From *The Optical Magic Lantern Journal*, concluding this series from the Society's book *Magic Images*

Optical and Mechanical Effects for the Lantern

By EDMUND H. WILKIE.

(Late Royal Polytechnic Institution).

Part Twelve – November 1899

HAVING determined the form of the lightning flash, and the manner in which it should be prepared, let us now consider the best methods of exhibiting its effects upon objects which may unfortunately for themselves stand in its path.

There are widely diverse opinions as to the best thing to do when a lightning storm takes place. Some people open the windows, some shut all the windows and doors, many cover up the looking glasses and other bright objects; but it all amounts to the same thing in the end. If the objects are in the path of the electrical discharge they will be destroyed, and if not they are safe without any precautions.

If I may dwell upon this subject for a moment without abusing your patience, I should like to tell you what my friend the late Mr. J. L. King was accustomed to tell audiences at the Polytechnic was the

safest place in a storm.

I do not think many in the audience quite considered him to be in earnest, but he used to say: "The safest possible position during a lightning storm would be to don a suit of polished steel armour, covering the entire body, and then to take a seat in the middle of an open field with one's feet in a pool of water." No doubt the advice was good, but the remedy would certainly be almost as bad as the disease.

On the screen we should have a complete change of picture when the lightning flashes, and when three lanterns are available this can be accomplished in perfection. One effect we have used in this way consisted of two views of "Thunder Peak" in the Rocky Mountains; the first showing the scene in its normal condition, and the second showing the devastation wrought by the lightning striking some trees, uprooting them, and setting them on fire.

When working such an effect as this, no mechanical shutters can be used with such perfect results as the palm of the hand or a piece of blackened card.

If the first view is placed in the top lantern, and the second view in the middle, both should be turned full up and the card held over the centre nozzle. The flash can be shown from the bottom lantern, and while the spectator's eyes are dazzled by its blinding glare, the card is simply shifted up about 6 inches, covering the top objective and uncovering the centre showing the damage done. This will be found far more effective and perfect in working than by the ordinary flashing shutters, which occupy two hands, and, besides, it possesses the advantage of being perfectly noiseless in operation.

One of the most used and favourite subjects for the lantern is the "Ship on Fire," in which the ship is struck by lightning and afterwards found to be on fire. The set was originally designed to illustrate Henry Russell's grand descriptive song entitled "The Emigrant Ship," and although it has now been in use for a considerable number of years, has been altered very little from time to time, the main designs remaining the same. In this case the ship is seen after the storm on a comparatively calm sea by moonlight, and a rack effect showing the flames and smoke is projected from another lantern. This rack effect has a slip glass attached, which is partially covered with opaque varnish, in order that it may be drawn over the rack flames and cut them off or disclose them as required. It is used by placing it in the lantern with the opaque slip over the flames, when by drawing the slip slowly outwards the flames appear first at the port-holes, then on deck, and finally envelope the whole vessel and rigging. Although not used in the ordinary sets, many little additions could be made to this effect, such as falling sparks, flickering flames, etc.

With this rack movement it will be apparent that only a portion of the picture can be enveloped in flames, as when the rack is revolved, one side of the glass ascends while the other descends, but in some cases it is requisite to cause the flames to ascend from both sides of the view at the same time.

This was the case with the Great Fire of London, painted by Mr. Childe for the late Polytechnic Institution, for in this view the flames extended from side to side of the scene. Fig. XXXV. shows us how this may be arranged on one slide. Two large glass wheels with brass edges, 10 inches in diameter, were arranged in a frame so that they overlapped half way across, and as they both revolved in the same direction, enough ascending motion was obtained to cover the whole width of the slide.

The top glass, by which I mean the one we see in its entirety in our diagram, was painted a little more heavily than the under one, as a portion of the under smoke and flame had a descending motion where the two wheels overlap, and to overcome this the top painting was very vivid.

