THE OPTICAL

MAGIC LANTERN

JOURNAL

AND

PHOTOGRAPHIC ENLARGER.

A Magazine of Popular Science for the Lecture-room and the Domestic Circle.

Vol. 5.—No. 66. NOVEMBER 1, 1894. Price 1d., Post-free 2d.

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The Optical Magic Lantern Journal and Photographic Enlarger.

Vol. 5.—No. 66. Entered at Stationers’ Hall. Nov. 1, 1894. Price One Penny.

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NOTICE.

Binding Cases for 12 numbers ... 1/- 14d.
Reading Cases with 12 cords at back 1/3 1d.
Bound vols. for 1893 ... ... ... 3/6 4d.

Notes.

In last issue we stated that it was our intention to exhibit the old Polytechnic lanterns, and a selection of the slides at the Lantern Society, 20, Hanover Square, W. The date has now been arranged for Monday 26th inst. (8 p.m.) As the Lantern Society members are at all times glad to have the attendance of visitors, should any of our readers wish to be present, they will be welcomed.

We observe that under the heading, "A Scheme," the editor of the Pacific Coast Photographer, in his journal for August, reprints an article which appeared in The Optical Magic Lantern Journal for July, and without comment, evidently leading his readers to believe that the remarks made therein are his own. Possibly the omission of the source was accidental.

* * *

* We would call the attention of readers to the scheme mentioned in last issue by "Bombastes Triple," in connection with the mutual interchange of surplus slides. If you wish to have your name included and will send same to us, it will be forwarded to the writer of the article.

* * *

In order to cope with increasing business, Messrs. Stedman & Soper have recently fitted their studios at 147 Strand, W.C., with electric light installation. Portraits, enlargements, or lantern slides can thus be made irrespective of the weather. We learn that all lantern transparencies made by this firm are by the wet collodion process.
In a letter received from Mr. T. C. Hepworth, he calls attention to the fact that there is at present no guarantee that all makers supply pure oxygen, and that, as in samples he has tested, he has found them to contain from five to thirty per cent. of nitrogen, suggests the desirability of users getting from those with whom they deal, some guarantee that the gas supplied is up to a certain standard of purity.

We learn that Messrs. York & Son, have brought out a set of lantern slides on "Coal mining, or underground life," from direct negatives by Mr. H. W. Hughes, F.G.S., Dudley. Photographs from some of these negatives were shown at the R. P. S. Exhibition by Mr. Hughes, and gained a silver medal. We expect this set of slides, being of great educational value, will be much in demand.

At the Lewisham Camera Club, Mr. A. L. Henderson lately gave a lecture on portions of Switzerland which he had visited last winter, and illustrated his remarks by about one hundred and fifty slides from negatives he had taken. The majority of the slides were printed by contact from half-plate negatives, then cut down so as to measure double lantern plate size. For this a special lantern was constructed, it having an eight inch condenser, the light being supplied from an ether saturator. The lecture was particularly bright and interesting, and the slides, which for the most part were snow scenes, tobogganing, and skating incidents, met with a round of applause. A number of views of interiors of the various hotels which the lecturer had visited, demonstrated the fact that for solid comfort Mr. Henderson knows where to find the best hotels.

Another Saturator has been placed upon the market by Messrs. Timberlake, this being the third style they are making; with it, any mixed jet can be used. This particular form has been in use by Mr. Timberlake for some years, and in the course of some remarks in our issue of September, 1893, we gave an illustration of it. In the case of the one just introduced certain improvements have been made. Messrs. Timberlake have just put in a new six horse-power engine so as to assist in keeping pace with their orders for saturators. The prediction that we made some time ago respecting improved saturators has now been fulfilled, and they are to be found in all parts of the world, and are greatly appreciated by those who use them.

An interesting set of slides will shortly be published by Archer & Sons, of Liverpool. They have obtained special permission to photograph the inside and outside of the two Cunard Steamships "Lucania" and "Campania," said to be the two finest boats afloat. Included in the set will be the grand saloon, music and drawing rooms, grand staircase, captain's room, ladies' saloon, and in fact all the interesting portions, including the engines.

A search-light of one hundred and ninety-four million candle-power, which was made in France, and lately exhibited at the Chicago Exhibition, has been erected at Sandy Hook (N.Y., U.S.A.).

On the 23rd and 24th ult., lantern exhibitions were held at Neyland, for the benefit of a Mr. Davies, whose eyesight has become affected. The tickets were sixpence each. At this time of the year a lantern benefit is a pleasant change from the usual style of friendly lead.

In connection with the work of the Manchester Diocesan Church of England Temperance Society, a new feature has been inaugurated. The Watch Committee of the City Council have granted permission for the Society to hold lantern lectures and services in Stevenson Square, and the first of these was held on the 20th ult. The lectures will consist of scientific illustrations, temperance stories, etc., and will be interspersed with hymns and temperance songs.

By the time that this number of the Journal is in the hands of readers, the electric current will have been laid on at 406, Strand, W.C., the premises of Mr. J. H. Steward. It is the intention of Mr. Steward to show his electric lanterns in operation to intending purchasers.

From 23rd inst. to December 1st, the Stanley Club will hold an exhibition at the Agricultural Hall. Photographic competitions will be held, and apparatus stalls will be erected. Full particulars about the photographic department may be obtained from Mr. W. D. Welford, 57, Chancery Lane, W.C.

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Universal Simplicy Patent Typewriter, almost new; useful for printing names on masks of slides; 9s., free.—Blaker, above.

 Lantern.—Newton's best single, two cylinders, two Beard's regulators, best mixed jet, cost nearly £20; almost new; what offers?—Blaker, above.

 Lantern Slides.—The Metropolitan Association for Providing Free Teas and Entertainments for Poor Children, would be pleased to hear from anyone who would give them a donation of a few slides. All particulars on application to the Hon. Superintendent, Mr. F. M. Harris, 94, New Kent road, S.E.

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SIMPLE,
CERTAIN.

One Fifth Ordinary Cost of Limelight.

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406, STRAND; 457, WEST STRAND; 7, GRACECHURCH ST., LONDON.
The Principle of a Saturator.

We recently heard that an operator who was familiar with saturators was lately using one for the illumination of some tableaux vivants, but as he was suddenly called to one side, he left a lanternist friend in charge for a few moments. Now this friend, who had never before seen a saturator in use, became somewhat curious, and tried the effect of turning the various taps slightly, in order to ascertain how they controlled the light. The result was that he managed to get a long and non-luminous flame, and becoming somewhat alarmed, he sought his friend to put matters to rights again.

The meddlesome friend, seeing that he could not manage the saturator, at once formed the opinion that they were very complicated affairs, and subsequently wrote to us to enquire what he could have done to the saturator that made it behave as it did. As a matter of fact, he had merely turned off the direct oxygen supply, but he being unacquainted with the principles of a saturator, did not know what he had done, nor the manner of rectifying it.

As it is possible that there may be others among our readers whose knowledge of saturators may be somewhat limited, the annexed sketch will at once enable them to understand how they work.

(a) is a cylinder of oxygen connected to a metallic Y piece (b) by means of a short length of rubber tubing. Attached to the two branches of the Y piece are two lengths of rubber piping, that marked (c) being connected with the inlet of the saturator at or about which juncture is the tap (e). The saturator (g) we will suppose to be packed and charged with ether. Now if the cylinder (a) (which should of course be provided with a regulator) be turned on, the oxygen gas will reach the tap (e), and on this being turned more or less, a certain quantity of the oxygen will pass through the saturator, and in doing so will take up or become saturated with the ether vapour, and will arrive at the mixing chamber (i) via the connecting tube (h). If then a light be applied at the nipple (j), the gas will burn in precisely the same manner as house gas, the size of the flame being regulated by means of the tap (e). In order to render the lime (k) incandescent, it is necessary that we have a percentage of pure oxygen. From the sketch it would seem that the oxygen will already be in the tube (p), it being prevented from passing further owing to the tap (f). If this be now turned on slightly, free oxygen will be permitted to reach the chamber (i), where it will mix with the saturated gas (which is now equivalent to hydrogen) and render the lime incandescent.

It will, of course, be necessary to adjust the two taps (e and f) until the requisite proportions of the two gases are obtained.

