## THE "UNILENS," A NOVEL FORM OF TELESCOPE.

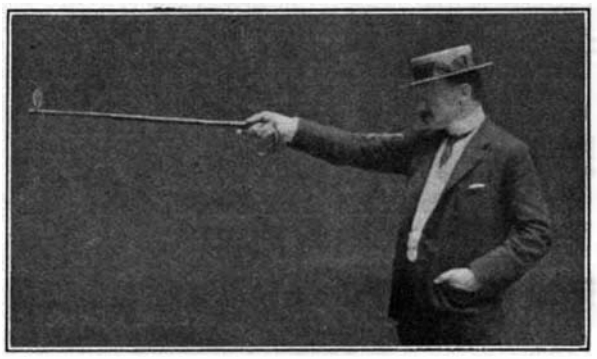
BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

A novel form of telescope or field glass, to which the name "unilens" has been applied, has recently been devised by Major Baden-Powell, F.R.A.S., of London, the feature of which is that it can be carried in the waistcoat pocket. As may be gathered from its title, the instrument comprises a single lens of convex form, 2½ inches in diameter and mounted in a simple metal rim. The mount is provided with a small clip and screw, by means of which the lens can be readily attached to a walking stick or umbrella, being carried, as the illustration shows, at the outer end. With this simple device it is possible to obtain an enlarged view of distant objects, the maximum magnification being about four diameters. In view of the simple nature of the device and its handy form, it constitutes a convenient and efficient means for all ordinary purposes where a slight magnification is desired, being capable of fulfilling the same functions as the general type of opera and field glasses; but owing to its flat form and small dimensions, it can be carried in the pocket without inconvenience.

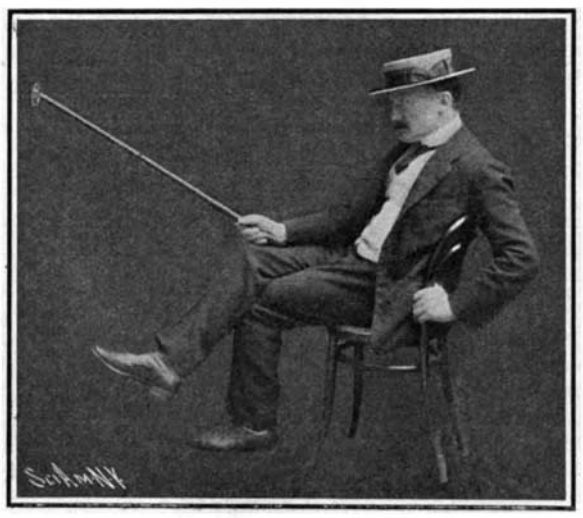
When mounted on a walking stick and held at the full extended length of the arm, its greatest efficiency is obtained, since the farther it is held from the eye, the greater is the magnification. At the full extended length, which is equivalent to a distance of about six feet between the eye and the lens, the object has its maximum magnification, though at this point a slight blurring is discernible. The most convenient and easy position to assume when studying subjects through the device is a sitting posture with the hand holding the stick resting on the knee, at which point the glass, about four feet distant from the eye, enables the user to view objects clearly and sharply. The lens, however, is always in focus, and consequently is a handy form of hand-glass, especially when held at arm's length. It then forms a great aid to the natural sight, more particularly in the examination of hanging pictures, the architectural features of a building, and so forth, and it will even fulfill the purposes of an opera glass at the theater.

From an astronomical point of view the "unilens" has no great claim, though in this work it has its possibilities. For instance, in looking at the Pleiades through the "unilens," eight stars can be discerned quite easily, whereas with the naked eye only six can generally be distinguished. In following the movements of birds and animals in their natural habitat from a distance of a few yards, the glass is of great utility to the naturalist.

Although the "unilens" is not applicable to all sights, yet, according to one very widely known firm of London opticians it may be safely said that three persons out of four can use it quite well. To be sure, those afflicted with myopia or short sight cannot see very clearly through the single lens, but when it is employed in conjunction with a concave eyeglass, not only can they see clearly through the "unilens," but such sights are found to be improved under ordinary circumstances by the habitual use of the eyeglass.



**Greatest Magnification at the Maximum Distance from the Eye.**



**A Convenient Method of Viewing Objects at a Distance.**

## THE "UNILENS."

## THE NEW LUSOL LAMP.

BY JACQUES BOYER.

The introduction of the lusol lamp marks an era in the history of illumination for, according to the calculations of its inventor, the new illuminant furnishes for a cost of one cent an amount of light which would cost 4 or 5 cents if furnished by kerosene, 8 or 10 cents if produced by electricity, and 15 or 20 cents if obtained from animal or vegetable oils.

There is no mystery about the composition of the substance, which is known by the trade name of lusol. It is simply impure benzene obtained by distilling coal tar. It is not a definite chemical compound but a mixture of hydrocarbons containing a very high percentage of carbon. The various forms of apparatus which have been devised by M. Louis Denayrouze for the utilization of lusol in domestic and other illumination are not simple lamps but rather complicated devices for the safe production and combustion of lusol vapor.