The effect upon the screen was very fine and extremely imposing, especially when accompanied by appropriate music and all those acoustical effects which formed a distinguishing feature of the dioramic entertainments at the Polytechnic. Many effects have been produced to illustrate a "House on Fire," but they all fail in one important particular—the fire continues to pour forth from windows, doors, and through the roof, but makes no

material progress;

as it appears on the screen, so it remains until dissolved off. This being the case, the writer has been at work for some time past endeavouring to produce a picture in which the building shall gradually become destroyed in front of the audience, and hopes to have more to say on this point very shortly.

In showing fire effects it is a very common fault to turn the rackwork too quickly; but fire and smoke, especially when viewed from a distance, do not appear to mount into the air at a great speed—they take matters very leisurely, and this should always be borne in mind, otherwise the effect is apt to seem unreal.

While upon these revolving effects to show elemental disturbances, it is a natural transition from fire to water again. We treated of water coming down from the clouds in our last paper, now let us consider the best methods of illustrating bodies of falling water, such as waterfalls.

The best way of realising these effects in a really natural manner is to consider in the first place the size and position of the falls, for we must not lose sight of the fact that the further we are away from any object the slower is its apparent motion. Thus, a fall such as Niagara appears to a close observer to rush by at almost lightning speed, but viewed from a great distance it seems to flow much more slowly and evenly.

Let us take this kind of waterfall first, and consider that we wish to make an effect to give it the appearance of actually flowing. The ordinary practice would be to take a rack frame and build up the effect on this, but such a motion would not give us the result we wish to obtain; it is too quiet and too slow.

Fig. XXXVI. shows us what really is required. It consists of a frame with a blackened glass fixed into it, above which revolves a circular disc of glass, which should be of as large a diameter as the width of the frame will possibly allow. This disc is pivoted in the centre, and has attached to it a small wooden pulley, from which a band is attached to a multiplying wheel moved by a handle.

The glass disc is blackened out all over, and a number of curved lines as shown in our

Fig. XXXVII.

diagram are etched out of the black. On the fixed glass is the shape of the waterfall, also etched out of black, and the course of the water indicated in the same manner. When the circular glass is revolved the lines pass one over the other, giving the appearance of descending water, and it will be appreciated at once by glancing at the diagram that the motion could be made of any degree of rapidity.

Now let us turn our attention for a moment to a waterfall on a smaller scale, such as we find in many cases in hilly countries, and in which the fall of water is neither so vast nor so rapid, and which are probably viewed from a greater distance, simply forming a portion of the landscape. For this purpose the ordinary rack frame will suffice, the fixed glass being blackened and etched out as before, but the revolving glass being treated in a different manner, as the black colour, instead of being etched in large semi-circular sweeps such as we see in Fig. XXXVI., should be prepared as shown in Fig. XXXVII. This will give an entirely different effect, and when used with the ordinary rack frame is well adapted for waterfalls of a quieter and less boisterous character.

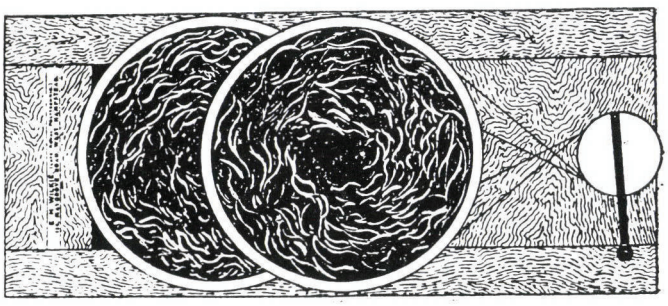


Fig. XXXV.

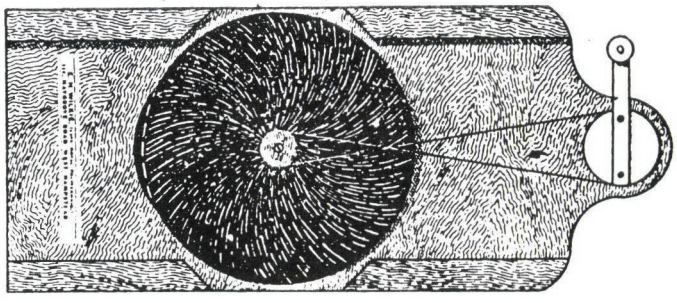


Fig. XXXVI.