Irrespective of the make of saturator, the general principle is as above stated, but in the sketch the controlling taps are placed as shown for clearness, whereas with commercial saturators the tubes are bent in such a manner that the controlling of the gas is done from behind, that being the most convenient position.

Hire of Lantern Slides.

By W. I. Chadwick.

Has the tone of lantern exhibitions, or so-called lantern lectures, been raised since the hire system of slides was introduced?

In my humble opinion, by the hire system, it has not, though I am willing to admit that lantern exhibitions have become more numerous. Of course, amateur photographers have multiplied enormously within the past few years, and thousands of amateurs can to-day make good slides such as some years ago only a few could equal. But amateurs showing their own slides is another thing altogether. Do people—the public, amateur photographers, and lanternists—buy slides as they used to do? I should reply certainly not.

I can call to mind many of my brother lanternists who used to work up a subject for an original lecture, and buy slides to illustrate it; it might be some place they had visited, or it might not. For instance, I have a dozen times given a lecture on Egypt, though I have never been there, but I recollect the pleasure it was to me to read up and collect all the information I could, and then select slides to suit me. I would not have had any stereotype set of slides in those days, but now, anybody can give a "lecture" if they can read the book sent with the hired slides. It may be Rome to-day, Scotland to-morrow, and the ascent of Mount Blanc the day after; these are not "lectures," they are simply readings.
Now, from a business point of view, I find that letting out slides on hire does not pay, and, as a business man, I have given it up. It is not my business whether it pays others or not. It may be that we had not the convenience for customer's spending perhaps an hour or two, and sometimes half a day, selecting slides, the hire of which might come to 2s. 6d. or 3s. The fearful number of catalogues (and postages) we have to send out is also a considerable item. Of course in some places the charges for hire exceed those with us. At one time (only a few years ago) 1s. per dozen was the general price, then it got reduced to 9d., and now there are those who are doing them at 6d. per dozen; coloured slides at the same price (coloured slides and comic sets are the most expensive). But even at this low rate it might pay, if customers would conform to the conditions of hire, and return the slides in good condition; but my experience is that not in one case out of three or four are the conditions complied with. Mr. Smith, of Shrewsbury, sends 2s. 6d., and engages, say, Rome slides for Monday, September 1st. We dispatch the slides a day or two before the time. These same slides may be required again by Mr. Jones in Rochdale for the Wednesday or Thursday following, but they do not come to hand in time. We telegraph Smith, and bang goes sixpence. The following day brings a sweet note from Jones, telling us it is most unbusinesslike. He was announced to give a lecture on Rome, and he did not know anything of either Florence or Pompeii; he refuses to pay for the hire or the carriage. Following day Rome slides come in from Smith, not carriage paid; another 1s. 3d. to pay. We send Smith a bill for 1s. 9d.; this amount has to go to his debit in our books, and very often it never gets any further; but that's not the worst of it. The slides often come back with one or two broken. We send a bill for these. He replies, "Can't understand it; they were packed as he received them, and all right when they left his hands. It must be carelessness on the part of the railway company, to whom he begs us to refer." We write again, calling his attention to conditions of hire on first page of our catalogue; that we had nothing to do with the railway company. He replies that he has lent this copy of our catalogue to a friend—"Please send another copy"; and here goes another 3d. Now, in the end, he promises to call the next time he is in Manchester. If I were to write the number of excuses for non-delivery, breakages, and the mixing of slides, I am sure the reader would not give me credit for writing the truth. All this trouble and annoyance ought to be well paid for, but unfortunately it is not; and taking into account that many hundred pounds worth of stock is lying idle for six months of the year, I have come to the conclusion that the game is not worth the candle, and the time will come when others will see it the same way.

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**The Luminosity of the various Sources of Light used for Optical Lanterns.**

By W. J. Coles, A.M.I.C.E.

Having for many years past been an amateur lanternist, and using almost exclusively either the blow-through jet or the mixed gases jet, naturally, I have tried many makes of limes with the view of obtaining the greatest amount of light, but without coming to any satisfactory conclusion. Being desirous of settling the question decisively, I determined to make a series of experiments to obtain the amount of light given by these different limes, by means of a photometer, in actual candle-power.

It then occurred to me that the result of these experiments would also be of value to other lanternists, and with a view of making the data still more useful and comprehensive, I decided to include the tests of the various other sources of light at present in use for optical magic lanterns.

The photometer used was one of the Bunsen type, which consists of a long scale, along which a screen carrying a piece of bilbous paper with a grease spot in the centre is made to slide; the lights to be compared are placed one at each end, and the screen is slid along between them until the grease spot is no longer visible, which happens when the amount of light upon each side is of equal intensity. The position of the screen upon the scale gives the relative candle-power.

The ordinary standard sperm candle, burning about 120 grains per hour, was used in the experiments with the lower-power lights, while a Welsbach incandescent burner, repeatedly compared with the standard candle to ensure reliable results, was used for the higher-power lights, being more convenient both on account of its great power and the whiteness of its light.
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W. C. HUGHES, Patentee and Specialist, Brewster House, Mortimer Road, Kingsland, London, N. Second-hand Lanterns and Slides—Bargains.
light, which nearer approaches the whiteness of the limelight. The results obtained in these experiments do not well accord with the generally accepted candle-power of the jets, etc.; but they are the results, not of one only, but of repeated experiments, and every care was taken to make them absolutely reliable.

The table gives the maximum working powers of the various sources of lights under ordinary circumstances, though in several cases a much higher is obtainable. Thus, with one of the “Gridiron” saturators 600 candle-power was obtained, with the ordinary blow-through jet 435, and with the mixed gas jet 675 candle-power, but these were with heavy pressure and more or less roaring.

It is to be noted that the size of the orifice of the oxygen jet was practically the same in each case. The approximate consumption of oxygen is also given, being determined by a special pressure gauge indicating the reduction of pressure in the bottle.

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<tr>
<td>&quot; Hardazion .....................................</td>
</tr>
</tbody>
</table>

The Welsbach incandescent burner was not of the latest pattern, which the Company state will give from 50 to 60 candle-power, but I had not the opportunity of testing this pattern, as they declined to lend me one for that purpose.

The ordinary paraffin lamp is one of the good but general make.

As to Stocks' patent lamp, it is my opinion that perfection is not obtainable in anything, yet I think that this lamp runs very close to it, both for purity of light and for power. At the same time it is, if anything, more simple and lighter in weight than the ordinary lamp, which is a consideration if one has to carry it far.

Wood's special oxy-spirit jet has the special feature that the spirit flame is governed by the amount of oxygen passing through; in other words, when the oxygen is lowered or turned off, as in the case of dissolving, the spirit flame is automatically lowered, and consequently uses very little spirit, which is not the case with the jets of ordinary construction. The advantage of this class of light is that, although the light is actually not very much greater than that of the oil lamp (about 50 per cent. greater), yet the effect of dissolving is obtained where coal gas or hydrogen is not procurable; while, owing to the greater concentration and brightness of the light, a brighter disc and better definition is obtained; but there is the supply of oxygen to be thought of. The same remarks apply to the saturator, but there the difference is much greater.

The blow-through jet was one of ordinary good make, taken from the stock of a large and well-known wholesale firm. There was practically no noise at the power given in the table. While for the high powers the hard lime was far superior, for low, say under 200 candle-power, the difference was not so marked; yet pitting in all cases was very much greater with the soft lime.

Wood's special blow-through jet is practically an injector jet, and almost gives the same light as a mixed jet, for the gases must mingle somewhat before reaching the point of ignition. I consider that this class of jet should find a large use on account of the high power it gives with gas at ordinary pressure from the mains.

The saturator. With this class of light it is possible to obtain nearly the same amount of light as with the mixed jet, and although I think that the mixed jet is on the whole better for many reasons, yet when it comes to paying threepence or fourpence per foot for coal gas, or about one shilling an hour, while the ether required to maintain a light of 400 candle-power is only 2-1/2 fluid ounces per hour, costing rather over three half-pence, one has serious thoughts of adopting the saturator in its place. And as with the Gridiron saturator the means of regulating the light are so good, that beyond having to fill the saturator, which only takes about a minute, it is as easy to work as the mixed jet; and, besides, the saturator is only about half the weight of an 8 ft. bottle. Therefore, although rather against my creed, I must confess that I think the saturator is destined to be more generally used than the mixed jet.

