The Dissipation of Fog and Smoke.

The experiments of Aitken have proved that dust particles play a very important part in the formation of fogs, by serving as nuclei for the condensation of water vapor. The electric and electrified particles known as ions are still more effective in condensing saturated water vapor, because their electric charges strongly attract and retain the water, thus counterbalancing the effect of surface tension, which promotes evaporation from the surfaces of drops of very small diameter. Hence ionization may produce fog and it may also destroy fog by collecting minute drops into large drops, which fall as rain.

In 1884, before Aitken's researches, Sir Oliver Lodge discovered that an electric spark discharge (which is now regarded as a stream of ions impelled by electric force) quickly dissipates smoke and dust clouds, and he has since employed the same means for the dissipation of fogs. These experiments, which have a great interest for railway and maritime traffic, are being conducted at great expense, especially in Liverpool, in the hope of keeping the suburban railway lines clear even in the foggiest weather.

About a year ago a French engineer, M. Dibos, began a series of experiments in the dispersion of fog by Hertzian waves and lately he has improved his apparatus by the addition of oxyhydrogen flames, states Cosmos. The effect produced by these flames may be partly caused by their heating the air but it is probably due chiefly to ionization, for it is well known that flames produce vast numbers of ions, or electrified particles, which become disseminated through the atmosphere.

The first decisive experiments with the flames were made on December 25th, 1908. The aerial waves were generated by an inductor of about 400,000 volts. Above the conical antenna by which the waves were emitted was placed a metal ring of smaller diameter which carried a large oxyhydrogen jet at each of the cardinal points of the compass. The four jets were connected by India rubber tubes to a central gas holder, which was supplied by a battery of cylinders containing compressed oxygen and hydrogen. The fog, which had prevailed for a week, was very thick that morning. When the emission of aerial waves commenced the oxyhydrogen flames had attained a temperature of 3,600 deg. F.

By the addition of the flames, the time required to clear the space surrounding the antenna was reduced from 40 minutes to 20 or 30 minutes and the diameter of the clear zone was greater than in the previous experiments with Hertzian waves alone, increasing from 400 feet to 500, 530, and 560 feet. The effect was maintained for nearly two hours and until the experiment was stopped by the exhaustion of the supply of oxygen. On the afternoon of the following day experiments with the Hertzian waves alone were commenced, but were discontinued in a few minutes, as the wind had shifted to the northeast and the fog was quickly dispersed by a brisk breeze from the North Sea. (These experiments were performed at Wimereux on the shore of the English Channel.)

An automobile mirror is now made based upon scientific principles. The laws of reflection and refraction are taken into proper account, so that not only is a greater volume of light projected by the lamp, but this volume is thrown just where it is wanted. The two surfaces of the mirror have curves differing in their radii the first or unsilvered surface having a deeper curve. The rays of light which strike the first surface perpendicularly pass on without refraction to the rear or silvered surface, and again reach the first surface by reflection, where they are bent or refracted. But those rays striking the mirror outside of the center do so at a greater and greater angle as the edge is approached, and are refracted more and more as the angle is increased. The marginal rays are therefore so refracted that when reflected by the silvered surface and again bent by the first surface the entire volume of reflected light is concentrated into an intense parallel beam to be directed exactly where wanted.

A HOUSE-TO-HOUSE MIRROR SYSTEM.

The idea of using mirrors to enable one to see objects without exposing one's self has found expression in more than one novel of adventure. A few patents have also been taken out for reflecting devices which render it possible to see, from a second-story room of a house, a person entering by the front door below. A New England inventor, Mr. Dana S. Dudley, has elaborated the plan on such a scale in his own town, that he is able to observe the surrounding country for a considerable distance, merely by looking down a tube mounted in his back yard.