If we dissect a lusol lamp of the small, or household, type we find that the openings of the lusol reservoir are hermetically closed by conical screw plugs, in order to prevent escape of the thin and very inflammable fluid if the lamp is overturned, or by capillary action or "sweating," in the normal position. On removing the burner we see a central tube extending nearly to the bottom of the reservoir and surrounding a metal core, the space between which and the tube is very tightly filled by a tubular cotton wick. The tube, however, is closed at the top so that the wick does not protrude from the reservoir or come into direct contact with the flame. The sole function of the wick is to raise the liquid lusol, by capillary action, to a small vaporizing chamber just above the top of the wick. From this chamber the vapor escapes through an orifice so small that it cannot be seen in the illustration. This hole, fine as a hair, is the only means of communication between the interior of the reservoir and the exterior. And as the liquid cannot reach this hole without traversing the tightly compressed wick there is no danger of leakage in this way. On the other hand, this orifice regulates the flow of the vapor to which it gives a velocity sufficient to cause it to carry with it the proportion of air required to produce a very hot flame. Finally, this little injector is surmounted by a chamber covered with wire gauze in order to perfect the mixture of air and vapor and to prevent the flame from striking back to the reservoir.

But in order to produce rapid vaporization heat must be applied, and for this purpose M. Denayrouze has adopted an original device which he had already employed in one of his earlier inventions. As the photograph shows, the inverted U-shaped support of the Auer mantle is not a thin wire, as in most incandescent lamps, but is massive and is soldered to the base of the distillation chamber. When the lamp is burning this support is very hot, and it consequently heats and vaporizes the lusol with which the top of the wick is saturated and which is continuously replaced by fresh liquid raised from the reservoir by capillary action.

But, in order to light the lamp, this support of the mantle must first be heated by an extraneous source. Different methods are employed in lusol lamps of the various types. In lighting a parlor, office, or hall lamp the upper part of the burner is first raised with the left hand. This action exposes two clusters of points on which two alcohol pastilles, consisting of paraffined cotton soaked in alcohol, are next placed. The gallery is then replaced and the pastilles are lighted with a match.

Street lamps of the type now in experimental use in the Square du Ranelagh, in Paris, have little reservoirs which can be filled with alcohol by means of a vessel mounted on a pole. In every case, however, a little time elapses before the mantle glows with maximum brightness.

In the very large street lamps, which rival the electric arc in intensity, the upward flow of liquid to replace the loss by vaporization cannot be produced by capillarity alone. It is consequently maintained by a low air pressure, involving the employment of only a very small volume of air. The apparatus which produces the air pressure consists of two small vessels connected by a long India-rubber tube. At the beginning of the operation one of these vessels is empty—or rather, filled with air—while the other, placed about 5 feet higher, is filled with glycerine. The glycerine flows slowly down the tube, compressing the air and forcing it into the lusol reservoir, and thus causing the lusol to rise in the wick. The operation is repeated once a day, by simply raising the filled vessel and lowering the other. A three-way cock may be arranged to apply and remove the pressure so that the lamp may be operated with or without pressure as desired. In one form of lamp the lusol and glycerine reservoirs are ingeniously combined, so that there is only one descending tube which, together with the air chamber, is concealed in the chandelier.

In point of economy the lusol lamp appears to surpass all other known lighting apparatus. A Denayrouze lamp having the power of 10 Carcel burners costs 0.3 of a cent per hour, while the same illumination produced by stearine candles costs 36 cents per hour.

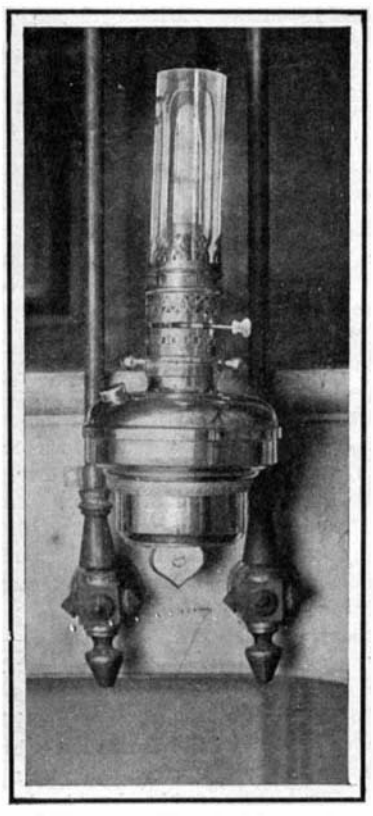
The use of lusol, however, is attended with certain inconveniences, the most serious of which is the necessity of filling the lamps and the time consumed in lighting them. On the other hand, it does not appear to be particularly dangerous. M. Lucion, the Belgian engineer who furnished the information on which this article is based, truly observes that: "Electricity is dangerous, causing death and fires due to short circuits. Gas is a frequent cause of asphyxiation, voluntary and involuntary. Acetylene is explosive, and a surgeon of my acquaintance was recently summoned in one day to attend five women fatally burned in five separate accidents with kerosene. The essential thing is to know how to use all these dangerous things."

Lusol, while it is in the lamp, is perfectly harmless. It cannot escape in the liquid form and the flame cannot strike back to a space filled with vapor, as it can in a kerosene lamp. Furthermore, the lusol reservoir remains cold even after the lamp has been burning for hours, owing to the following arrangement: The central tube is double, the space between the tubes communicating with the external air, and the inner tube, in contact with the wick, being made of an alloy which is a comparatively poor conductor of heat. This air-cooling device has another object, in addition to safety, for if the tube should become hot the lusol would be vaporized so rapidly that its loss could not be supplied by capillary action.

The lamp is extinguished instantly by moving a little lever which closes the small orifice for the vapor. The lamp should be filled very carefully, at a distance from all lights and fires and never while the lamp is burning.

A favorable forecast for the future of the lusol lamp may be drawn from the past record of its inventor. Denayrouze and Jablochkof were the first champions of the electric light in Paris. Later M. Denayrouze became the most ardent advocate of incandescent lighting by means of alcohol and he

**LIGHTING A SMALL LUSOL LAMP WITH ALCOHOL PASTILLES.**



**LUSOL LAMP DESIGNED FOR A STAIRCASE.**