IT is a constant source of surprise to the specialist in lantern work to discover the very cramped ideas of most lanternists with regard to mechanical and dissolving effects. They appear in most cases to imagine that all that can be done in this respect has already been accomplished, and that nothing remains for us to do but continue the same old round of subjects year after year or abandon effects altogether. This idea I think mainly arises from the fact that the majority of opticians' catalogues contain subjects with which we were familiar in early youth, and that only on very rare occasions are novelties offered. But the fault does not rest altogether with the dealers; they do not as a rule (even at Christmas time) conduct their businesses on purely philanthropic lines and cannot afford to produce a succession of optical novelties unless each subject meets with sufficient demand to justify its existence.

The production of a new effect set is always expensive, frequently worrying and tedious, and almost invariably demands

more attention

and absorbs more time than it pays for, hence the paucity of novelties.

Many exhibitors say that at the present time they cannot obtain fees of sufficiently magnificent dimensions to allow them to exhibit the class of work they would desire, but they lose sight of the truism that before we can gather the harvest we must sow the seed. As an instance, we may quote the case of a public exhibitor who was recently fitted out by the writer with views and apparatus. Commencing only this season, he is now booking an average of two lectures a week at five guineas each, but mark this, his pictures are gems; where he exhibits once he goes again, and sometimes at very short intervals. Good work pays, but the modern exhibitor appears to be sceptical as to that fact. We cannot insist too much or too often upon these two points, colour, and scenic effect, without these the exhibition is foredoomed to failure. In this paper we treat upon two effects or mechanical slides which are absolutely unique, and of which only one of each has ever been made to the writer's knowledge.

There is in Palestine somewhere, a bridge crossing a small stream, and the parapet of this bridge rising from each end comes to a point in the centre resembling an inverted V. The angle however is not so acute, in fact it is so obtuse that given a bridge of say 4 inches in length the rise in the centre would not be more than half-an-inch. The bridge crosses almost the entire width of the picture, and as it stands in the track of caravans, we wish if possible to represent it at the exact moment that a train of laden camels is passing across. If we paint the camels upon a slip of glass they disappear as they near the centre of the bridge, being hidden by the rise in the parapet, therefore a straight slipping glass will not give us the effect we wish to obtain. We may it is true tilt the guide upon which the glass runs, but in that case the camels would continue ascending and would not descend on the other side of the bridge.

It is clear that to cause our camels to change the direction of their path after passing the apex of the bridge they must be painted upon some substance, or mounted in such a manner that the procession is flexible and not rigid, as is usually the case. No such substance being known to us at present, we must overcome the difficulty by mechanical means. The whole of the machinery is laid out in Fig. XXXIX.

We see that it consists essentially of a wooden frame of suitable size, in the centre of which is cut a round hole 3 inches in diameter, this being filled by a circular glass; and this glass is blacked entirely over, with the exception of a small portion left clear to show the train of camels. On the top of this, in the position shown in our diagram, is screwed a thin piece of hard wood, the upper edge of which is cut to the exact shape of the parapet of the bridge in our foundation picture. This is about one-eighth of an inch in thickness, and is extended as a guide along which the flexible train of camels is to pass. At either end of this piece of hard wood, very close to it but not quite touching, are large wooden wheels also one-eighth of an inch in thickness, and round these wheels and across the top of the wooden block passes a tightly stretched endless band composed of the strongest kind of tape.

To facilitate its working the top of the wooden block is not only made very smooth, but is carefully coated with powdered black-lead. On this band are rivetted a number of small squares of mica, which overlap each other to prevent any blank space intervening when the procession is bent as it passes over the point in the centre of the bridge. On each of these pieces of mica is painted a camel, and on reference to our diagram the method of moving the whole arrangement will be at once apparent. To keep all the various portions in their places a plate of glass is then placed over the whole, as shown by the dotted lines in our illustration.

