LANTERN ILLUMINATION.

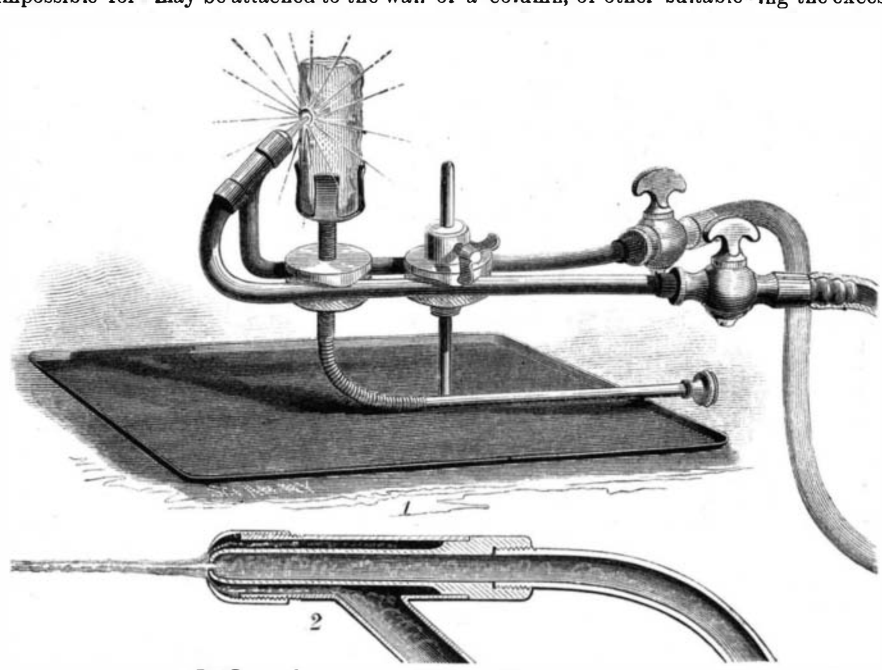
BY GEO. M. HOPKINS.

The most available and satisfactory illumination for ordinary projections is the oxyhydrogen or lime light. The two forms of compound blow pipe generally employed for this purpose have their defects, as every user of the instrument knows. The form in which the two gases are mixed within the nozzle, and projected through a common orifice, produces by far the stronger light, but its use is fraught with danger. The concentric or annular form of blow pipe, in which the gases are mingled as they issue from their respective orifices, is perfectly safe, it being impossible for the gases to mix in the tubes or gas holders; but ordinarily it is necessary to employ a superfluity of hydrogen gas to realize the full effect of the oxygen jet. This is especially true where illuminating gas is used instead of pure hydrogen.

The result of this extra amount of gas is a large and intensely hot flame, surrounding the incandescent spot on the lime and flaming out in all directions. This impairs the light, heats the lantern, and endangers the condenser, which is very liable to become broken by the heat.

The engraving shows a modified annular oxyhydrogen burner, in which the serious defects of its predecessors are overcome, while their good qualities are preserved; at the same time the illuminating power is increased. The central or oxygen tube has a conical end with a central orifice 0·03 inch in diameter. The hydrogen tube is provided with an adjustable cap, having a central orifice 0·1 inch in diameter. The cap is conical internally and externally, and when properly adjusted, as shown in the sectional view, the thin space between the internal surface of the cap and the conical end of the oxygen tube forms a passage for the hydrogen, which directs it across the path of the jet of oxygen. By this simple device the gases are intimately mixed at the moment of ignition, and the result is a clear, intense light with no superfluous flame, and with little free heat. The performance of the burner compares favorably with those that mix inside, while it is perfectly safe, and may be used with gas cylinders or bags and with ordinary illuminating gas at the usual pressure.

A simple and effective device for turning and elevating the lime holder is shown in the cut. It consists of a spiral spring soldered to the lime holder spindle, and secured to a rod extending to the back of the lantern. It is, in fact, a small use of the "flexible shaft." By turning the rod the lime is turned and elevated.



IMPROVED OXYHYDROGEN BURNER.

NEW BAG AND TWINE HOLDER.

