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ing Gaseous or Aerated Beverages.-11 figures.-Bicarbonate of soda apparatus. -Generator.-Washer.-Suction pump.-Saturator.

THE EDISON ELECTRIC LIGHT.

The difficulties encountered by the Edison Light Company in the development of their public system in this city appear to be serious as well as perplexing. The main diffi-Post that it has been determined to replace the engines of the central station by others, one of which is already in position. The experiments made to overcome the defects of the first battery of engines have retarded the work, he blind, while certain odors produce a like effect. says, have made the light uneven, and severely tried the houses with 5,053 lamps, with an average of 3,000 lamps in constant use.

A change has also been made in the price of the light, The charge is now at the rate of \$2an hour for a light equal cubic feet. Meters for the registry of the current used are being put in as fast as they can be made and tested.

The isolated system has been more successful than the public system. In a year and a half, 154 plants have been established in the United States, employing 29,192 lamps.

..... THE UNDULATORY THEORY OF ODORS.

The immortal Newton, in common with other savants of his time, believed that light consisted of minute particles emitted from luminous bodies and traveling through space the "undulatory theory," so ably advocated by Huyghens, ¹ more hydrogen, and an equal volume of chlorine (HCl). and perfected by Young, Fresnel, Cauchy, and others. When Crookes succeeded in weighing a sunbeam, the corof life, as better able to explain the action of the radiometer. of an imponderable ether, omnipresent and persistent, the phenomena of gases are now explained on the kinetic theory, which has motion for its basis.

Notwithstanding the success that has attended the application of the undulatory theory to the varied phenomena of heat, light, and electricity, chemists and physicists still adhere to the corpuscular theory of smell, and teach that odor is due to small particles thrown out from the odoriferous body. A phenomenon that goes far to disprove this assumption is seized on by chemists to illustrate the smallness of the molecule and by physicists to prove the (almost) infinite divisibility of matter. A few grains of musk will impart a strong odor to the air of a room for years without suffering any appreciable loss of weight. Other instances of nonmight be cited; a familiar example of a powerful and penevery slight volatility is found in carbolic acid, the loss of surrounded with much combustible matter. volume by evaporation being entirely out of proportion to the odor. On the other hand, the fact that many volatile liquids are odoriferous does not prove that it is the particles of liquid or vapor which, coming in contact with the organs of smell, produce the well known pbenomena, for there are volatile substances innumerable which have little or no odor. The elementary gases, with the exception of chlorine, are nitrous oxide and carbon dioxide, are void of odor when pure

Dr. W. Ramsey, of England, has recently called attention to the fact that the lower the specific gravity of a gas the less odor it has, and this we find confirmed in the case of elementary gases by chlorine, which alone is odorous, while its specific gravity (35.5) is more than double that of oxygen (16) or nitrogen (14).

One of the most remarkable phenomena of light, except-ing polarization, is that known as "interference." It was impossible to explain this satisfactorily on the corpuscular theory, while it was easily accomplished on the undulatory

length, including several octaves. What length of waves are able to affect the olfactory nerves we are not yet able to determine, nor do we know whether disagreeable smells are caused by undulations of greater velocity than pleasant ones, culty, arising from the lack of unison in the working of the or the reverse. It is probable that each odor consists of engines, seems to have proved insurmountable except by a several separate and elementary notes; that when these are change of plan. The president of the company tells the harmoniously combined the result is agreeable, and that vile odors are simply the result of discord.

> One fact may be of use in the study of the undulatory theory of odors: that sunlight causes sneezing, even in the

The difficulty in the way of investigating the subject of lamps; yet there has been no break in the service, which smells is the lack of any instrument for measuring odors, all has been extended from 85 houses with 2,000 lamps to 226 depending as yet on unreliable senses, and all observations being subject to a very large discount for "personal error."

When a spectroscope for analyzing odors shall have been invented, it is not unlikely that we shall find certain lines corresponding to certain elements, each being so modified by to 2,000 candles, or about the cost of gas at \$2 a thousand the other elements in the compound that it is not possible to distinguish it in the general effect on the olfactories. However this may be, it is probable that nitrogen, arsenic, and phosphorus (pentads all), as well as sulphur and selenium, will be found to possess some peculiar modifying power over the others. Perhaps it will be found that simple bodies vibrate only in one plane, like polarized light, but not all in the same plane; that when two elements vibrating in different planes combine, the resulting vibration, being the resultant of two forces, differs from both of them, and hence the odor of the compound differs from that of each constituent. One of the most remarkable and familiar cases of with immense rapidity till they reached the eye. This this sort is where odorless nitrogen and hydrogen combine to theory, known as the corpuscular theory of light, has since form ammonia gas, NH2 with its penetrating odor, which been almost entirely abandoned by scientific men in favor of is, nevertheless, so easily destroyed by combination with