One of the most ingenious mechanical motions ever applied to the production of optical effects upon the screen was exhibited in connection with an entertainment founded upon Weber's opera of "Der Freyschutz." Those acquainted with this opera will remember the thrilling and dramatic incantation scene, in the course of which the magic bullets are cast. At each casting the light from the brazier changed colour, and a variety of weird and grotesque apparitions appeared floating in the air, seated upon the rocks, and crawling upon the ground. The most natural of these appearances was a wriggling serpent, which contorted its body in an extremely realistic manner, and which entering on the left side of the picture crawled across the foreground and disappeared upon the right.

This remarkable piece of mechanism is now in possession of the writer, and will be found illustrated at Fig. XL. It bears a certain family resemblance to Fig. XXXIX., as the actual painted portion is drawn upon small plates of mica. The usual framework of wood contains a square brass plate, shown by the blacked out portion of our diagram. In the centre of this plate is an opening of sufficient breadth and length to show the serpent even in his most acute contortions, and covering this opening are four plates of mica loosely rivetted together at their edges, and upon these plates the figure of the serpent is painted.

On reference to our diagram, it will be seen that if the lever A is gradually pushed downwards, the four plates of mica will leave the angular positions in which we have represented them, and form a straight line; but as that will cause the combination to become elongated, and the whole affair is fastened to the brass plate by the screw C, it is necessary that the centres upon which they work shall not be fixed, but shall allow a little play towards the right hand side of the slide. To accomplish this the rivets through the centre of the plates are not fastened directly into the brass plate, but are secured to metal levers D, which working on the pivots E, allow the necessary amount of latitude.

By working the lever A slowly upwards and downwards, it will be seen that the serpent apparently bends its body to and fro, the forward motion being obtained by pushing the slide bodily through a loose outer frame. The lever B is quite independent of A, and is simply used to work the serpent's lower jaw, causing the mouth to open and shut.

It is difficult by mere words to convey an adequate idea of the extreme realism of this wonderful mechanical slide, but it is to be hoped that the description of its working parts may excite in the minds of ingenious lanternists a desire to possess a similar piece of mechanism, and to further their efforts we hope in the next paper to give in detail all the separate portions of which it is composed.

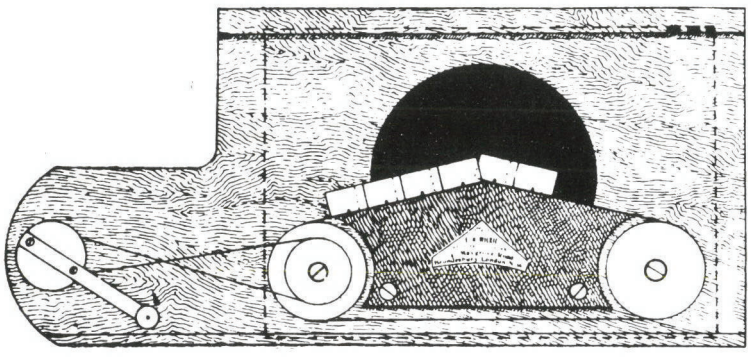


Fig. XXXIX.

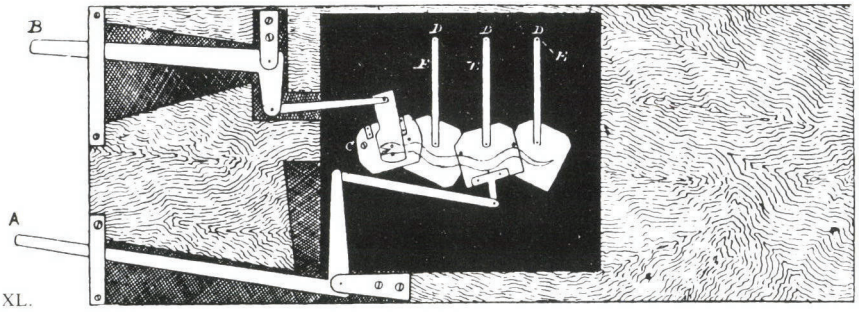


Fig. XL.

