

air is forced by the pumps into the outer pipe and compressed therein, so as to apply the compressed air to the surface of the liquid in the outer pipe, and thereby assist in forcing it into the suction pipe. With this apparatus, water can be easily raised to any desired height.

This invention has been patented by Mr. Patrick F. Guthrie, of Franklin, N. J.

POLARIZED LIGHT.

A FEW OBJECTS FOR THE POLARISCOPE.

BY GEO. M. HOPKINS.

II.

Scientific experimentation, though practiced merely as a pastime, can but elevate the thoughts and bring the mind into new channels, thus promoting knowledge to some degree, even though the student proceed no farther than the observation of effects. But once interested in effects, the inquisitive mind cannot rest satisfied without probing for causes.

So far as effects are concerned, the subject under consideration is everything that could be desired, and no great scientific knowledge or high manipulative skill is required to secure splendid results.

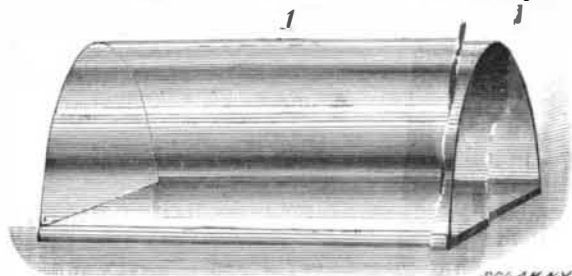
In a former article, the writer mentioned a few ways in which light could be polarized and analyzed, and gave hints as to some objects which might be viewed by polarized light.

A few simple objects easily prepared from mica are here shown. The material is of course procurable everywhere, and it requires little more than a glance at the engravings to enable any one to prepare the objects. Doubtless many other forms than those illustrated will suggest themselves to the student.

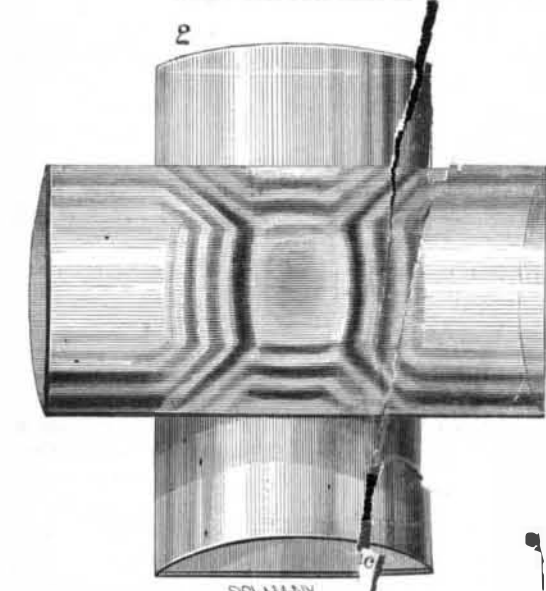
The simplest form is shown in Fig. 1. It consists of a thin plate of mica bowed into approximately cylindrical form, and secured by its edges to a glass plate by means of narrow strips of gummed paper. The size is immaterial; the glass plate may be 1 1/2 inches wide by 3 inches long. This object exhibits fine bands of prismatic color when viewed in the polariscope. Two such semi-cylinders, when crossed, exhibit the intricate figure shown in Fig. 2, with all the splendid colors of the spectrum.

The object shown in Fig. 3 is formed of a disk of mica having a sector cut out and the radial edges overlapped, forming a low cone. The overlapping edges are best fastened together by small tin clips inserted in holes in the mica and bent downward on opposite sides. The clips are not noticeable, and are efficient in holding the edges together. Cement will not answer the purpose, as it adheres to the surface only, and it must be remembered that mica splits almost indefinitely.

The cone thus made has the appearance in the polariscope of a huge circular crystal of salicite. The colors of the cone may be heightened by mounting it on a sheet of mica, as shown in the engraving. The cone is first placed in the polariscope, with the polarizer and analyzer crossed, and turned until it appears brightest, when the lower edge is marked. The mica sheet is then placed in a similar way in the polariscope,