Mr. Dudley's system may be employed for reflecting to a receiving station images of objects and persons in remote apartments of the same house or distant houses. The system comprises, as may be supposed,

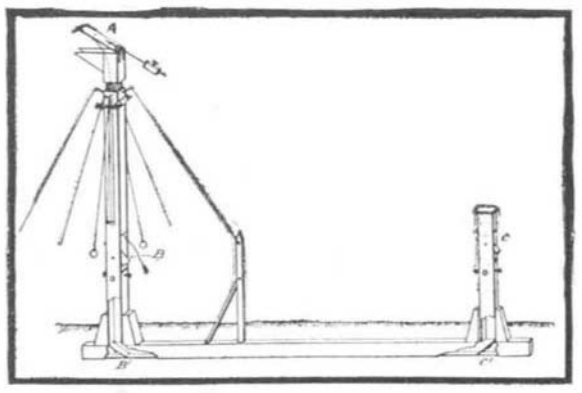
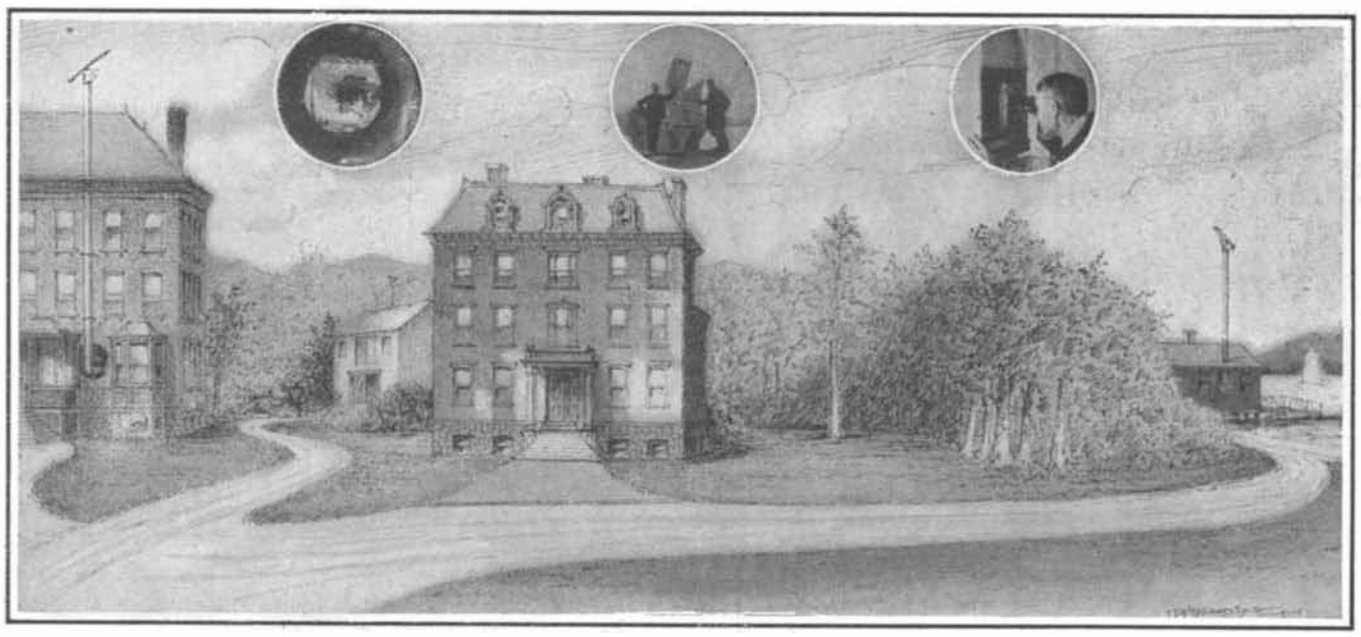


Diagram showing arrangement of mirrors and tubes.

a series of main pipes or tubes and branch tubes about a foot in diameter, which ramify a house, or which may be extended underground from one house to another beneath an intervening structure. Plane mirrors are mounted in the tubes for the purpose of reflecting the images around corners, from one tube to another. Either by electrical or mechanical means it is possible to operate a particular mirror in a particular room from a central station and cut off reflections from all other mirrors in the system, so that objects in that particular room alone may be seen. Any of the visual tubes entering the central station may be thus connected with each other.