REFERENCE was made in an editorial note which appeared in the December number of the MAGIC LANTERN JOURNAL to the retirement from the lecture platform of one of the most prominent figures in the lantern world. I allude to Mr. B. J. Malden, whose name will be familiar to lanternists all over the world who are interested in the higher forms of dioramic entertainments.

It may appear at first sight that there is very little connection between a series of papers descriptive of lantern effects and this editorial note, but such is nevertheless the case; and it affords a good opportunity for the introduction of a few valuable considerations.

In reading this note we find the following words:—"This popular lantern lecturer, whose name has long been a household word, has at last decided to retire. Mr. Malden has probably made more money by his lantern lectures than any other lecturer." I think it may be asserted without fear of contradiction that although the ranks of lantern exhibitors contain a goodly number of gentlemen who exhibit for philanthropic purposes, without anticipation of benefiting themselves in any way, yet the majority of exhibitors would prefer to reap a financial reward as the

result of their exertions.

If it be true, as it undoubtedly is, that Mr. Malden has succeeded in materially benefiting his banking account in a greater proportion than anyone else, we shall be doing wisely to consider for a moment how he has succeeded in accomplishing so desirable an end.

Of the genuinely interesting lectures written with so much care and delivered in his own easy, unaffected and pleasing manner, which made us all feel on a friendly footing at once, I have no time or space to say much now, perhaps a more fitting occasion may arise, but there is another aspect of the case with which we are now more immediately concerned. The lecture was half the battle, the illustrations formed the other half, and it is to this point that I desire to direct your most particular attention. I need not refer to the quality of his pictures, all lanternists whose experience dates back a few years know that they consisted of hand paintings of the very highest class, elaborately worked up photographs, and a fine series of novel mechanical effects, all correctly registered.

Now what conclusion does this lead us to? What is the lesson that we learn from Mr. Malden's experience? Why this; that if he *made more money* by his exhibitions than any of his contemporaries, he also in the first place *spent more*; and there we have the whole case in a nutshell.

The writer frequently comes in contact with professional exhibitors, who say, "These effects are beautiful and striking, but I am doing very little business and cannot afford them. When I get more engagements I will certainly go in for some of this kind." But this is an entire mistake; it is a mistake which cannot too frequently be pointed out and insisted upon.

My very dear friends, if you wish to do good business and get good fees, you must first have good apparatus to exhibit with, and good pictures and effects to show. You must first deserve success, and believe me it will come.

I think I am correct in stating that Mr. Malden frequently paid as much as 25s. each for his paintings, and you may depend upon it that he found it to his advantage to do so in order to retain his

well-earned reputation.

Can exhibitors, therefore, expect to meet with the same measure of success if they exhibit abominations in the form of slides costing a few pence each?

What should we think of a butcher who sent out circulars and published advertisements regarding a new business he was establishing, and then opened his shop with one mutton chop which had seen its best days, saying he would wait until he received some orders before he invested in any more meat. Should we expect him to do a flourishing business? This may appear an extreme view of the case, but believe me the parallel is not overdrawn.

We cannot reap the harvest unless we first sow the seed, and this is the root of the difficulty experienced by many in attracting the public to witness their exhibitions.

Plain photographs and single lanterns are admirable in their place, which is as adjuncts to the lecture table for the exhibition of an occasional diagram, but pictures without colour or movement soon pall upon the most interested audience and do not in any sense form genuine lantern entertainments.

We must have fine pictures and we cannot do without effect slides, as they form the very backbone of popular dioramic exhibitions, and to pay we must be popular. This being the case, let us turn once more to our immediate subject "Effects" and proceed with the description of the details of the Mechanical Serpent commenced in the last number of our series.