We at last come to the mixed jet, which was of the ordinary construction, taken from stock as in the case of the blow-through jet. In testing the difference in amount of light obtainable by the various limes, great care was taken that all the conditions should be equal. The figures in the table speak for themselves. With the new lime, Hardazion, one of the
great features is that it may be kept in one position while the light is at full power for several minutes, without any apparent falling off of light from pitting, which is very slight, owing to the great hardness, which also produces greater concentration of light; while following the rules laid down by Professor Faraday, they are truly turned to the size which is found to give the greatest light. Another feature is their great freedom from cracking.

As to the so-called patent limes, those made of pipe-clay I mean, the less said about them the better.

Personally, I prefer the mixed jet to all others, yet the difficulty about the coal gas before mentioned has been a serious drawback since bottles came in and bags went out. When one had to make his own oxygen, the matter of coal gas under pressure was a very simple and inexpensive affair. Yet it is so much more convenient to be able to obtain the oxygen without the trouble of making it, and the bottles are lighter and less cumbersome than the gas bags, weights and boards, that one scarcely cares to go back to the old method, although under that method there was a certainty as to the purity of the oxygen. For my own part, as about one half of my exhibits are given in one particular hall, I keep my boards, etc., there, and use the bag for the hydrogen and bottle for the oxygen, but cannot recommend this practice to others, as there is some risk attached to it.

It will be seen by the table that the mixed jet gives the greatest amount of light, but also uses the least amount of oxygen per candle-power.

It may interest some to know the value of reflectors when used with lamps, etc.; it would seem that the lower the power of the light the greater the advantage gained by the reflector. With a flat reflector the gain is about 70 per cent., while with a good concave reflector as much as six times the light may be thrown on the condenser.

The foregoing remarks are not intended in any way to depreciate the goods of other makers which I have not had the opportunity of testing, and I have refused to make the test a competition between different firms for obvious reasons.

My thanks are due to the various makers whose names are mentioned or indicated, for the use of the various jets, lamps, and saturators.

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*Modern Optical Illusions.—No. III*

BY EDMUND H. WILKIE,
Of the late Royal Polytechnic Institution.

In the last journal I gave a description of the illusion "Metempsychosis" invented by Messrs. Pepper and Walker, as it appeared to the audience, and now propose to go into details showing the construction and working of this beautiful effect.

When first produced the stage was not so elaborately arranged as in the drawing given last month, but was simply closed in, in the shape shown in Fig. VIII., by flat scenes and drapery.

![Fig. VIII.](image_url)

To properly appreciate the description, it will be necessary, in the first place, to turn our attention for a few moments to the diagram, Fig. VIII., as that gives us the whole ground plan, and also the working parts.

At W we have the opening in the proscenium, H, H being two flats of scenery which close in the stage from the front wings to the steps F, which in their turn lead up to the small chamber of mystery at the back, in which all the changes occur. The walls of this chamber are c 1, c 2, c 3 and c 4. A is a large sheet of silvered glass extending from floor to ceiling, which can be wheeled to and from b on a specially constructed carriage, the glass travelling through a narrow groove in the floor. I must remark in passing
We hereby beg to announce that we have opened a retail depot for our Manufactures at our Optical Works, Warstone Parade, Birmingham. Hitherto our business been wholesale, and for years our goods have been before the trade and public with the utmost satisfaction, and success. The rapid strides made in the use of the Lantern during the past few years, and the increased demand for our goods, encourages us to launch upon a larger scale, so that the public may a direct supply. Our business, doubtless, has been built up upon the lines of excellence of workmanship at moderate prices. We now anticipate still greater demand for our apparatus, consequently have greatly reduced our prices, which only large productions and demand could do. We regard the Lantern as being far too valuable an agent to be limited to the few only, the costliness of which we fear has hitherto somewhat hindered its universal adoption. Nothing can be calculated to uplift and stimulate the minds of the public more than the aid of the Lantern, and by endeavouring to bring the prices of reliable instruments within the reach of all, we hope for its still greater use, and to receive the generous patronage of intending purchasers. Engravings particularly, and prices will be found in our advertisement in this Journal, and, as far as possible, orders will be executed by return. Yours truly,

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that in order to conceal this groove, the floor was covered with a pattern consisting of diagonal lines crossing each other, one set of lines running parallel with the groove.

Now if this travelling reflector is completely withdrawn, the audience are able to see straight through the entrance of the chamber to the back wall, the chair marked p being in the centre of the field of view. The mirror then being pushed across the chamber, p vanishes from before the eyes of the spectators, and the walls of the chamber at g 1 and g 2 being reflected at g 3 and g 4, the disappearance of the chair is the only apparent change.

It will doubtless occur to many that as the edge of the mirror travelled past the chair a hard line would be seen; I mean that there would be no gradual disappearance, there would be a distinct vertical line which would seem to wipe out the object as it passed along. To avoid this, the inventors hit upon a most ingenious expedient. They etched vertical lines in the silver deposit on the back of the mirror at the travelling end (that is, the end which passed across the field of view), commencing with thick lines close together and tapering off to thin lines further apart. Thus the glass at its extreme end was half transparent and half reflecting, giving a very vague and misty appearance to any objects reflected by or seen through it.

In the illustration (Fig. IX.) these etched lines are much exaggerated in size, as it would be next to impossible to reproduce the portrait of the gentleman depicted, in such thin slices as occurred in the illusion. Each line would not be individually perceptible on the stage, but only a general haziness. This appearance is just the same whether the figure is being disclosed by withdrawing the glass (the edge of which is marked by the dotted line) or being reflected from a hidden object by pushing the mirror forward along its groove.

This appearance and disappearance of objects would not, however, present any features of novelty if the illusion consisted in that alone, but I have simply introduced this to give a plain illustration of its working.

There is one point which we must pay particular attention to, and that is the illumination in the chamber of mystery (a gas jet marked n). This must be arranged so that it illuminates the walls, ceiling, and floor equally on both sides of the mirror; this is extremely important, as a little light more or less on one side of the room would at once show that some change took place as the mirror passed.

If we first place a chair at c similar in all respects to that at p and exactly registered with regard to reflection, we may pass the mirror a to and fro as often as we please without any change being apparent, as the reflection takes the place of the reality and we suppose we are still looking at the solid object. It is impossible to place too much stress on this point, as the proper appreciation of all that follows depends upon keeping this fact well before us, and it is to this peculiarity that the illusion owes its greatest triumphs.

When these two chairs are in position, the actor may walk up the steps and sit in the chair to prove that it is a reality, and immediately upon his retiring from the chamber the glass may travel across (the reflection of the chair taking the place of reality). A second actor habited as the spectre then enters behind the glass by a concealed door, and seating himself at n the glass can be slowly withdrawn, the etched portion as it passes between the audience and the spectre gradually revealing him until the reflector being entirely withdrawn the apparition is fully exposed to view, and able to walk about the stage, after which he once more seats himself and disappears.

These conditions being understood, let us take in detail the operations necessary to produce the mysterious effect described last month.
It will be remembered that an artist having purchased a lay figure, two porters bring it to his studio in sections, which are put together, and the whole deposited in the chair p. They retire, the artist falls asleep, the lay figure descends the steps, finishes the outline of a portrait, and ascending to its original position becomes once more inanimate.

To accomplish this the "Property Man" has to be called to our assistance to make two lay figures of papier mache and one suit of plates of the same material, to exactly resemble the lay figures when worn by a living person.

In preparing our entertainment, we first place one of the lay figures in position at c, seated in the chair and facing along the dotted line of reflection e, and the glass being drawn completely off the floor of the chamber, and left standing behind w, the figure is out of sight from the auditorium.

After the preliminaries have been gone through and the lay figure seated in its place, the glass reflector is pushed across the stage, and the figure removed, its place being supplied by an actor made up to resemble it exactly.

Great care has to be taken in ensuring that the two figures, the dummy, and the actor made up to resemble it, occupy the same positions on the chair and are in register with the lay figure at c, but even with the greatest amount of pains it is not always possible to avoid a slight difference being perceptible as the glass crosses. The only effect of this, however, is to give an undulatory or wavy motion to the image, which imparts to it the appearance of shuddering.