What effect the shape of the chemical molecule may have on the odor is evident from the fact that all ring-shaped puscular theory was supposed to have received a fresh lease hydrocarbons like benzole, and the double and triple ringed naphthaline and anthracene, are called "aromatic," from But the disciples of the undulatory theory soon rallied from their characteristic and remarkable odors. The chain comthe blow, and, notwithstanding the difficulty of conceiving pounds, like the paraffines, have less characteristic odors; but of either class, the greater the number of atoms in the undulatory theory still prevails. Not only light but heat is molecule the stronger the odor; yet isomeric bodies often now explained as a form or mode of motion, and the whole differ in odor, proving still more conclusively that the shape of the molecule affects the smell, probably by changing the plane of vibration.

Perhaps we are in advance of the times; the age is not yet ripe to accept the undulatory theory of smell, but the day is not so far distant when discoveries will be made that will establish and sustain our views.

E. J. H.

----GAS METERS AS HELPS TO FIRES.

In most buildings designed for multiple tenancy, like our great apartment houses and the capacious office buildings which comprise so large a part of the busi ess part of this volatile substances possessing a remarkably strong odor city, it is customary to provide a separate g is meter for each room or suite of rooms. These meters are commonly placed trating odor from a liquid with high boiling point and of in closets and out of the way corners, and are very apt to be

> The connections of meters with the gas pipes are usually, if not always, of lead, a metal that is easily fusible, and the solder with which the plates of the meter are joined togetber yields even more readily to heat.

Let a fire break out in a building containing, as many buildings do, a score or more of these fragile fire feeders, and the hot air sweeping in advance of the fire will quickly melt the without odor, and many of the compound gases, such as lead or solder. The outpouring gas fills the building with an explosive atmosphere which hastens the spread of the flames, and keeps up an inexhaustible supply of fuel. Such burning gas jets, sometimes of great size, are to be seen after almost every city fire, when nothing is left of a building but blackened and broken walls.

> The gas poured into burning buildings through such openings doubtless belps materially to account for the surprising suddenness with which many great buildings have been swept by flames; and in all cases the outflow of gas must seriously counteract, if it does not altogether thwart, the efforts of the firemen.

The remedy for this great evil is not so easy to point out. theory. Sound, which is due to vibrations of the air so large It is obvious that where a multitude of meters are to be disas to be easily observed, does not afford such striking exam- tributed through a building, they should be more securely ples of interference as seen in the case of light, yet a delicate incased, and provided with infusible connections; or some upply shall be

| mechanical in operation 5815 | ear has no difficulty in detecting such interference in many | means should be devised whereby the gas supply shall be |
|---|--|---|
| Detection and Estimation of Fusel Oil | of the commonest affairs of life, such as two clocks ticking, | automatically shut off whenever the temperature rises so as |
| On Silicob.—Curious formation of sulfcide of platinum | the interference between musical notes, etc. | to imperil the integrity of the meter. There should also be |
| mac_mes by the corrosion of bronze and tin solder | If smell depends on vibrations of any sort, it must be pos- | near the outer door and readily accessible to firemen some |
| Metallic Thorium. By L. F. NILSON | sible to detect cases however rare of interference. There | means by which the connection of the house with the gas |
| Friedrich WöhlerObituary notice of the great German | | means by which the connection of the house with the gas |
| chemist | are familiar instances where one strong odor masks and con- | main in the street can be quickly closed. |
| Apparatus for Printing by the Blue Process. By CHANNING | ceals another, as also of substances of unlike odors combin- | There is clearly an opportunity here for useful and profit- |
| WHITAKER.—3 figures 5820 | ing chemically to produce odorless ones, but it is doubtful | able invention. |
| III. ELECTRICITY, LIGHT, HEAT, ETCSpectrum Gratings 5822 | if these are true cases of interference. The observation re- | |
| A New Pocket Opera Glass4 figures 5822 | cently made that animine destroys the odar of much deserves | |
| Atoms, Molecules, and Ether Waves. By JOHN TYNDALL | centry made that quilline destroys the odor of musk deserves | A Liconson Connat Sun for an Infringement |
| Action of heat and light on molecules.—Heat as an agent in ex- | a closer study to determine whether this is not due to inter- | A Dicensee Cannot Sue for an Infingement, |
| | a closer stady to weter line whether this is not wat to inter- | |
| ploring molecular conditions.—The results of a recent incursion | ference, just as red and green light produce white. We do | Judge Wallace, in the case of Ingalls vs. Tice, U. S. Cir- |
| ploring molecular conditions.—The results of a recent incursion into the extra-sensible world of atoms and molecules | ference, just as red and green light produce white. We do not even know as yet whether odorless substances owe this | Judge Wallace, in the case of Ingalls vs. Tice, U. S. Cir- cuit Court for this district, has decided that an agreement |
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