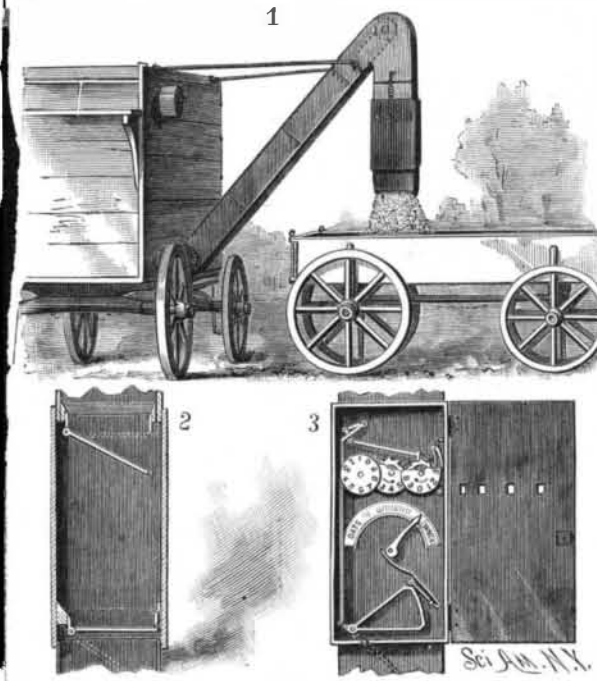
MICA SEMI-CYLINDER.



MICA SEMI-CYLINDER 2 CROSSED.

secure a pin head downward on a square of glass with sealing wax or other cement. A small paper tube which will fit the pin loosely is then made, and a little head of sealing wax is formed around the tube near one end. A piece of mica is selected which exhibits fine colors in the polariscope, and four equilateral triangles are cut from it, either with their corresponding sides cut upon the same base line, or with one side of each cut from one side of a square, or they may be cut and mounted haphazard.

To the apex of the angle designed for attachment to



GABBEY'S AUTOMATIC GRAIN WEIGHING AND REGISTERING MACHINE.

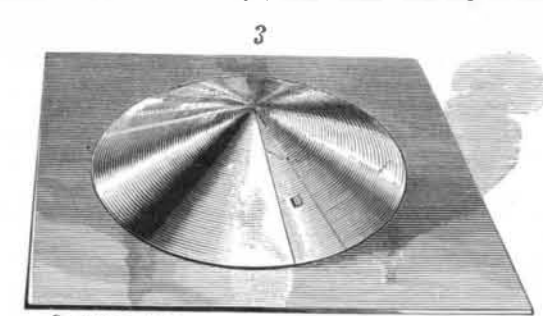
the paper tube a small drop of sealing wax is applied, and with the tube on the pin the first triangle is attached by holding it in the required position by means of a pair of tweezers, and then fusing the wax on the mica and that on the tube simultaneously by means of a small heated wire, such as a knitting needle.

The other members are placed and secured in a similar way, care being taken to arrange the triangles symmetrically, and at a slight angle with the plane of rotation of the object, as shown in the engraving.

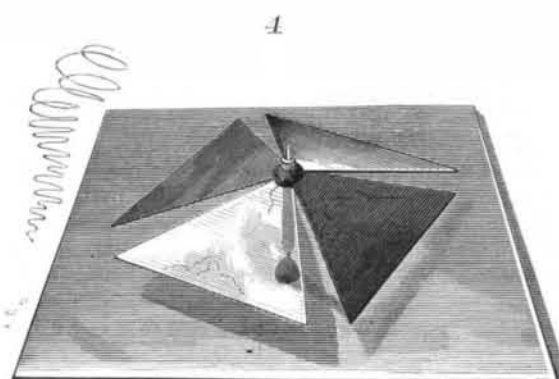
The wheel shown in Fig. 5 and the star shown in Fig. 6 are prepared in a similar way. The sections of the wheel are cut from a circular piece of mica, and cemented in place on the paper tube after the fashion of a propeller wheel or wind wheel.

Each ray of the star is made of two scalene triangles of mica oppositely arranged with respect to each other, and inclined in opposite directions, the longer and shorter sides of adjacent triangles being fastened at the periphery of the star by a minute drop of sealing wax.

In Fig. 6 beside the star are shown two somewhat similar objects, formed of strips of mica, pivoted together on a small rivet, one object having the pivot in the center of the strips, the other having it at the



MICA CONE.



MALTESE CROSS.