Directly the actor is in his place the glass is drawn back out of the way, and as by this time the artist has fallen asleep, the weird chords (especially devised to harrow the feelings of all who hear them) are commenced by the musicians, and under their influence the lay figure gradually stands upon its feet and advancing, descends the steps.

At the Polytechnic Institution the figure was impersonated (or, to be correct, the shell was filled) by Mr. Walter Lightfoot, so long the "Property Man" of the establishment, and although not a trained actor his performance was realistic in the highest degree. The creaky, jerky, uncertain movements he imparted to the figure were such as we should expect to find were we to meet a wooden lay figure out for a constitutional, more particularly if it had been left in a damp corner for a time; and the effect as it descended the centre of the stage was so great, that many persons, having struggled hard to get into the front seats, appeared to wish they were a little further from the stage.

After sketching on the canvas standing on the easel, which will be found on the left side of the illustration, the figure retired to its seat, the glass travelled across to hide the change and the original figure was restored to its place, after which, the glass being once more drawn off behind the scene, the artist could run up the steps and drag the mysterious figure down for dissection. Thus closed one of the best and most striking illusions ever brought before the public.

After a time when it began to be felt that some change was necessary in the programme, an improved form of this illusion was invented by Mr. Walker and introduced in a musical entertainment from the talented pen of Mr. Burnand, of "Punch" fame, and entitled "Curried Prawns."

It was produced by my old friend, the late Mr. George Buckland, and represented the trials of a gentleman, who having a party of friends in his house for the purpose of giving an amateur edition of the opera "Faust," indulges too freely in that extremely indigestible dish "Curried Prawns," and falling asleep imme-
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A Holiday Ramble in Belgium and the Picturesque Holland. [Ardennes.
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The Country of Wordsworth and Southey.
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diately after, is visited in his dreams by Mephistopheses, Marguerite, and Faust, Mr. Walker’s illusion being responsible for the apparitions.

The diagram (Fig. XI.) will show the ground plan of the working parts when arranged for this entertainment. The shape of the scene and chamber of mystery (or changing box) was altered in this case, and by reference to Fig. XI. you will find that the front wall of the chamber marked G1 in Fig. VIII. was removed, and the whole room exposed to the sight of the audience.

In the centre, over the groove, stood an ottoman, which was divided into two parts along the course of the groove, the separation just allowing sufficient room for the passage of the mirror. Although this was regarded as an improvement, yet it will be at once apparent that no changes, such as those mentioned in “The Artist’s Dream,” could be introduced, as there remained no place behind which the doubles could be concealed.

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The Optical Magic Lantern Journal and Photographic Enlarger.

Lanterns of Darkness and Lanterns of Light.

By G. R. Baker.

In the dark ages the magic lantern was brought into requisition to assist those who wished to work on the superstitions of the people or profit by their ignorance, and before it was employed for entertainments or instruction it was used for projecting phantom figures and demons in the smoke rising from a fire. The secrecy of use and mysterious effects produced no doubt gave the idea of the title “Magic Lantern.”

The picture on next page is a reproduction from an old French print, and represents a primitive lantern used in the way modern lanterns are for entertainments, viz., among the audience.

The moment the mystery of any production is unravelled, enlightenment comes in, and progress is sure to follow. In the case of the lantern the small oil lamp of very poor illumination gave place to the argand, which in time was ousted by mineral oil lamps; while in the powerful lights the Drummond limelight was followed by the limelight produced by oxygen and house gas and the oxy-hydrogen light with both gases under pressure. For special work the electric light was first employed with electricity generated by batteries, and afterwards (as electric lighting became more general) from dynamos. The oxy-ether limelight becoming popular, must not be omitted from the list.

While all these improvements were in progress, photography was lending practical aid to demonstrators, and instead of crude drawings and rough colouring that was bold and brilliant in an indifferent light, but unacceptable in a strong one, thousands upon thousands of excellent photographic transparencies were being published, and now are the recognised “slides” for the lantern, the hand-drawn pictures being limited to those of the highest excellence by a few artists who have special gifts in this way and technical knowledge to produce results that almost rival the miniature painters of old. That “Magic” Lantern could not any longer serve as the title of the improved lanterns for projection properly was generally felt, and gradually the word “Optical” was substituted for “Magic,” and is now the accepted title by many.

Dissolving view apparatus have been improved to such an extent that the original side by side oil lanterns now look very antiquated beside the modern apparatus; yet thirty years ago they were in vogue, and the bi-unial lanterns, as we

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The Association for the Promotion of Home and Foreign Travel (Lld.), of 41, Gracechurch-st., E.C., are prepared to lend the following lectures, free of cost, together with the necessary slides (out-of-pocket expenses for carriage, etc., only being charged), to churches, chapels, public schools, Young Men’s Christian Associations, clubs, institutes, societies, polytechnics, and associations of various kinds:

Scenery of the Connaught Highlands; Norway—Fjord and Bre; the Mountains, Rivers, and Waterfalls of Wales; Brussels, Waterloo, and Antwerp; Lakes and Fjords of Ireland; the Carnarvon Peninsular.
know them, were just being developed. The various improvements suggested or designed by Dancer, Highley, Malden, Bridgman Smith, Steward, and others, produced dissolving view lanterns with two and three fronts that could be conveniently worked by one operator, and made the registration of slides for the perfect production of realistic "effects" a certainty.

The improvement effected in dissolving, economising of gas, and getting increased light for the picture with superior definition followed hand in hand with the development of photographic slides, and when the compressed gas became more general, by reason of the cheaper method of production and facilities for distribution, a still further change took place. This was in the use of large diameter and long focus lenses, so that an apparatus could be placed in the gallery, or at the extreme end of the hall, without the resultant picture suffering in brilliancy.

What a big step from the lantern as shown in this old-fashioned picture with its oil light of two or three candle-power, giving a disc that could only be seen by a few quite close up to the wall or sheet, to that such as one can often see now in our large halls of twenty-five feet in diameter produced by a limelight jet of 400 or 500 candle-power, and which can be seen by thousands of people at once.

What the possibilities of the future will be who can say? But with electric lights, easily obtainable wherever the electric current is laid on, for use with ordinary lanterns, giving 1,000 candle-power light for projection of ordinary photographic transparencies and anything required up to 5,000 candle-power for special work, it will be readily conceived that scientific men and enthusiasts will either invent new apparatus or develop existing instruments so that spectroscopic, stereoscopic, and optical effects can be produced that we hardly dream of now.

In the same way that the limelight has superseded the oil in public exhibitions where optical projections are made, the electric light will in turn, before many years have passed, have superseded it, for we have every month evidence of its growth; by its use in theatres for stage work and in institutions for physical and electrical experiments, as well as for the projection of ordinary transparencies.

Whoever has seen an electric lantern at work cannot but agree that it is a "lantern of light," and the possibilities of imparting information and gaining increased knowledge by demonstration with the projection microscope and kindred instruments removes it from the region of mystery. The optical lantern, therefore, as we now know it, is no longer a lantern of darkness or magic.

An edition de luxe of the "Photogram" will be supplied to subscribers for 1895, at 9s. per annum, post free 9s., by any dealer, or the publishers, Dawbarn & Ward, Ltd., Farringdon Avenue, E.C.
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Faithfully yours.

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Wash the prints from five to ten minutes, then immerse in the above bath, examining the prints by transmitted light.

Tone to a dark brown or chocolate colour (not black), then, without previous washing, immerse the prints in the following bath to stop toning action:

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- Water: 20 ounces.

Slightly rinse the prints and transfer to the ALUM BATH.

- Alum: 4 ounces.
- Water: 20 ounces.

Allow them to remain in the alum bath for ten minutes, wash thoroughly in running water for five minutes, and fix in the FIXING BATH.

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- Water: 20 ounces.

Wash thoroughly in running water, or by frequent changes for one hour.

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**Slides for Science Teachers, No. II.**

**TANK EXPERIMENTS.**

By E. D. B.