It was there promised that more definite details of the construction of this wonderful slide should be given, and in Fig. XLI. we have an enlarged diagram of the various portions of which it is composed. It consists of four plates of thin transparent horn loosely rivetted together, the actual position of the rivets with regard to the curves of the snake being clearly shown in our sketch. Each plate moves upon a pivot in its centre which pivot is formed by a rivet which passes through the horn and is fastened in the extreme end of one of the black leads in drawing. These bars are not fixtures but work loosely upon a screw which passes through the opposite end and is secured firmly into the back plate of brass upon which it is all built up. The head of the reptile is in two parts, the upper portion with the eye being upon the end plate of horn on the right hand side and the lower jaw being upon the supplementary plate A which being pivoted just above the jaw allows the mouth to be opened or shut as desired by moving the small lever shown in our last paper. The opening in the brass plate through which the snake is seen is described by the dotted lines.

Many ingenious movements have at various times been arranged by using small pieces of horn or talc rivetted in places and allowing of a slight movement; and another example of this description of slide is given in Fig. XLII.

In this picture we see a scientific gentleman inspecting the interior of a large glass vessel apparently empty. Perhaps he has discovered a new gas, and wishes to learn if it is offensive to the nose. Beneath the table on which it is placed is a small demon, who by a slip movement jumps through the table, and is seen sitting on the bottom of the glass jar, much to the surprise of the savant, who starts back in surprise; the movement to the head being obtained by the lever handle.

The picture is painted upon a blacked out glass fitted into the centre of a frame, as shown, the head being omitted, and in its place is a clear space sufficiently large to allow the head to move without touching the black portion surrounding. A piece of horn is then cut of the size and proportion as shown in sketch, and loosely rivetted to the arm A, which is secured to the frame by screws.

Upon this piece of horn the head is painted, and the manner of working will be easily gathered from the diagrams. Formerly many effects were worked out upon horn foundations, but the substance does not suit modern requirements if used in large pieces, owing to the much greater heat given by the high-power jets in ordinary use at the present time. Where a small portion of a thin transparent substance is required, mica or talc is found to answer all requirements, but owing to its "powdery" nature it is not suitable where the substance has to work upon a pivot driven through it, as in that case it very quickly wears away and the hole becoming too large the movement falls to pieces. Talc, however, is very useful where the framework of the movement can be made of sheet metal with spaces cut out where any painting is necessary; these holes can be covered by plates of talc secured by rivets and the artistic work executed just in the same way as upon glass.

This method of preparation has many advantages over painting upon glass pure and simple. Most lanternists must have experienced the extreme annoyance of blacked out effects continually cracking, sometimes during a critical portion of the exhibition. This is caused by the blacked surface absorbing more heat than the glass can manage to cope with by expanding, and the more powerful our jets the more we suffer from this annoyance. Such effects as rack motions and slip glasses are peculiarly liable to these breakdowns, but in most cases the difficulty can be entirely avoided by using the combination of talc and metal just recommended.

In the next paper I shall endeavour to represent a slide prepared in this manner.

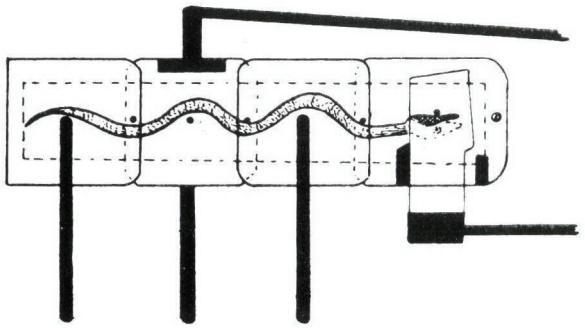


Fig. XLI.

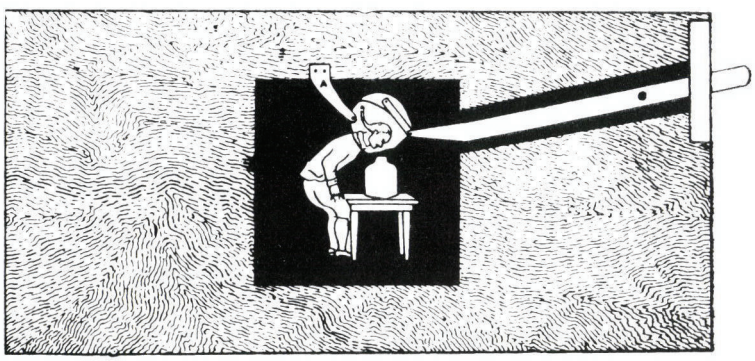


Fig. XLII.

