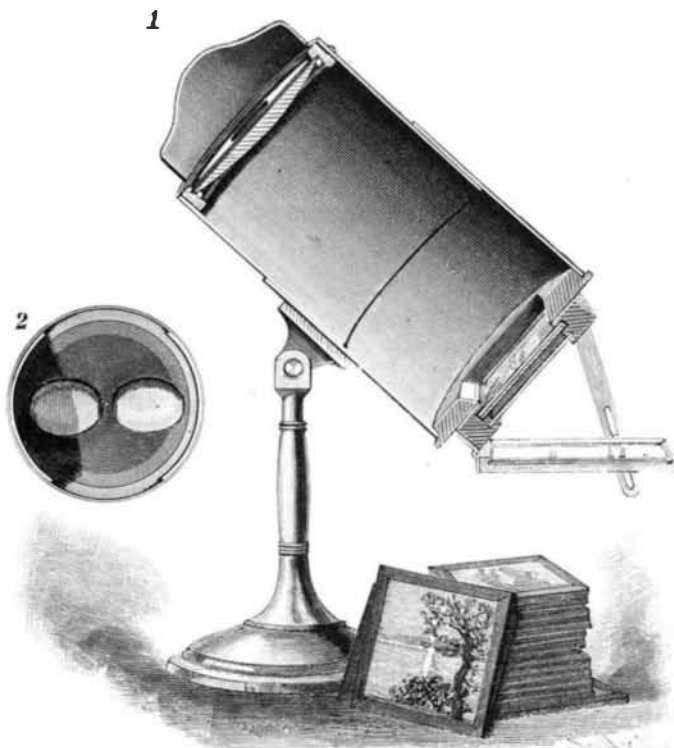


## INSTRUMENT FOR VIEWING LANTERN SLIDES.

BY GEO. M. HOPKINS.

The photographer or lanternist who has a large accumulation of slides loses much of the pleasure and profit of his collection unless he is provided with an instrument of some kind for viewing the pictures directly, without the use of a lantern. Several instruments of this character have been devised, most of which admit of the use of only one eye, thus



INSTRUMENT FOR VIEWING LANTERN SLIDES.

making the examination of the views tiresome and unsatisfactory.

The annexed engraving shows a very convenient instrument for this purpose, in which both eyes are used, giving an effect which is almost stereoscopic. The instrument, which is shown in section, consists of two tin tubes sliding one within the other telescopically, and mounted adjustably on a standard. The lower end of the tube is provided with two grooved guides similar to those used in the lantern for receiving slides. In the outer guide is placed a piece of fine ground glass, and the slides are inserted in the inner guide. Below the ground glass is hinged a reflector for throwing the light through the ground glass and slide. To the upper end of the telescopic tube is fitted a wooden ring in which is placed a plano-convex lens, with the plane side out. It is of sufficient diameter to admit of the use of both eyes in viewing the slide, and has a convenient focal length. Over the glass is placed a screen of black paper, with two apertures of about the size and shape of the lenses of an eyeglass, see Fig. 2, and around the opening in which the lens is placed is arranged a hood for screening off extraneous light. The diameter of the plano-convex lens is  $4\frac{1}{2}$  in. and its focal length is 15 in.; the telescopic tube is 5 in. in diameter, and when extended for use has a length of 10 to 12 in.

By thus placing the plane side of the lens out, and arranging the slide within the focus of the lens, the spherical aberration is almost overcome, and both eyes are enabled to view the picture. The effect is very satisfactory, and as the view is considerably enlarged, at the same time being seen with both eyes at short range, the picture appears practically stereoscopic. With daylight only the plane mirror is required for proper illumination when the light comes from the sky or some plain light colored surface, but for lamp or gas light the lamp should have a plain porcelain or ground glass globe, or a piece of smooth white paper should be laid over the mirror to furnish light of the character required.