The most useful accessory to the educational lantern is the tank, of which there are many forms. A tank for all-round demonstration work must allow of being readily taken to pieces to facilitate cleaning, so as to thoroughly remove the chemicals that may from time to time be used in them. The materials of which they are made must also be of such a nature that they are not acted upon by the majority of chemicals used in them. The following description and accompanying Figs. 1, 2, 3, will enable anyone to make a tank for themselves. A tank as shown in Fig. 1, consists of two pieces of plate-glass, preferably that known in the trade as French plate, it being much whiter than the English, and for showing colour experiments better results are more likely to be obtained by its use. Between the plates of glass to form the cavity is a piece of india-rubber, either square or round in section; a piece of stout tubing will answer the purpose. The two plates of glass (AA) are then placed together with the rubber (B) between. To facilitate the bending of the rubber when square in section, a number of nitches are cut out at the corners, as shown at c. The whole is then secured by means of four clamps (D) in the position shown; one of the clamps (D) is shown separately in Fig. 2. The clamps may be dispensed with, and two plates of brass cut to the shape shown in Fig. 3, about three-eights of an inch larger on the sides (1, 2, and 3), and with five holes (x), through which pass five small bolts.

A simple arrangement I have found useful for filling tanks with water when in the front of the lantern is shown in Fig. 4. It merely consists of a moderately wide-mouthed bottle fitted with a cork, through which a bent tube (E) is passed, but does not project lower than the underside of the cork. The other tube (F) is the reverse, the top of the tube not projecting beyond the top of the cork, but continued longer inside, and is bent towards the top portion of the inside as shown. This simple arrangement allows you to pour a gentle stream of water into your tank without any fear of spilling. By making the tube (E) somewhat longer, it will sometimes be found an advantage when working in a confined space.

The following are some experiments that can be shown in the tank and projected by the lantern:

Into a tank filled with dilute alcohol, drop a few drops of aniline dye, such as Judson’s. The effect is very beautiful, and resembles a tree; and when various colours are used the beauty of the effect is still more increased. The image on the screen, being inverted, will appear to shoot upwards.
Fill a tank with dilute sulphuric acid, and dropping into it a few pieces of broken zinc, decomposition of the water instantly commences. Its oxygen gas combines, unperceived, with the zinc, which then dissolves gradually in the sulphuric acid, while the hydrogen gas set free at the same time rapidly rises in bubbles through the liquid, and escapes at the surface. These bubbles, magnified, present a most extraordinary appearance, forming a series of whitish luminous globules descending in the fluid from an opaque surface, and swelling enormously as they struggle to the surface under the expansive powers of heat, combination, and lessening pressure.

A pure homogenous or monochromatic light for colour experiments by transmitted light can be obtained as follows:—For a very pure blue, fill the tank with an ammoniacal solution of sulphate of copper; and to obtain a nearly pure red, fill the tank with a solution of sulphocyanide of iron.

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About Electric Lamps.

By A. M. Hiddon.

During this season, the electric lamp as a radiant will doubtless receive a considerable amount of attention from those interested in lantern work. Among these there will probably be many whose knowledge of electricity and its adaptability for the purposes of projection is vague, or even altogether wanting; and who, for this reason, are unable to form opinions as to the desirability, or the reverse, of entertaining the idea of fitting electric lamps to their lanterns. For the benefit of such, therefore, a few elementary facts concerning electricity, together with the pros and cons of its use from a lanternist's point of view, will be briefly set forth below.

There is no really satisfactory theory as to what electricity actually may be, but, like the phenomena of heat and light, it is generally supposed to owe its existence to certain movements either of the molecules of which bodies consist, or else of wave-like motions of the ether which is supposed to surround the molecules. Of course, it is not a "fluid," though the term is descriptive of certain of its properties, and is also a convenient one for every-day use. It can be thought of as an indefinite something flowing along a suitable conductor, such as a copper wire; and hence, we habitually speak of it as the current. The strength of the current is measured in what is known as "ampères," while the resistance, which we may regard as due to friction offered by the material of which the conductor is formed, is measured by "ohms."

The amount of force that any generator of electricity is capable of producing is known as electromotive force and is measured in "volts." These three technical terms are of constant occurrence in the literature on the subject, and some slight knowledge of them is useful.

Regarding resistance as caused by the length or smallness of the wire, it will be seen that the thinner the latter, the greater will be the friction, and that as the natural consequence of this friction, heat will be produced. The same intensity of current which will pass through a thickish copper wire without developing any appreciable amount of heat, will even melt a thin platinum wire. In the same way if the ends of two pencils of specially prepared carbon be brought into contact, and a current passed through them, the resistance it meets with heats their points red hot. On the two pencils being removed slightly apart, a light of great brilliancy is produced by the transfer of whitehot particles from the positive carbon to the negative one. This stream of heated particles passes in an arch from one carbon to the other, and thus the name "arc light" is given to this particular system. The result of this passage of particles is that the positive carbon is more rapidly consumed than the other; and this fact has compelled the invention of sundry automatic regulators for the purpose of keeping the two pencils the requisite distance apart by compensating for their unequal consumption.

Most of the new forms of electric lamps for the lantern are fitted with some such automatic regulating apparatus, though as the carbons wear away but slowly—about an inch or so an hour—the necessary adjustment can be made by hand just as easily as an operator now turns his limes.

Concerning the form of electric light known as the "incandescent," little need be said, as it offers few facilities for use in a lantern. It consists of a small glass globe (from which the air has been exhausted) containing a filament of carbon. When this thread of carbon is heated by the passage of the current it glows with a soft and pleasant light, but, so far as I know, it has never yet been rendered of sufficient intensity for lantern work. Perhaps later on it may be so modified and improved that its use, probably in combination with small accumulators,
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Ask to see 'any of the above before purchasing or hiring any others. Lanternists failing to get them, should write to SLIDES, care of this paper, when the address of the nearest Optician supplying them will be forwarded.


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will become quite feasible; but in its present form it cannot compare with the arc light for projective purposes.

Several forms of arc lamps have been placed on the market of late, and the writer has had opportunities of inspecting most of them. It is perhaps hardly fair to criticise too closely an invention, or rather an adaptation, which is still in its infancy, but apparently the ideal lamp for ordinary lantern work has not yet made its appearance. Several of the learned societies and institutions are fitted up with magnificent electric lanterns, capable of giving the best possible results, but their great cost, want of portability, etc., etc., put such apparatus utterly beyond the means of the ordinary amateur lanternist.

With a view of ascertaining what prospects the electric light has of supplanting limelight for projective purposes under ordinary circumstances, certain questions were lately submitted to a friend who is a practical and experienced electrician. His answer is rather too technical to quote at full length, but practically it amounts to this:—That while eminently suited to lanterns fitted as fixtures in institutions, etc., there are serious obstacles to its use by the travelling operator or by the amateur lanternist who works in all sorts of different halls and rooms. He points out that, as the arc light is run in series (that is, the current circulates through the whole set of lamps), the introduction of an extra and temporary light would generally be opposed by the companies supplying the current. Furthermore, the wires carrying a heavy current are of course very dangerous for any inexperienced person to handle; and he rather scoffs at the idea that a firm would allow anyone but their own skilled workmen to make the necessary connections. With regard to these connections, they might sometimes be made at the switch-box to which the mains are brought, but since the arc lights are in series, and would be all turned out together when the room was darkened, it would often be necessary to run a separate lead from the lantern to the dynamo; a proceeding which could very rarely be easily adopted.

He also points out that, although a very powerful light is obtainable with an electric lamp, still, in a lantern of ordinary pattern and size, the great heat evolved will prevent very high candle-power being used.

On the whole, therefore, it would appear that the travelling operator will rarely find conditions under which he can make use of the electric lamp. Perhaps in the course of time some adaptation of the incandescent system may be introduced; but, for the present, the whole subject of electric lamps for the lantern is still an open field for experiment and invention.

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A Good Portable Screen Stand.

By R. Moss.

I often wondered how it came about that so many lanternists used home-made screen stands. One reason was plain, as soon as I looked at the price lists of one or two firms, viz., the high price of the commercial article; while two other reasons I very soon found out for myself, one that the screen being secured by a cord running over a pulley very soon began to bag in the centre, but the second is to my mind the most important. All the stands I have seen advertised, or in use, were made square, just to fit the screen; it is therefore necessary to raise them by means of chairs or tables, so that the picture may be seen by those at the back of room. Now it is by no means an easy matter to get two tables or other supports the same height, and yet have one left for the lantern. Finding the latter a very awkward affair when visiting villages, and also in town schoolrooms, I consulted all the lists I could get hold of, but could not find anything that would suit. I therefore decided to construct a stand to suit my own requirements.

