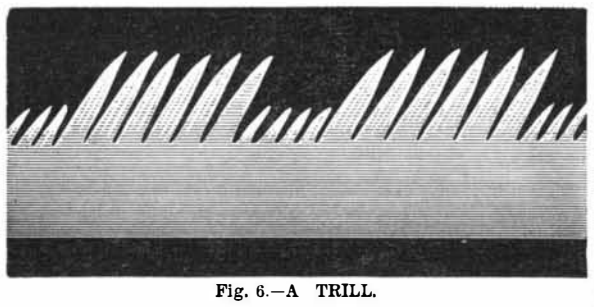


Fig. 6.—A TRILL.

tween the bases of the others, and a "husky" or dry voice will produce a fuzziness at the sides and point of the flame. A trill, made by saying *t-r-r-r-r* in a high key in the mouthpiece, produces a flame which, in the revolving mirror, appears like that shown in Fig. 6, and by inclining the burner at a proper angle a figure will be produced which resembles a golden rope (Fig. 7) whose strands are fine or coarse as the pitch of the sound is high or low. In addition to these most beautiful flame figures, the waves (Fig. 8) are produced by making a loud tone of low pitch in the mouthpiece. The waves, which are fire tipped, are of a gorgeous blue, as is also the band from which they rise.

A beautiful effect is secured by using the mirror shown in Fig. 4, which is simply a disk mounted on a small shaft, and arranged at a slight angle with the plane of rotation of the shaft, so that when it is turned it will "wabble" and produce a blue crown with golden tipped flames. By connecting the burner with a flute, as in the illustration, very sharp and clearly defined flame points will be formed.

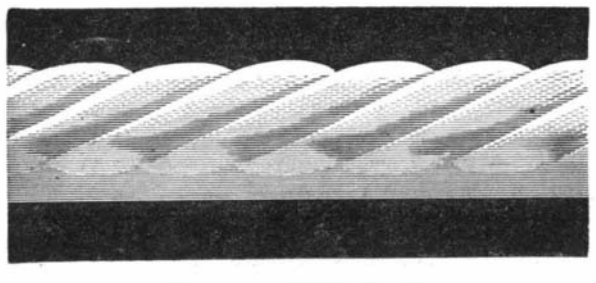
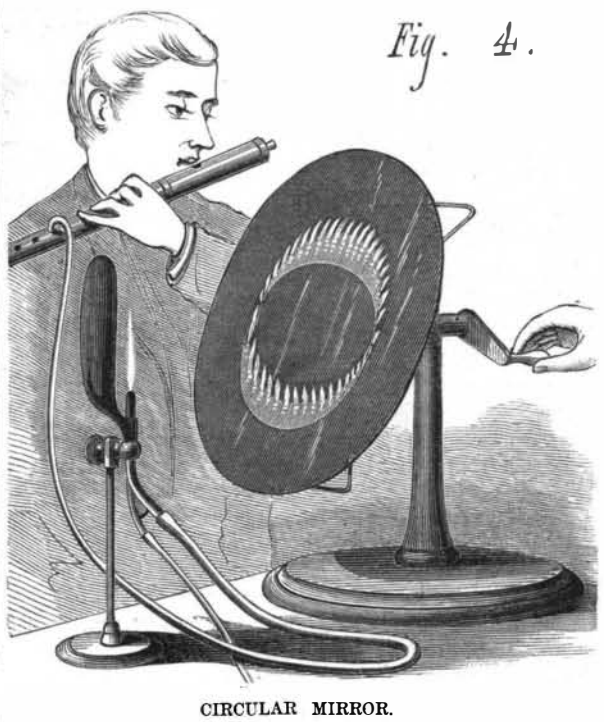


Fig. 7.—A GOLDEN ROPE.

In all of these experiments the band from which the flames spring, as well as more or less of the base of the flame, is of a beautiful indescribable blue.

The Silk Thread Electroscope.

To the Société des Sciences of Nancy, M. Rameaux recently introduced a very simple and sensitive electroscope. It consists of a fine fiber of white silk, fixed at one end by means of a little wax to any support, and free to oscillate in any direction under its point of attachment. A single thread would, of course, suffice for the ordinary purposes of electroscopy properly so called, but it is preferable to employ two near each other, taking care to space them so that they cannot foul each other during their swing, or influence each other reciprocally. One of the threads is charged by means of a glass rod with positive electricity. The other is charged by means of a stick of resin with negative electricity. Every body which attracts one of the threads so charged, and repels the other, is necessarily electrified. Its electricity is of the same sign as that of the thread which it repels. The sensibility of these electroscopes is greater, within certain limits, as the threads are made finer, longer, and less conducting. If the finest sewing silk of commerce be untwisted, each of the parts or strands obtained will make an excellent electroscopic pendulum, which, if about 2 feet long, is very handy, and suffices for almost all tests. White silk is preferable to colored. The motions of these threads, if well charged, are considerable, even when the bodies presented to them contain but slight charges of electricity. When the threads are not excessively fine, disturbances of the air do not destroy the observations so much as might be



CIRCULAR MIRROR.

supposed. M. Rameaux has found this arrangement in all cases more sensitive and sure than a carefully constructed gold leaf electroscope which he used for comparison. This system also recommends itself in several ways; for instance: 1. It is so simple that every one can construct and use it. 2. It costs nothing, no special support being necessary. The threads can be fixed to any projecting piece, as the edge of a table, the only condition being that they may hang freely. 3. It can be set up in a moment, and consequently is at once ready for any unexpected requirement; whereas a gold leaf electroscope long unused requires to be dried for hours. 4. It works perfectly, whatever the hygrometric state of the atmosphere. 5. It can be employed to show electric phenomena to a numerous auditory. With long thin fibers and highly electrified bodies the experiments are very telling.

Effect of Glycerine on Fermentation.

It is well for those who manufacture articles liable to decomposition to know that glycerine has the power of arresting fermentation to a remarkable degree. It is stated in the *Chemical Journal* that glycerine retards both lactic and alcoholic fermentations. One fifth of glycerine added to milk at a temperature of 15° to 20° C. prevents it from turning sour for eight or ten days. One half or one third of glycerine, at the same temperature, retarded the fermentation of milk for six or seven weeks.

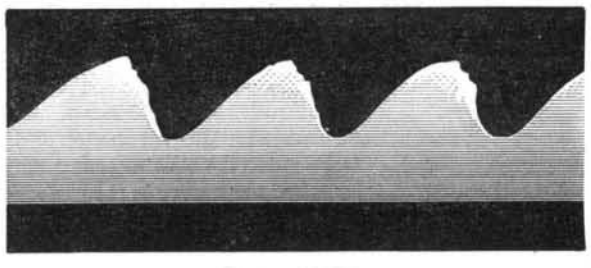


Fig. 8.—WAVES.

At higher temperatures larger quantities are needed to produce the same results. The formation of hydrocyanic acid from amygdalin and emulsin is also retarded by glycerine. It becomes thus very serviceable in preventing the spoiling of various lotions. For this reason it is not unusual to add a small quantity to the preparation known as milk of roses, and also to almond paste. With regard to cosmetics generally, the use of glycerine in small quantities may be recommended.