IN the last portion of this series of papers reference was made to the difficulties experienced by operators on account of the frequent breaking of slip glasses in effect slides, owing to the great heat radiated by some modern limelight jets. All those who are intimately acquainted with optical effects are well aware that opaque bodies absorb more heat than transparent, and that black surfaces become hotter than white under precisely similar circumstances.

The slip glasses are, as a rule, blacked over the greater portion of their surfaces, comparative little being devoted to transparent painting, and for that reason soon become extremely hot when in the full glare of the light in the lantern. If the whole of the slip glass was exposed to this degree of warmth at one time, there would not be so much chance of a breakage occurring, but many of these movements have glasses 10 or 12 inches in length, and as only 3 inches at a time is exposed we have unequal expansion, resulting in most cases in fracture.

Now, excepting under very unusual circumstances this difficulty could be entirely avoided by following the plan illustrated in Fig. XLIII. Here we see the ordinary slip frame, but the side which would be towards the light in the lantern holds the slip movement, and instead of

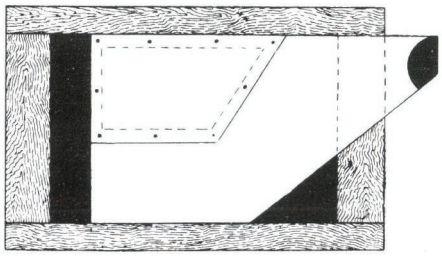


Fig. XLIII.

being of glass this slip movement is made of metal—either brass or zinc—and where the transparent painting is required a space is cut out and filled in with a piece of stout talc or mica. This substance is not affected by heat and can be painted upon as easily as glass and with just as perfect a result. The majority of effects are composed of slip motions, and this mode of preparation may doubtless be a great convenience to those using jets which give great heat in the lantern.

Amongst the most effective subjects for mechanical and dissolving effects are volcanic eruptions, fireworks and bombardments, the latter class being much sought after of late owing to the war at present raging in South Africa.

Prior to 1870 it will be remembered that at Easter the *façade* of St. Peter's at Rome was illuminated by hundreds of little oil lamps, which completely outlined the vast building, while the interior was illuminated by a gigantic fiery cross erected under the dome, and consisting of a mass of small lamps so closely packed together that at a short distance they had the appearance of one great blaze of splendour.

This illumination especially lends itself to dioramic representation, as the effects are brilliant, and the background dark, and it can be recommended as being one of the most telling and satisfactory lantern effects in the ordinary dealers' lists. This is one of the effects which are more perfect when prepared on the basis of a good natural photograph than when entirely painted by hand, for it would be almost beyond the bounds of possibility for an artist to do justice to a perspective view of the interior of St. Peter's in the small diameter of 3 inches. If two photographs of the exterior are obtained in perfect register, one may be coloured as moonlight, and on the other may be worked up the illumination effect, with the