I consider that the first essential of a screen stand should be to raise the bottom of the screen (and picture) at least 3 ft. from the ground; of course 4 ft. would be better, as then the whole of the picture would be above the heads of all ordinary size people when seated; but there are very few village chapels or schoolrooms which are lofty enough for this with a 10 ft. or even a 9 ft. screen. The second essential is that it could be secured as it was being put up in a small space, as in villages people generally get to lantern entertainments early, and the operators are usually late. With these ideas in my mind I set to work. My first effort was an ultimate failure, the screen being suspended by a cord at the top, and afterwards strained taut; it did well for a few times, and as it could be put up in a very short time indeed, I thought I had a good thing on hand, but before very long the screen began to stretch at the corners, and some most elegant natural waves on the picture were the result. As this could only be remedied by substituting a fixed rod, an entirely different pattern had to be adopted, resulting after one or two attempts in the stand herein described.
Having been tested for two seasons in rooms from 11 ft. to 16 ft. high, I can thoroughly recommend it for village and school work. It is very easily put up; can be made either 13 ft. 8 in., 12 ft. 2 in., or 10 ft. 8 in. high, even when partly fixed and with but little trouble. The first of these is the best, as then the whole picture is just above the heads of the audience, but I have found the middle height quite high enough for most buildings, so will describe how to fit up that size.

The stand is composed of poles as follows:—

- (a) four poles 3 ft. 6 in. long, with 9 in. ferrules on one end and steel spike 1 in. long in other end;
- (b) two poles 3 ft. 6 in. long, with 9 in. ferrules on one end and steel spike 1½ in. long in other end;
- (c) two poles (1 in.) 3 ft. 6 in. long, with 9 in. ferrules on one end and steel spike 1 in. long in other end;
- (d) two poles 1 ft. 6 in. long, with 9 in. ferrules on one end;
- (e) two poles 3 ft. 6 in. long, with 6 in. angles on one end;
- (f) two wood blocks 2 ft. long and 1½ in. square, with hole in centre for steel spike on bottom end of b to fit into;
- (g) are four stays, 1 in. hoop iron, with a hole about ¾ in. from each end; they are fastened by means of a round-headed screw to each end of the two blocks c, taking care to put a washer between, to allow of their being folded up for packing; the use of other holes will be described later.
- (L) is a piece of cord with loop at each end to pass over uprights BB for that purpose, and thus keeps frame more rigid.

We will now proceed to fix up, assuming there are two persons—a small boy or anyone who happens to be handy will do. Take one piece each of a, b, c, lay a on ground where screen is to stand with iron stays m inwards, drop spike on b in hole in centre of a, then raise stays m and pass spike on end of c through the holes of each, then through a hole in b made for this purpose; now take one piece d, and connect the two cross-pieces cc as shown in cut, slip cord L over BB, put EE into BB as shown, the stand is now complete as high as xx.

Take one angle pole F, two AA and one D, connect together as at top, then slide through a hem in screen (made for the purpose), and when through the other angle F can be put on, completing the upper part as low as zz, and the two tapes 1, 15 can be tied; this may be now raised in one hand high enough to place another AA pole on each side, these should be held by the foot, or on a peg close against BB, but resting upon the base blocks c, while tapes 2, 3, 13, 14, are tied, when the entire upper part can be lifted up and dropped into lower part at xx, and the remainder of tapes made fast, beginning with 5 and 11 as previously described. We have now a rigid affair, perfectly steady, which can be moved to any desired position should the lantern not be quite in the right place, without in any way disturbing the tautness of the screen. Personally, I have found it more convenient and more easily put up than any stand for folding screens I had previously used or seen used; this opinion is also endorsed by others who have used it. I therefore venture to think that many lanternists who work under similar conditions may find the hints I have given valuable to them. But, you say, what about the cost? Well, you can get the lot if you have tin ferrules for about 6s. 6d.; brass would probably cost another ds., but so satisfied am I with it, that as soon as I can find time I am going to build another with brass ferrules.

The following is about the cost:—One doz. best deal broom handles—these being well seasoned and free from sap are much lighter than ash or cheap handles, and not so liable to warp—they would cost about 2s. or 2s. 6d. the dozen. The 9 in. tin ferrules and angles must be strong and seamed together, they would probably cost 2s. 6d. My reason for having them so long is that it allows the poles to fit in easily and yet afford sufficient support to prevent wobbling.

Four iron stays ought not to cost more than
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The Rev. H. J. HARRISON, Org. Sec. Church Pastoral Aid Society, wrote on September 29th, 1893, as follows: "I have now given your Lantern a fair trial, and have much pleasure in stating that the light, especially of the Oil Lantern, is by far the best I have ever met with."

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Hints in Lantern Slide Making.

By George Kilburn.

In the making of lantern slides, as in any other branch whether photographic or any other profession, any means resorted to is permissible so long as the results obtained through their use is proved to be advantageous. To obtain good lantern slides from all negatives taken under ever-varying conditions, both of light and weather, would tax the skill and energy of any photographer whether amateur or professional. As is well known by those who have devoted much time to this class of work, a large percentage of negatives taken are unsuitable owing to causes which it is not necessary here to enumerate. Therefore leaving out those from which it is impossible to obtain anything of a meritorious character.

In making lantern slides, I prefer copying them in the camera. The best results are obtained by this method, though good slides are sometimes got by printing in contact when the negatives are of a suitable size. In copying with the camera there is no necessity for elaborate apparatus; anyone can make for themselves all that is required. To make such, obtain a box of suitable size to take the largest size negatives desired to copy. Remove the lid, then cut out an opening in the bottom part an eighth of an inch less than negative, and glue or screw four narrow strips of wood round the opening, so that the negative will just fit in. A couple of turn buttons screwed on to these will hold the negative in position.

Negatives which show too much contrast can be remedied by rubbing down the over-dense
parts with a rag moistened with a little methylated spirits, and the shadows painted over with the yellow varnish, and a full exposure given.

Negatives which are thin should have only a minimum exposure given, with a strong developer to follow, and negatives with strong contrasts *vice versa*. Before making the exposure, place the focussing cloth over the space between box and camera to prevent any light entering the lens except that coming through the negative.

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**The Supply of Oxygen to Lantern Flames.**

**By W. H. Harrison.**

(Continued from p. 135.)

In continuation of our subject relating to the question whether it is possible for practical purposes to obtain air much richer in oxygen than usual by passing normal air through a thin septum of india-rubber, I have now to give the closing part of the summary of Mr. Graham’s researches on the phenomenon.

He tried silk cloth, varnished with rubber on one side, and vulcanised. Perhaps his results would have been better had the rubber not been vulcanised, so that it should have been free from sulphur. He says that he used a thin but close silk fabric, of a single thickness, varnished with india-rubber on one side alone, which was black. It was a much superior material to the ordinary cotton fabrics, which are double, with the two varnished sides pressed together. The silk cloth, however, should always be tested by examining the air it has dialysed, and if the proportion of oxygen therein is found to be below forty per cent., the silk is unsound at one or more spots. He adds that these spots may usually be discovered by wetting one side of the silk with a sponge, and observing where the water produces a visible stain on the other side; the spots may be covered with a thin small disc of sheet rubber applied warm to the surface. He stretched the sheet over a disc of porous earthenware, closing the mouth of a small glass bell-jar, with an opening of one-hundredth part of a square metre, and obtained ten cubic centimetres of dialysed air in one hour, containing 42.2 per cent of oxygen. For a square metre of surface this is a passage of 2.77 cubic centimetres per minute.