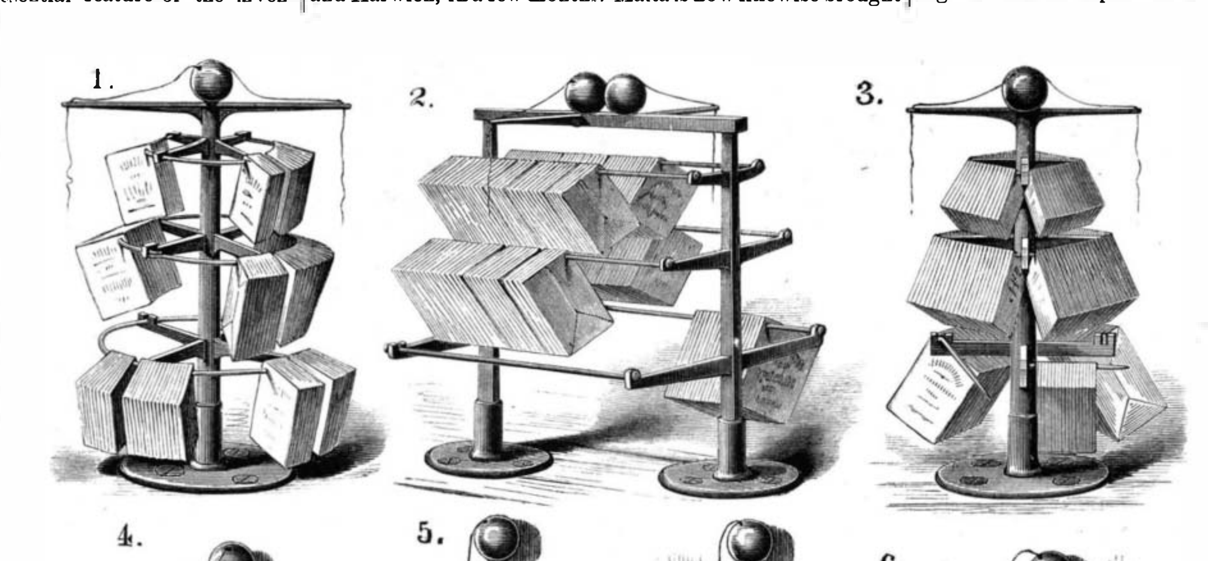
The engraving shows several forms of a novel paper bag and twine holder for grocers and others who use paper bags for putting up goods. The essential feature of the invention is a stand or support of suitable form, with wire pins, rods, or hoops fixed thereon in a convenient way, so that they may be wholly or partly detached for stringing the bags on them, and replaced in retaining hooks or notches, to support the bags in position to be readily detached when wanted for use. Twine ball cups are provided for holding the twine for tying the bags.

The several figures in the engraving represent different forms of the invention.

The holder may have one or more standards attached to a base or other support. To each standard are attached horizontal arms for supporting the wire pins, hooks, or rods on which the bags are strung. The pins are fixed so that their points can be readily freed from their supports at any time when it may be required to replenish the stock, and at the same time be so placed, when returned to their resting places, that the stripping of the bags from them will not dislodge either the points or the heads. For this purpose the pins may be connected to the arms in various ways, and the connecting devices may also be varied to suit the forms and arrangements of the pins and their supporting arms. For instance, in Figs. 1 and 4, where the wire forms a circle or hoop around the standard, two of the arms may have hook ends, in which the bent or notched head of one pin and the point of another may be lodged, as shown, the other arms having a notch in which the pins rest at the middle, the pins being bent so as to extend half-way around the stand and spring into the hooks and notches, so as to be readily put in or taken out, the tension of the wire keeping them in place when lodged therein. In Figs. 3 and 6 the pin heads are bent at right angles and pivoted to the notches in the arms, so that the points will spring into the notches of the adjacent arms. In Figs. 2 and 5 the heads of the rods have a collar, and the points rest in the notches in the arms by their weight, the said head and collar preventing the rods from shifting lengthwise, and the notches are crooked, to prevent the accidental escape of the rods in case of being thrust upward.

When the device is arranged as in Figs 4, 5, and 6, it may be attached to the wall or a column, or other suitable support. This device enables the dealer to take the bags one by one for use, the object being to so arrange the bags that one can be readily selected from the rest, and can be detached without disturbing or scattering the others, and at the same time to hold them so securely that they will not be accidentally scattered.

This device has been patented by Mr. Louis Steinberger, of Bradford, Pa. (P. O. Box 1,933).



BAG AND TWINE HOLDER.

The St. Gothard Railway.

