

PROBLEMS IN OPTICS

R.G. Morris

The unbound book was found ten years ago by the former Chairman of the Magic Lantern Society of Great Britain, Ron Morris, and its title page reads as follows:

**MATHEMATICAL
and
PHILOSOPHICAL**
(possibly PHYSICAL - translation
change, ref. Ozanam)
RECREATIONS

The book was translated by Chas. Hutton, dated 1803, from an earlier work by Ozanam - late 17th Century. As well as a full description of how to construct a lantern, the writer makes interesting comments on the users of the lantern and also includes a simple treatise on slide painting. All the sixteen engraved plates are of the 'fold-out' type and bear the name Mutlow Sc. Russell Co. The book has been rebound by Sally Lou Smith, a well-known designer/bookbinder.

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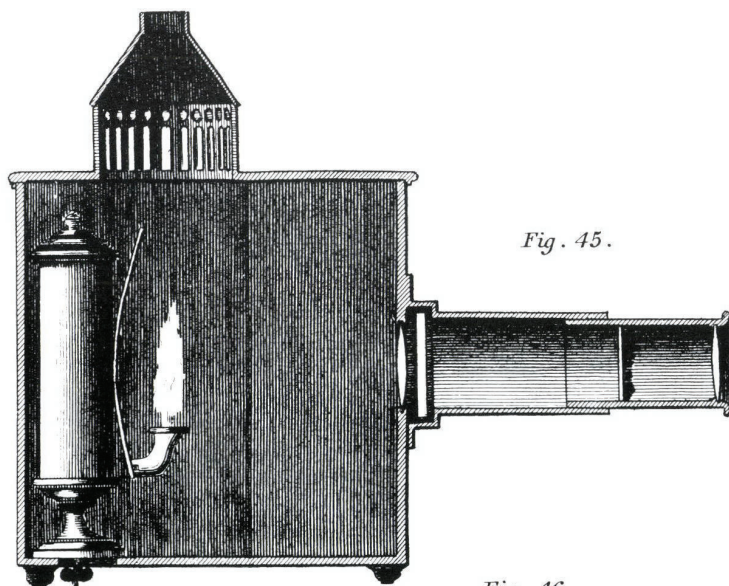


Fig. 45.

Fig. 46.

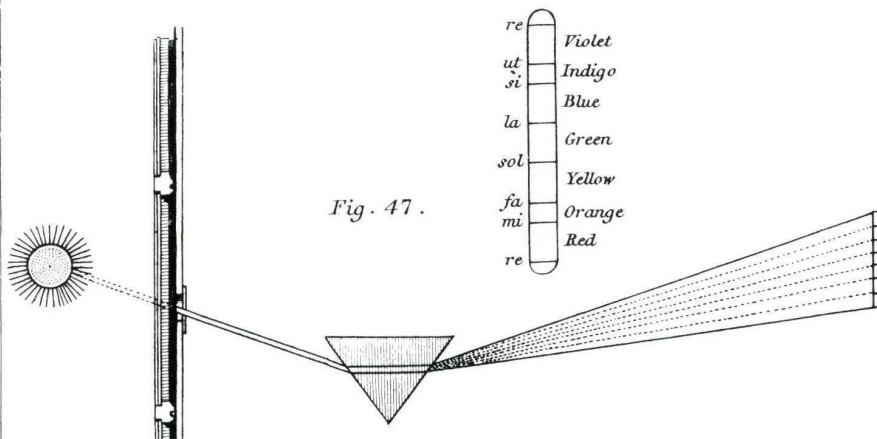


Fig. 47.

THE name of *magic lantern*, as is well known, is given to an optical instrument, by means of which figures greatly magnified may be represented on a white wall or cloth. This instrument, invented, we believe, by Father Kircher, a jesuit, has become a useful resource to a great number of people, who gain their livelihood by exhibiting this spectacle to the populace. But though it has fallen into vulgar hands, it is nevertheless ingenious, and deserves a place in this work. We shall therefore describe the method of constructing it, and add a few observations, which may tend to improve it, and to render it more interesting.

First, provide a box about a foot square (fig. 45 pl. 13) of tin-plate, or copper or wood, and make a hole towards the middle of the fore-part of it, about three inches in diameter: into this hole let there be soldered a tube, the interior aperture of which must be furnished with a very transparent lens, having its focus within the box, and at the distance of two thirds or three fourths of the breadth of the box. In this focus place a lamp with a large wick, in order that it may produce a strong light; and that the machine may be more perfect, the lamp ought to be moveable, so that it can be placed exactly in the focus of the lens. To avoid the aberration of sphericity, the lens in question may be formed of two lenses, each of a double focus. This, in our opinion, would greatly contribute to the distinctness of the picture.

At a small distance from the aperture of the box, let there be a slit in the tube, for which purpose this part of it must be square, capable of receiving a slip of glass surrounded by a frame, four inches in breadth, and of any length at pleasure. Various objects according to fancy are painted on this slip of glass, with transparent colours; but in general the subjects chosen are of the comic and grotesque kind (fig. 46 pl. 13).

Another tube, furnished with a lens of about 3 inches focal distance, must be fitted into the former one, and in such a manner, that it can be drawn out or pushed in as may be found necessary.

Having thus given a description of the machine, we shall now explain its effect. The lamp being lighted, and the machine placed on the table opposite to a white wall, if it be exhibited in the day time, shut the windows of the apartment, and introduce into the slit above mentioned one of the painted slips of glass, but in such a manner that the figures may be inverted: if the moveable tube be then pushed in or drawn out, till the proper focus is obtained, the figures on the glass will be seen painted on the wall in their proper colours, and greatly magnified.

If the other end of the moveable tube be furnished with a lens of a much greater focal distance, the luminous field will be increased, and the figures will be magnified in proportion. It will be of advantage to place a diaphragm in this moveable tube, at nearly the focal distance of the first lens, as it will exclude the rays of the lateral objects, and thereby contribute to render the painting much more distinct.

We have already said that the small figures on the glass must be painted with transparent colours. The colours for this purpose may be made in the following manner: red by a strong infusion of Brasil wood, or cochineal, or carmine, according to the tint required; green by a solution of verdigris; or for dark greens, of martial vitriol (sulphate of iron); yellow, by an infusion of yellow berries; blue, by a solution of vitriol of copper (sulphate of copper); these three or four colours, as is well known, will be sufficient to form all the rest: they may be mixed up and rendered tenacious by means of very pure and transparent gum-water, after which they will be fit for painting on glass. In most machines of this kind, the paintings are so coarsely executed, that they cannot fail to excite disgust; but if they are neatly designed, and well finished, this small optical exhibition must afford a considerable degree of pleasure.