Mr. Graham next made a small bag of the varnished silk 0.53 metre long and 0.27 metre wide, with a surface therefore of 0.143 square metre. Inside the bag was a double thickness of common felt carpet; a glass quill tube also entered the bag a few inches, and was connected by a French rubber tube to the Sprengel pump. The edges of the silk cloth were cemented by india-rubber varnish. The best result was obtained when the exhaustion was with half an inch of the barometric vacuum; when the pressure was allowed to fall to one-half or one-third of an atmosphere, the proportion of oxygen was lessened by two or three per cent. The equivalent for a square metre of surface of dialysed air obtained by this arrangement was 2.25 cubic centimetres per minute, with the thermometer at 20° C. With the thermometer at 60° C. the dialysis of the air was about three times as rapid. The amount dialysed fell off greatly at low temperatures. He next tried a similar bag two yards square, but it was rather beyond the exhausting power of his largest Sprengel pump. He says that the usual proportion of oxygen in air dialysed by rubber appears to be about 41.6 per cent., and that it may be described as atmospheric air deprived of one-half its usual proportion of nitrogen.

The book contains much about the passage of hydrogen gas through metals at high temperatures, as discovered by Deville, Troost, and others.

In one of my preceding articles it was mentioned that Mr. John William Draper, M.D., Professor of Chemistry in the University of New York, was one of those who in early times gave attention to the passage of gases through india-rubber, but that I had not then access to his writings on the subject. The book containing them is entitled "A Treatise on the Forces which produce the Organisation of Plants," with an appendix on miscellaneous scientific subjects, published by Harper Brothers, New York, 1884. The particulars relating to our subject are in the appendix to the work.

Dr. Draper found that india-rubber will not alone exercise a separating action upon mixed gases, but a synthetic action. He capped an open tube containing two hundred measures of hydrogen with a thin film of this substance, and exposed it to a hundred measures of oxygen in another tube; in sixteen days the united free gases measured but 215 volumes; the india-rubber became quite white, in consequence of a portion of the mixed gases having been condensed into water in its pores. He tried to obtain pure oxygen from atmospheric air, by drawing it through india-rubber by means of the weight of a column of mercury, and says that
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THE ITALIAN LAKES IN SPRING 38
MARY QUEEN OF SCOTS 60
CENTRAL AFRICA 54
WITH A MISSIONARY IN SIKKIM 39
WILD ANIMALS IN CAPTIVITY 60
SOME RUINS OF ANCIENT GREECE 36
THE ROMAN CAMPAGNA 60
THE SACRED MOUNT OF VARALLO 33
MALTA 32
TRIPOLI 40
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AMONG THE CHATEAUX OF THE LOIRE 44
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NOAKES' New Combined TRAVELLING CASES & STANDS for CYLINDERS, 10 ft., 5/6; 12 ft., 6/-; 15 ft., 7/6; 20 ft. 8/6, and 40 ft., 9/6.
only common air passed through, in which he evidently made a mistake, and did not discover that the proportion of nitrogen had been reduced. He, like others, had difficulty in fastening the edges of films of india-rubber to the mouths of tubes and glass vessels so that gases could not get in through the joint; the leakages, however, he finally prevented by setting fire to a piece of india-rubber, and daubing the semi-fluid material on that part of the glass round which the string was to pass; then, on tightly binding the barrier, it came into perfect contact with the glass and was retained there by the sticky material, no leakage whatever taking place unless some part of the arrangement burst.

Dr. Draper described another plan of getting a mixture of nitrogen and oxygen, much richer than common air, by taking advantage of the absorption of certain gases by water. If water, with all the gases it normally dissolves, have them boiled out of it, and then be at once exposed to common air, in a few hours it takes up oxygen and nitrogen gases, in the proportion of one-third oxygen instead of the one-fifth contained in our atmosphere. He says that by taking advantage of this, it is possible to obtain oxygen from the atmosphere. If a volume of atmospheric air be agitated with boiled water in a close vessel, it will be found that a rapid absorption of oxygen ensues, while but little nitrogen is imprisoned among the pores of the liquid. The gas, by the action of heat, may be driven off from the water, and being subjected to another washing, may be rendered still more pure; by successively washing and rejecting the nitrogen left, a gas so rich in oxygen may be procured as to be equal to some that has been obtained by other processes, as by the action of sulphuric acid upon peroxide of manganese.

This interesting book contains much about photographic subjects, and the action of light on chemical substances. In it Dr. Draper emphasises the fact that he was the first to take a portrait by the Daguerreotype process, as published in *The Philosophical Magazine* for June, 1840, page 555; he also gives the details of how he quickened the original Daguerreotype process for the purpose. Dr. Draper says that hydrochloric acid gas will pass through gold leaf into a vessel containing common air, when the gold leaf is so thin as to uniformly transmit green light. This may be of interest to Mr. J. W. Swan, who recently exhibited at the Royal Society some leaves of gold leaf abnormally thin, which transmitted green light freely. Dr. Draper’s scarce and interesting book should be in every photographic library, if copies can now and then be obtained.

Mr. H. P. Chandler, the club lanternist, is doing excellent work in connection with the entertainment of clubs in general, and cycle clubs in particular. On the 17th ult., at The Talbot, London Wall, we were present at one of these social evenings, and had an enjoyable time. Gathered together under the patronage of the leading cycling clubs, over three hundred members and their friends listened to a good selection of songs, mostly by professionals, and also enjoyed an hour with the lantern, during which time Mr. Chandler projected on the screen a large number of slides from negatives taken during several outings. The pictures were of great variety, including portraits of the captains of many clubs, reminiscences of the outings during the past summer, not forgetting a few cycle breakdowns, which elicited rounds of applause.

New Apparatus.

NEGATIVE RACK.

The Birmingham Photo Co. have introduced several specialities, amongst them being a drying rack for negatives. The sketch shows the style of same, and the manner in which the negatives are inserted. We have found this rack handy in our office as a letter rack.

A DUSTING BRUSH, for use with either negatives or paper having wings, so that the brush portion is prevented from touching the table (by the same firm) will also be found convenient.

A NEGATIVE BOX (PARTITIONED) to hold a dozen quarter-plate negatives is a handy and economical way of storing negatives. Other novelties are about to be brought out by this firm, one being a dark room box, of which we hope to speak when they are manufactured.

ELECTRIC TRIPLE LANTERN.

In introducing this lantern, Mr. J. H. Steward, of 406, Strand, W.C., has kept in mind all those ideas which assist to make the manipulation of a triple lantern a simple matter. This lantern is fitted with Davenport’s hand-fed lamp, there of course being three, whilst, so as to allow of the various currents of electricity...
obtainable, three resistances and switches are arranged at the side of the lantern, as shown. The fronts are capable of the finest adjustment for rendering the discs coincident, and the curtain shutter is so arranged that the slide can be revealed from either stage at will. The condenser is a triple one, and is provided with protecting glass.

"COMPACTUS" LANTERN.

In bringing out this lantern, the Wesleyan Sunday School Union, Ludgate Circus Buildings, E.C., have arranged that the lantern itself shall contain as much as possible. The "Compactus" lantern is made of Russian iron; the front, which is of brass, has a stage open all round so that even a tank can be used with it. It is provided with a Stocks' lamp. The lower portion of the lantern contains a receptacle in which the slide carrier can be inserted so as to ensure it always being at hand, and as a lid to this receptacle a small iron drawer is provided. This drawer is divided into two divisions, one containing a piece of chamois leather for cleaning the lenses, and the other wax matches. These two items, although they may seem small matters, are, nevertheless, of great importance, as it often happens that neither are at hand when most required.

GREEN AND SONS' SLIDES.

We have received from Messrs. Green & Sons, of 20, Fairbridge Road, Upper Holloway, N. (a wholesale firm), a number of the slides of their new sets on the Antwerp Exhibition, and "Bravery in Matabeleland," which are remarkably clear and well coloured. Among the sets are some fine effects of moonlight, and lamp illumination. A humorous mechanical slide of a dancing sailor is a most important adjunct when giving an entertainment to a juvenile audience. The figure is hinged at the joints, and can be made to dance in a very effective manner. These slides may be obtained through any dealer.

"PRIMUS" SPECIALITIES.