One form of the invention (one of the simplest, moreover) is illustrated in the accompanying drawings. The object of this particular form is to render it possible to see at the point *A* whatever may be happening at the point *C*, despite the fact that a building intervenes, as shown in the drawing. At *A* and *C*, twelve-inch mirrors are mounted on ball-bearing trunnions and swiveled on a vertical axis, so that they can



The small circular pictures show respectively an image of a face transmitted through several rooms and back again; a swiveled hood on a house-top, containing a mirror; a receiving station with telescopic eye-piece.

A HOUSE-TO-HOUSE MIRROR SYSTEM.

be turned up and down and from side to side. These mirrors are designed to reflect images through tubes leading downwardly into the ground and communicating with a horizontal tube buried in the ground and passing either under or through a house situated between the stations *A* and *C*. At the points of the vertical and horizontal tubes, mirrors *B'* and *C'* are mounted at such an angle that they will reflect the image from the mirrors *A* and *C* either through the vertical tubes or through the horizontal tubes. If the image reflected to the receiving mirror is that of an object so distant that it appears very small, telescope eyepieces can be employed to magnify it, the effect being much the same as if the distant object were observed through a spy-glass.

By means of this mirror system of his, the inventor has succeeded in obtaining some very curious effects. His arrangement of mirrors and tubes in his own house enabled him to send his own reflection through several rooms and back to himself again, so that he saw himself as if afar. He could look around the house through one lens of the telescope eyepiece and see his other eye. Two persons seated next to each other at the receiving mirror and separated by a screen could see each other clearly, after their images had been transmitted through room after room, the faces appearing remotely distant, although the two were near enough to shake hands. Mr. Dudley has also used his apparatus to reflect sunlight into cellars and dark rooms, the first mirror being so mounted that it could follow the sun's movement, as in the case of a heliostat.

Telephones can be employed in connection with this system, so that two persons may talk to each other and see each other at the same time.

A New Phonograph.

Consul Thomas H. Norton, in the following report from Chemnitz, describes a new German invention which combines the phonograph and the siren:

The methods for recording sound have reached a higher stage of perfection than those employed for its reproduction. The chief difficulty encountered in the present systems of reproducing conversation, and especially music, from phonographic and similar records, is caused by the friction of the needle resting upon the surface of the rapidly revolving disk or cylinder. This introduces a more or less noticeable buzzing or rumbling sound, which interferes materially with the clearness of musical notes or spoken words. Numerous attempts have been made to overcome this unpleasant accompaniment. In none of the devices hitherto brought forward has complete success been attained, since all involved the factor of friction as the fundamental means of transmission.

In a recent number of the Deutsche Musikwerk-Industrie, a German inventor describes a newly patented instrument, in which friction is completely avoided. It combines the leading elements of the phonograph and the siren. The novel and essential feature is the substitution of a current of compressed air for the needle or stylus of Edison's invention.

In a siren, openings of various sizes allow the production of all musical notes with any desired degree of intensity or length. In the new instrument, perforations in the disk of a siren are replaced by tangential incisions on the surface of a large record cylinder. A second perfectly smooth cylinder rests close upon the surface of the first cylinder and revolves in unison with it as the two cylinders are set in movement. A constantly varying succession of minute openings between their surfaces is presented, due to the incisions on the record cylinder. When a powerful blast of compressed air is directed upon the line of contact between the two cylinders, at such an angle as to be an exact tangent to the surfaces of both, sounds are evoked identically as in the case of an ordinary siren. It is possible to communicate signals and even words which can be readily heard miles away.

It is already evident that a field of usefulness is open to this new invention as an adjunct to the equipment of seagoing vessels. Its availability for musical purposes has not yet been tested sufficiently to determine whether it can successfully vie with the gramophone, phonograph, etc., or even replace them.

The cylinders thus far employed are about ten times as large as ordinary phonographic cylinders, and this fact renders the instrument necessarily somewhat clumsy. The requirement of a current of compressed air may also militate against a widespread domestic use, although such a current can be supplied by a comparatively inexpensive attachment to a water tap where the water supply is under considerable pressure.

Illuminating Mass for Pyrotechnic Purposes.—Take 36 parts of nitrate of baryta, 15 parts of iron filings, 1 to 10 parts of aluminium powder, 1 part stearine, 3 parts of sugar of milk, and 3 parts of dextrine.