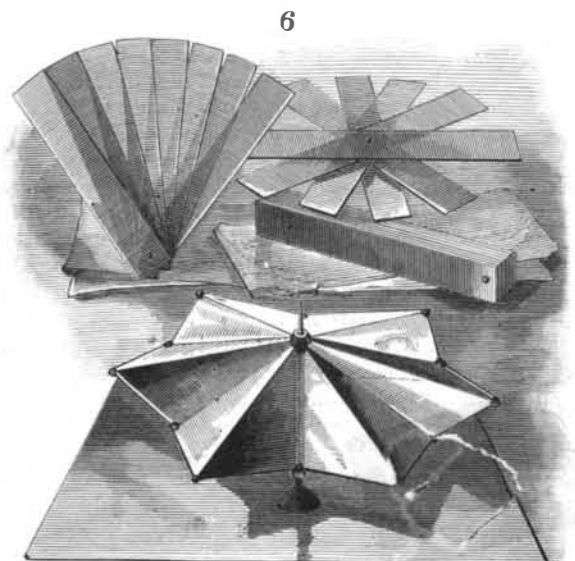
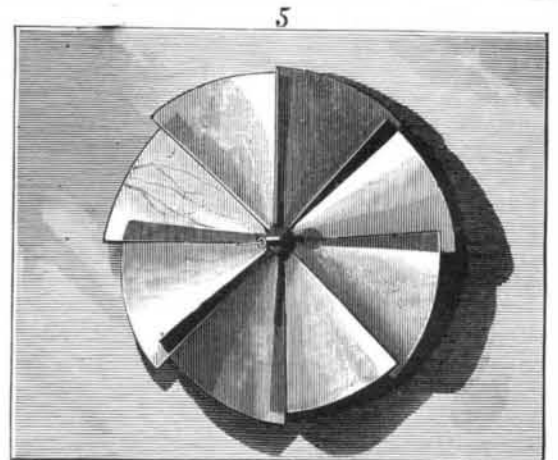
the simple form of Norremberg doubler. These objects are also very satisfactory when projected on the screen.

AUTOMATIC GRAIN WEIGHING AND REGISTERING MACHINE.

This machine is designed especially for attachment to the elevator spouts of grain separators and corn shellers. The case is made in three parts—a large central part and two smaller end ones. In the upper and lower ends of the central part are placed plate valves. The upper valve closes against the sharp beveled edge of a metal strap designed to cut off straws, weeds, and other substances that would prevent the valve from closing tightly. The lower valve closes against the lower edge of a metal strap, the upper parts of which are bent upward and outward and are attached to the inner surface of the end of the central part. The valves are so connected that one will always be closed when the other is open. Attached to the shaft carrying the upper valve is an arm pivoted to the rear end of a pawl operating numbered wheels (Fig. 3). With this construction, as the valve is lowered to admit grain to the central part of the case, which is designed to contain half a bushel, the pawl is drawn back, and when the valve is raised to stop the inflow of grain, the pawl is pushed forward to make the numbered disks register the amount. At the proper time the numeral 1/2 can be seen through one of the holes in the door covering the register. To the shaft of the lower valve is rigidly attached the acute angle of a triangular arm, whose outer angles are cut off to form seats for a friction roller pivoted to the end of the short arm of a spring attached to the frame.

The long arm of the spring rests against a pivoted eccentric provided with an index finger, which points to a scale marked with the names of the different grains to be cleaned and weighed, and the number of pounds of each to a bushel. The tension of the spring is regulated by adjusting the finger so that the spring will hold the arm with sufficient force to keep the valve closed until the weight of half a bushel of grain has been received upon it, when it will open to discharge the grain, and the upper valve will close to prevent any grain from entering the middle part of the case while the lower valve is open. The case is suspended from the spout of the elevator (Fig. 1) by spring hooks; the grain can be discharged in bulk into a wagon or into sacks. This invention has been patented by Mr. Robert S. Gabbey, of Rossville, Kansas.

SOME one suggests that trees after transplanting may be kept alive by burying a row of flower pots filled with water around the body and over the roots of the tree.



STAR FAN AND CROSSED BARS OF MICA.

The moisture which will percolate through the bottom and sides of the pots will be so gradual that two-gallon ones will hold enough so as not to require refilling for some time, and the roots will be kept moist till such time as they begin to sprout afresh.

and turned and marked. The object is then cemented by its edges to the sheet, the marked edges of both members being arranged in the same direction.

The Maltese cross shown in Fig. 4 is revoluble. The first step toward the preparation of this object is to

end, giving the object an appearance similar to that of a folding fan.

Any of these objects may be viewed by means of the black glass polarizer in connection with either of the forms of analyzer described in the former article, or in