It was naturally to be expected that the opening of the St. Gothard Railway would divert the bulk of the Italian trade into the hands of Germany, Belgium, and Holland. This is being accomplished with surprising rapidity. Early fruit and vegetables are conveyed without transshipment from all parts of Italy to Ostend, Antwerp, and Rotterdam, whence they are taken by fast steamers to London and other English ports. The Great Eastern Railway Company alone is stated to have carried over 6,000 tons of these goods, *via* Antwerp and Harwich, in a few months. Malta is now likewise brought nearer, and Algerian produce, such as green peas and early potatoes, is made more available. On the other hand, Italy is receiving an unprecedented, not to say overwhelming, amount of attention from Germany. In two months after the opening of the St. Gothard route the Germans dispatched 40,000 tons of coal, 107 tons of unmanufactured iron and hardware, 14,000 tons of machinery, 693 tons of copper, 17,409 tuns of spirits, 1,446 tons of paper, and 76 railway wagons—the export of all these articles having previously been either *nil* or quite nominal.

Refining Shellac.

Ordinary commercial shellac, it is well known, when treated with alcohol does not furnish a clear solution, but always produces a more or less turbid, yellowish solution, which, when warmed, clears itself by forming a brown solution and throwing down a grayish-yellow sediment. Also by filtration through good thick filter paper, a perfectly clear solution can be obtained, but this succeeds only when there is about ten per cent of shellac in the solution, and not in working on large quantities. Of course, there is no difficulty in subsequently concentrating the thin solution by evaporating the excess of alcohol, but the filtration of large quantities is attended with loss of time and material, as well as other difficulties, for it is not easy to make the filters tight enough to prevent loss of alcohol, and the filter paper has to be frequently changed.

Dr Peetz proposed to add finely pulverized chalk or carbonate of magnesia, which would carry down the light particles of wax that make the solution turbid. This may answer for small quantities, and where the cost of manipulation is not taken into account, but is absolutely useless for large quantities.

Shellac is not a pure natural product, but is prepared from stick lac by melting, straining, and washing. Both in stick and shell lac there is a substance which some chemists call wax and others fat, that will not dissolve in alcohol and ether, but is soluble in benzine, naphtha, etc. Dr. Peetz adds to three parts of shellac solution one part of petroleum ether and shakes well. After standing quietly for a few minutes the liquid forms two layers; the upper light brown one is petroleum ether containing the dissolved fat or wax, while below is a clear yellowish-brown solution of shellac to which only a little naphtha adheres. On removing the upper layer and allowing it to evaporate spontaneously, a white residue is obtained, consisting of the fat that was in the solution. This fat can be saponified with caustic alkali, but is not dissolved by carbonated alkali, and on this property depends the new process for refining of shellac.

Edgar Andes, of Vienna, has been experimenting upon the best methods of refining shellac, and communicates his results to *Neuste Erfindung*. Passing by the details of his experiments as given in the original, we give his final results. He says: "I have come to the conclusion that for the preparation of a perfectly soluble shellac, that shall retain its other qualities unchanged, ten pounds of shellac should be treated with three pounds of soda (carbonate of soda) dissolved in ninety pounds of water.

"The operation is conducted as follows: The water is heated to boiling in a suitable kettle, the soda added next, and when that is dissolved the shellac is put in slowly, waiting for the first portion to dissolve before adding more. The liquid has a pink color and the well known agreeable odor of shellac. It is turbid from the small amount of fat in it. After all the shellac is dissolved, the solution is boiled a few minutes longer, and the kettle covered with a tight fitting wooden lid, which is luted on with clay, so that no air can enter. It is then allowed to cool slowly, and when the cover is at length removed, a thin cake of fat will be found floating on the liquid.

"This is removed and the liquid strained through linen. The shellac is then precipitated with dilute sulphuric acid added drop by drop. The yellow shellac is washed until it is no longer acid. The well pressed cake is put in boiling water, when it becomes softened, so that it can be worked by the hands into rods, strings, or rolls, which are next put in cold water containing glycerine, so that it will harden quickly, and then dried.

"The hot, soft shellac must be squeezed, wrung, and pressed to remove all the water. This refined shellac has a silver white brilliant surface, is yellowish-brown within, and must be perfectly dry, so as to dissolve without residue in alcohol." The presence of water in alcoholic solutions of any resin makes it turbid and milky.

THE venerable Professor Listing, of Gottingen, died in that city, December 24, in his 75th year. Professor Listing numbered many warm friends among his scholars in this country, who will hear of his death with profound regret.