Nearly 2,000 electric cars are running in the United States. Boston alone has about 100 miles of electrically operated roads. Several systems have been developed to a perfection that insures smooth and regular service. Other systems are still in the experimental stage.

## FIREWORKS IN MINIATURE.

To set off this piece of fireworks it is not necessary to be a pyrotechnist. Provide yourself simply with a blowpipe or even a clay tobacco pipe. Take a few sheets of thin tinfoil, such as is used as a wrapping for chocolate, and cut them into strips of a width of about an inch. Then present each slip to the flame of the blowpipe, when the metal will ignite and fall in incandescent globules, which will rebound and run over the table on which you operate and travel to a considerable distance. Sometimes they will divide and give rise to other globules that will run and leap in all directions.

When the flame is strong and the tinfoil burns briskly, the globules are very abundant and then present the aspect of a bouquet of fireworks in miniature.

There is absolutely no danger attending this experiment. The globules, surrounded with oxide formed during the combustion, leave only a small whitish track that may be quickly removed, even from oil cloth.

This combustion, which produces a curious effect, is at the same time a demonstration of the combination of a metal with the oxygen of the air. By such combination, the tinfoil is converted into a white oxide. It was by studying the increase in weight exhibited by tin heated in contact with the air that John Rey, a chemist of the seventeenth century, succeeded in understanding the fixation of the air upon metals.—*La Nature*.

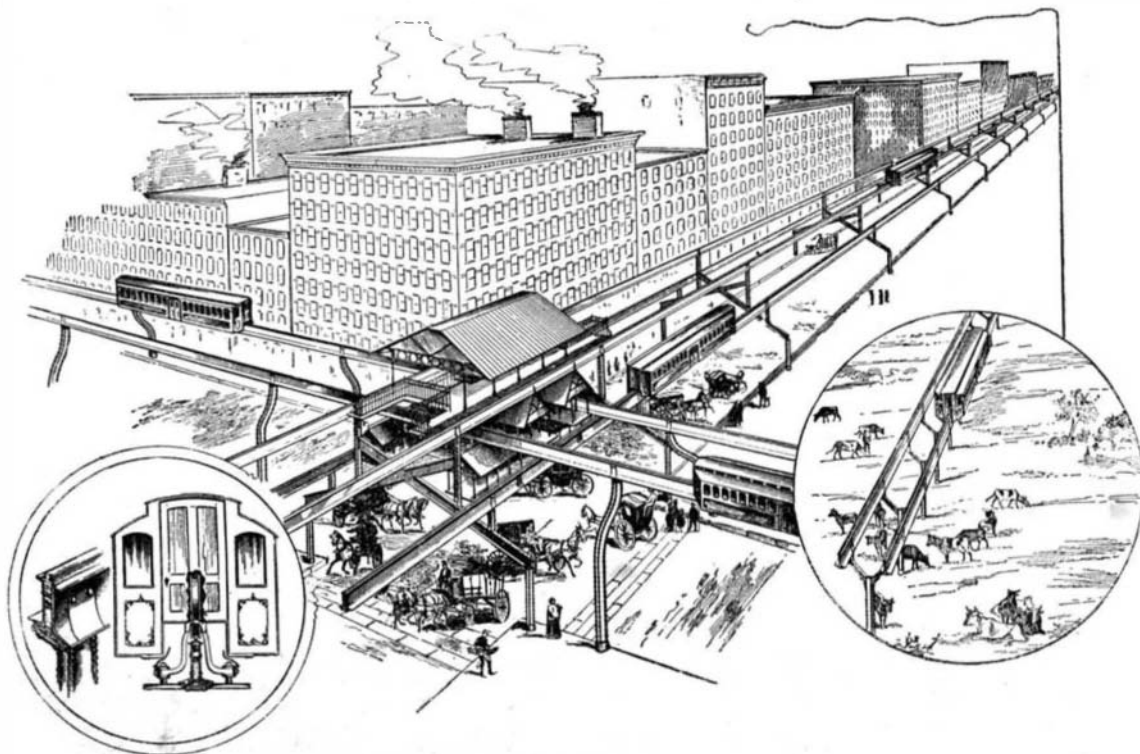
## A NEW ELEVATED ELECTRIC RAILWAY SYSTEM.

