eral reform in methods of teaching in other branches of the courses of primary instruction in the schools of the country has not taken place, particularly in mathematical courses. This anomaly will, however, disappear, because of the initiative taken by the eminent Director of primary education to the Minister of Public Instruction, M. Buisson. The Minister has in fact decided, on M. Buisson's recommendation, that a certain number of those learning to be teachers, in the normal school of Lyons, shall be authorized to form a fourth-year course at la Martinière for the purpose of being instructed in the peculiar methods of teaching there adopted. In consequence of this arrangement it is certain that the method of Tabareau will find its way into the primary schools of Lyons, and little by little eventually in the other schools of France, producing the same results that long experience has shown at la Martinière.

[*To be continued.*]

THE IVES PORTABLE PROJECTING LANTERN.

[*Report of the Committee on Science and the Arts.*]

[No. 1479.]

HALL OF THE FRANKLIN INSTITUTE,
PHILADELPHIA, October 23, 1889.

The Sub-Committee of the Committee on Science and the Arts, constituted by the FRANKLIN INSTITUTE of the State of Pennsylvania, to whom was referred, for examination,

THE IMPROVEMENTS OF FREDERICK E. IVES, IN THE PROJECTING LANTERN AND ITS APPURTENANCES,

Report that: They have examined the apparatus as arranged, the object of which may be thus described :

The projecting lantern is pre-eminently an educational instrument, the places of exhibition constantly changing. In a few instances, as in the case of the fixed lecture-room of a college, bulk and weight are of no great moment, but in the great majority of cases, the apparatus must be moved to the place of exhibit and taken away at its close. In such

cases, weight and bulk become most important items. It has for years been the study to reduce the weight and bulk of the apparatus, as the older forms made a heavy load to handle.

Mr. Ives presented to your sub-committee, the apparatus in two items, viz: the projecting lantern itself, and his method of producing light.

We consider first the light.

In Mr. Ives' patented arrangement, he dispenses with the weight and bulk of the hydrogen cylinder, or bag and press-board, thus transporting one gas-holder instead of two.

Instead of hydrogen, as the combustible in the jet flame, he passes a small stream of oxygen through a small metal cylinder, containing a porous filling saturated with ether, then on to the ordinary jet, when it is mixed with the

blast stream of oxygen. The details of the invention are set forth in the accompanying patent specifications and drawings.

It is sufficient to say that this small metal cylinder is completely filled with a rolled cylinder or wad of soft cotton cloth, cut so as to form a small canal on its upper surface, when in place in the metal cylinder, which canal is not in a straight line from end to end, but zigzag, so as to form a canal two or three times longer than if the channel were straight, compelling the gas to take more time in passing through, and thus insuring more perfect saturation of the oxygen with the ether vapor.

The sub-committee carefully compared the light given by the Ives ether light with that of the best oxyhydrogen apparatus, by throwing the two lights, each upon half of the screen at the same time, and believe the two to be equal in intensity.

Both sulphuric and petroleum ether were tried, the opinion of the Committee from observation being that the petroleum ether gave perhaps a whiter light. Petroleum ether possesses the advantage that it leaves no residuum, while sulphuric ether gives a residuum of alcohol and water, which in time take the place in the cylinder which should be occupied by ether only, and make it necessary occasionally to remove and dry out the cotton roll. An advantage appears to be with the ether-oxygen over the oxyhydrogen mixture, in that it gives upon the lime a smaller surface of incandescence, and as the principle upon which condensers are constructed is based upon the idea of the light emanating from a point, it would seem that the smaller the incan-

descent spot (other things being equal) the sharper the definition.

The question of danger was elaborately discussed. Under its first form, namely, bubbling the gas through a wash-bottle half filled with ether, the apparatus certainly was dangerous, because that method did not positively insure a non-explosive mixture, and in case of accidental removal of pressure of gas supply the mixture was liable to explode back into the wash-bottle, bursting it and throwing burning ether about the room. In the Ives saturator a non-explosive mixture is produced under normal conditions, and even if from any cause, such as an unusually low temperature or a deficient supply of ether, an explosive mixture be produced, the quantity would be so small that the worst effect of an explosion would be to blow the cork from the end of the tube or blow the rubber tubes from the nipples.

The "folding lantern" was exhibited in both single and double forms, there being nothing new in the principle of the lantern itself, but only in the plan of construction, which permits of the folding and sliding of the parts upon another in such manner as greatly to reduce bulk of apparatus, when packed for carriage; the single lantern being disposed in a box $8\frac{1}{2}$ inches long, 6 inches wide, and $6\frac{1}{2}$ inches deep, and weighing about 8 pounds.

On sliding out the top or lid, the condenser is found securely fastened to its under side. The frame carrying the objective is also secured to the lid by bayonet hinges

and folds back close to the condenser. When the hinged piece carrying the objective is turned open to its provided limit, we have the condenser and objective in a true axial line, without needing further adjustment. The reversed lid is now slid into the top of the box which becomes the base of the lantern. The jet is then fastened in its place and a sheet-iron hood, which is made of the proper dimensions exactly to slide into the box from the open or back end, is affixed to its place over the jet. The frame of the objective has wings of sheet-iron hinged to the top and sides, forming, when opened, screens to prevent side dispersion of the light. The sheet-iron hood has likewise hinged doors, which

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close flat when packed and open when in position to prevent diffusion of light into the room. The removal of the hinged front-piece, carrying the objective, leaves an open platform upon which such lantern attachments as the microscope, polariscope, etc., may be fastened.

By a simple device the lantern is securely attached to the top of the oxygen cylinder, thus having a firm and compact base, which obviates the necessity of providing a separate stand or table.

It appears to your sub-committee that Mr. Ives, both in respect of the design and construction of the mechanical portion of the projecting lantern, and in the method employed for producing light, has greatly improved this educational apparatus, adding materially to its portability and general handiness, without sacrificing anything of its efficiency. In short he has produced a high-class apparatus of notably small bulk and weight compared with the forms of lanterns heretofore known and used, of great convenience for carriage and manipulation, yet sufficiently strong to withstand the rough usage of transportation.

In consideration of the foregoing facts, your Committee recommend the award of the JOHN SCOTT LEGACY PREMIUM AND MEDAL to Mr. Frederick E. Ives, for substantial improvements in construction and operation of the projecting lantern, which have added to its convenience and usefulness as an educational apparatus.

Respectfully submitted,

[SIGNED]

EDWARD F. MOODY, *Chairman*,
SAMUEL SARTAIN,
N. H. EDGERTON,
H. PEMBERTON, JR.,
H. R. HEYL.

Adopted November 6, 1889.

S. LLOYD WIEGAND,
Chairman of the Committee on Science and the Arts.