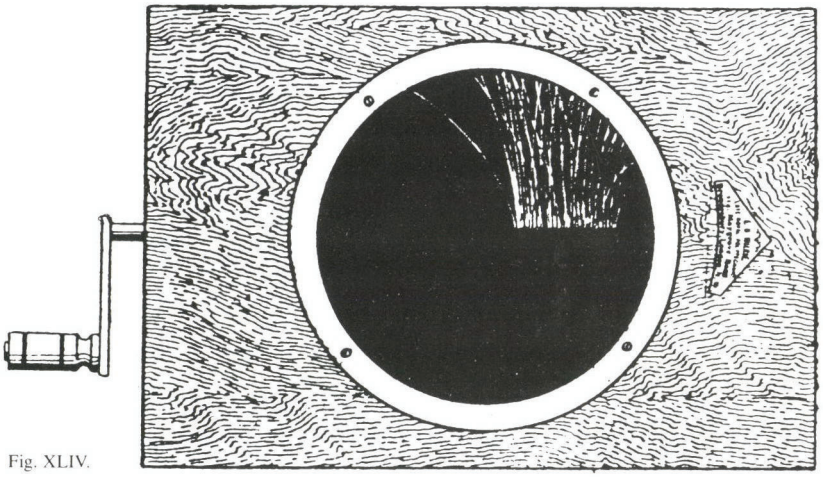


Fig. XLIV.

perfect certainty that the effects on the screen will register without difficulty.

During the same festivities the Castle of St. Angelo, facing the bridge of the same name crossing the Tiber, was the scene of a grand and imposing display of fireworks, and this is illustrated in the following manner.

A picture is thrown on to the screen showing a portion of Rome with the river and distant hills, and on the left side of the centre stands the Castle of St. Angelo, which consists of one upright round tower of a diameter greater than its height. At the top of this tower are deeply set embrasures through which guns were intended to project. The scene is changed to night, and to produce the firework effect two separate slides are necessary, the first of which is shown at Fig. XLIV. It consists of a double rack, or, as it is sometimes called, a chromatrope frame with a square fixed glass at the back, and on this fixed glass a number of lines are made on a black ground, to indicate the paths of a flight of rockets. These lines stretch across the whole width of the top of the tower, and extend upwards to the edge of the picture.

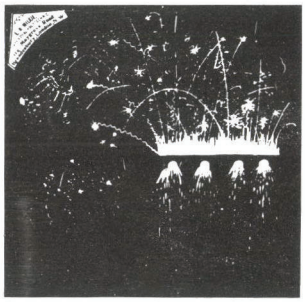
Now, although these lines show the paths of the rockets they do *not* give the motion. If thrown on the screen they would simply appear as so many bright lines, so something further is necessary, and this we find in the movable glasses of the chromatrope frame.

Many lanternists will doubtless be familiar with the method of painting these two revolving glasses in order to imitate flowing water, and in this case the markings are the same, and consist of a series of half circles drawn with a very fine brush from the centre of the revolving glass to the edge. These lines should be not only fine but close together: there must be a large number of them in order to produce a really good effect, and care must be taken that *the convexity of the half circles* is to the right on one glass and to the left on the other, so that when they are mounted together in their frame and involved in such a manner that the *convexities* are opposed to each other, there is an apparent continuous outward motion from the centre to the edge.

This gives the appearance of the flights of rockets ascending, but something more than this is required. A rocket, especially if it is an expensive or elaborate one, does not simply rise and disappear without further result; it commonly throws out stars, coloured balls which change colour while descending, or at times a peculiar startling firework known to the ribald little boys as the "Devil amongst the Tailors." This latter, after descending a short distance, bursts with a loud report, scattering a shower of crackers in mid air, which add by their detonations to the effect of the first explosion.

Such an effect is tedious to make, but very effective to work, and consists of a number of these forms of crackers, fiery serpents, etc., etc., drawn with a sharp point upon a blackened glass; the various designs being afterwards coloured in very bright tints, according to the taste of the artist.

Fig. XLV.



Such an effect slide is shown at Fig. XLV., where the ingenious amateur artist may trace out for himself the various fireworks. In the lower portion of the effect will be seen the cascades of fire which descend from the embrasures of the Castle of St. Angelo.

It will be seen that to show this effect in perfection a triple lantern is necessary, as we place upon the screen first, Rome and the Castle of St. Angelo by day; secondly, the same scene by night; then on this scene the double rack is worked, while at the same time the blacked out effect of the bursting fireworks is flickered on and off by means of the flashing shutter on the lantern front; the whole forming one of the most perfect and striking lantern effects ever arranged.

It is commonly produced in hand painting, but there are several different photographs from Nature to be obtained, upon which this effect could be worked up with excellent results.