BY HENRY S. PRUYN.

A new elevated electric railway system, known as the Pruyneway, is shown in the accompanying illustrations. The picture at the left gives a perspective view of the structure of the girder and of the rail which it carries on top of it and the two current conductors carried under the lower flanges, where they are not only insulated, but protected from damage by the weather or any other cause. Slightly below the level of these power current conductors, and between them and below the structure, is a space for telegraph, telephone, light or any other electric lines, which are also protected from interruption by snow, ice or other causes. As these conductors are firmly fastened and completely protected, there is no danger of short circuiting or leakage of any of the current.

The track and its structure stand on posts high enough to permit free passage for the public below, and to prevent all interference. Freedom from obstruction by snow is secured, even in the most snowy regions; and the drifting of snow and cleaning it away from tracks on city streets is a serious nuisance which this system entirely escapes. In fact, no obstructions of any kind, intentional or accidental, are liable to occur.

In the Pruyneway method of operating the electric power and current, the system does not depend upon the or-



PRUYN'S ELEVATED ELECTRIC RAILWAY.

dinary ground circuit. Instead of the return current being allowed to pass through the structure to the ground, it is passed from generators stationed at suitable intervals along or under the railway line, out through the conductor at one side of the structure, and picked up and carried by a suitable truck conductor to the car motor, and after having performed its allotted labor in driving the carrying wheel which rests on the top of the main rail, passes down on the

other side of the car through a suitable conductor into the opposite guide wheel below, which delivers it to the current conductor on that side and returns it to the original generating dynamo.

Each car is self-propelling and the cars may be run singly or in trains. The weight of the car and its load is carried low on either side of the track rail, and largely below.

Doors for the use of passengers are provided in the sides of the car. Passengers sit comfortably, back to



COMBUSTION OF TINFOIL IN THE FLAME OF A BLOWPIPE.

back, separated by a narrow aisle or passageway for the use of the motoneer, and facing the sides of the car.

The view in the right hand panel will give an idea of the Pruyneway method of construction for a cross-country, double track road. A right of way one rod wide is sufficient for it. There are no grade crossings for wagon roads, footpaths or railways, and thus no liability of damage to persons or property from passing trains, smoke or accidental fires from locomotive sparks. The Pruyneway needs no grading, ballasting, draining, culverts, fencing, telegraph posts, cattle guards or small bridges; no bridges are required except over large streams and ravines. The Pruyneway passes over bridges without obstructing footpaths and roadways; and as the electric current which propels the car is broken on drawbridges by the opening of the draw, the cars cannot run upon a drawbridge or approach it while the draw is open. The line can run through agricultural lands with no more interference with tillage and grazing than would be occasioned by a series of trees standing several rods apart.

Cars and trains can be run at a speed limited only by the rate at which the driving wheels can be rotated by the heavy electrical current, without the necessity of stopping for supplies of water and fuel, for re-oiling journals or changing engines, and can be run without danger or inconvenience within or without, at full speed, through the most densely populated towns as well as anywhere else.

The central view shows the system as applied in cities, with a three-story station at the intersection of two streets, for the accommodation of passengers on either of the three lines of railway shown. Through express cars run on the two highest tracks of the main line; local accommodation cars run on the lowest pair of tracks, nearly over the curbs on each side of the street.

The structure is a permanent way. Once made, it is there for years. It does not require the expenditure necessary in ordinary railroads to keep in repair their 2,500 ties and 350 rail joints to the mile on a track bed exposed to the action of rain, frost and other effects of the weather.

The cars are lighted and can be heated by electricity under instant control, without danger from fire or steam under any circumstances; from the breakage of