Our readers, of course, know that the word "Primus" has been adopted by Messrs. Butcher & Sons, of Blackheath. This firm are, this Season, introducing a number of handy apparatus for lanternists as follows. Gas fitting outfit.—This, as will be seen from the illustration, consists of a T piece, two tube connections, two screw elbows for putting in place of burner, and lime tongs and borer. Limes.—These they now put up in threes, in hermetically sealed tubes. The "Primus" carrier is made with the corner cut off, so that slides may be inserted or withdrawn with ease, and without fingerling the central portion of the slide. A number of other handy appliances are also manufactured by this firm, including electric signal, cylinder stand, disc registering slides, cylinder keys, tinters, lamps for reading, etc. The spot slide binders which we described last season are now being made for stereoscopic slides, there being ample space for the title, both on the edge and front of the slide.
The English Factory manufacturing Blair’s Film has now been in operation over two months, and the products are proving of a superior quality.

All the latest improvements in the machinery and process, the result of two years’ working in America, have been introduced into this plant, by which means, and the aid of natural advantages and conditions, a film of even superior quality to the product of the American Factory is now being made by this Co.’s own works, which are equal to a very large output. Therefore the trade need now have no fear that there will be a scarcity of Blair’s Film in the market. This also enables us to announce the reduction in the price of Bullseye “Light Proof” Cartridges as follows:—

3½ inches for 12 exposures $3 \frac{1}{2} \times 3 \frac{1}{2}, 2s. 0d.$
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LEVIATHAN, LONDON.
THE "BESSUS" BI-UNIAL LANTERN, by the same firm, has an ingenious method of rapid registration of the discs by means of rack and pinion. So as to get at the lime or condenser, the front of the lantern is made to hinge; the rotation of one milled head causes the up and downward motion to the fronts, whilst another causes a slight side motion. These adjustments can be made with rapidity and precision.

"BESSUS" FILM HOLDER.

Some time ago we announced the fact that Messrs. Airs & Co., 152, Farringdon Road, had brought out a new form of plate holder; they have now introduced a somewhat similar holder for the use of films. As in the illustration, the film is merely laid on a particular form of skeleton holder, and the handle sprung in at the side which causes the film to be kept flat and in place during development, fixing, and drying.

ELECTRIC ARC LAMP.

The "Newtonian" arc lamp (Newton & Co., 3, Fleet Street, E.C.) will be found a most convenient lamp for lantern use. It is self feeding and focus-keeping. An ingenious indicator fitted on the upper portion shows at a glance whether the electric supply wires have been properly connected. The stand in which the lamp is fastened is provided with means for centering.

Editorial Table.

"SUNSHINE." (London, Macmillan and Co., 6s.)—This useful book of five hundred pages, by Miss Amy Johnson, LL.A., is, we understand, the first of a series termed "Nature's Story Books."s Illustrations and experiments in connection with Natural Science are here treated in a thoroughly interesting and instructive manner, and thus students are brought face to face with facts, which, if presented to them in any other way to that which Miss Johnson has adopted, might possibly to them seem dry reading. In this elementary work each subject glides into the other in so fascinating a manner that one becomes as it were wedded to the book itself, and the subject it treats of; and hence, by the aid of the 163 illustrations scattered throughout, one who perhaps previously had little or no inclination for scientific subjects, finds therein a fund of information wherewith to lay a good foundation for further investigation. Lantern slides of most of the illustrations may be obtained.

EASTMAN'S MATTE SOLIO PAPER.—We have received a fine platinum-toned print on this paper. The print is everything that could be desired. On another page we give the formulae, so that those interested can try it for themselves.

ART FOLIO.—From Mr. W. Tylar, of Birmingham, we have received a folio of fine views printed by a permanent process. The pictures without the margin are 11½ x 15 ins., and comprise Alton Towers, Tintern Abbey, Chester Castle, Hawarden Castle, Kenilworth Castle, Ann Hathaway's Cottage. These pictures are excellent, and the moderate price, 3s., renders them in the words of the auctioneer, "cheaper than the paper on the wall."

SPONGE SLIDES.—A new set of 27 slides illustrating the sponge industry has been published by Messrs. Philip & Son, of Fleet-street. All the operations, diving, trimming, sorting, stringing, and packing, are given, together with photographs of sponges ranging as high as £20 in value.

Catalogues.—LEA & SON, of Runcorn, have issued a new price list of their celebrated cylinders, valves, and fittings. The metal employed in the manufacture of the cylinders contains, we learn, about 145 per cent. combined carbon, and has a tensile strength of 26 tons per square inch, with 20 per cent. elongation in a length of eight inches.

YORK'S SCIENTIFIC AND EDUCATIONAL SLIDES.—From such a comprehensive list all tastes can be supplied.

ANDERTON'S LANTERN STEREOSCOPE.—From the catalogue of this apparatus we learn that Mr. J. H. Steward, 406, Strand, W.C., has undertaken the agency for this valuable and interesting adjunct.

WATSON.—A very concise and complete list of lanterns, fittings, and slides comes to hand from Mr. John Watson, 34, Grainger Street, Newcastle-on-Tyne. Any piece of apparatus will be sent on approval after deposit, or will be demonstrated at the show-rooms.

UNDERHILL.—Mr. Alfred Underhill, Clarendon-road, West Croydon, in his new list, gives particulars of his series of dioramic effects to illustrate the chief features of the Antwerp Exhibition.
Notes and Queries.

J. H. Steward.—In our next.

B. R. T.—Measure the length of plate from corner to corner diagonally, and obtain a condenser of that diameter.

Ignoramus asks:—‘Would not an ordinary large house-
hold paraffin lamp, with circular wick of about 100
\[\text{candle-power, act as well as a 4-wick lamp for lantern}
projection?" Ans.—No, the flame has too large an area.

W. T.—Thanks for information.

E. D.—We will try and send you a list in a short time.

R. W. J. Leicester.—We tried one, after the style you
speak of, but made it upright. This was not a great
success as far as the lasting power, but we will have a
horizontal one made, and will let you know the result.

Rev. W. Miles Barnes.—We regret we cannot agree
with you about the limes.

F. Hodgson.—Yes, the limes alluded to in last issue
can now be obtained; they are named 'Harlaxton.'

M. D. writes:—'I have a lantern and a 60 ft. cylinder,
and my gauge shows 18 ft. of oxygen. I am about to
give a 'show' in a village where no coal gas is obtain-
able, and so I am getting a 20 ft. cylinder of coal gas.
I use a safety blow-through jet, the same as pattern
attached, and I note your remark at foot of first column
on page 168 of last month's Journal, viz., 'that the
safety jet can be used with both gases from cylinders,'
etc., but you do not say what would be the effect sup-
posing the oxygen were to burn out before the coal gas
was used, or vice-versa; would there be any fear of an
explosion from this cause in the use of this particular
jet? This is the question I should be much obliged for
your answer. I am not using regulators, but only the
ordinary nipple and the union, and I regulate the supply
by the key of cylinder. There is just a bare possibility
of one of the two gases burning out while in use, and I
would like to feel satisfied that nothing more would
happen than that the light would go out. Ans.—You
will find it a difficult matter to regulate with automatic
regulators. There is no danger whatever, and if things
happened as you suggest, the light would simply go out
if the hydrogen ran out; and if the oxygen supply gave
out, the gas would simply burn like house gas.

Geo. Kilburn.—'Sunshine' from Macmillan and Co.,
'Soap Bubbles' from Longmans, and 'Science at Home'
from Scibagraph Co., Coleman-row, London, N.

W. B.—We have used your initials, as the 'von de plume'
you give is already in this column. You should get
exceedingly thin glass; that known as 'Microscopic' will
answer. Houghton, of Holborn, keeps it. Mica is of
little use.

Colour.—If you wish to spread the colour evenly over a
large space on the slide, it should first be brushed over
the space, and then dabbed with either a dabber or the
end of the finger until quite even. This, although it
may seem a simple matter is one which requires a great
deal of practice to acquire properly, but when once
mastered, it can be done with great dispatch.

Calfaria.—Of course we heard of the breakdown, but
did not think it worth while to mention it in our
columns.

Mark.—You can buy a Y or T piece for a few coppers;
you will not find it an easy matter to make a suitable
one.

Lena.—An objective of four inches focus is no use
whatever for your purpose; get one of about 12 inches
focus.

Too Late for Insertion.—'Photographer,' Mrs. B.,
Helmer, Stevenson, Webb, Sheffield.

Mr. Saunders, of Heath Street, Birmingham, writes:
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