

AN IMPROVED TYPE OF ZEISS FIELD GLASS.

The Galilean telescope, while an improvement over the ordinary astronomical telescope fitted with terrestrial eyepiece, possesses the disadvantage of having a small field and requires object lenses of considerable diameter and moderately long focus in order to give a fairly flat field with suitable illumination.

It has long been a live problem with opticians as to how the field might be enlarged and the bulk reduced while maintaining good illumination and sharp definition. The solution of the problem has been reached in a manner which increases the optical efficiency of the field glass in every possible way by the application of Porro's prism—invented independently by Porro and Prof. Abbe—in the new Zeiss field glasses, now being



BAUSCH & LOMB—ZEISS FIELD GLASS.

manufactured in this country by the Bausch & Lomb Optical Company, Rochester, N. Y.

These glasses are the invention of Prof. Abbe, of Jena, to whom optical science owes so many recent improvements.

It is only within the last few years that the optical manufacturer has attained the refinement which enables him to produce this class of work.

The illustration shows the Zeiss binocular field glass partly in section, with the Porro's prisms in position. It will be noticed that the light first passes through the objective lens, is reflected twice by the first prism, and enters the second prism placed at an angle of 45° to the first, where it is again twice reflected, emerging parallel to its original direction, where it is magnified by the eyepiece, which is of the compact Kellner construction.

The three principal defects of the ordinary binocular field glass are overcome by the use of these prisms, which have the effect of erecting the inverted image formed by the object glass, shortening the telescope by two-thirds, and at the same time giving a means of placing the object glasses farther apart than the eyepieces are.

The amount of this displacement is variable within wide limits and has the effect of increasing the stereoscopic effect possessed to a certain extent by ordinary binocular glasses, giving greater relief and appearance of solidity to the images of objects seen at a distance.

The relation of aperture to magnification has been so calculated that the largest possible amount of light is made to enter the pupil of the eye, the actual diameter of which has been taken into account in calculating the eyepieces. In order to reduce weight, the cases are made of aluminum covered with leather.

Adjustment for the correct pupillary distance of any user is made by moving the two parts of the binocular about the axis of the hinge. A click setting device enables any individual user to determine his own pupillary distance and set the click to that distance permanently. Each ocular is focused separately, so that in case there are differences in the foci of the eyes they may be compensated for in the field glass, giving correct coincidence of the two images and increasing the distinctness of the combined image.

The extraordinary depth of focus of these glasses makes it unnecessary to

change the focus after it has been once determined for the eyes of the user, except for objects extremely close to the observer.

A NEW INSULATOR.

The insulator which forms the subject of the accompanying engraving is constructed in the form of a tube, divided into longitudinal sections, each of which has interlocking shoulders and a head at its outer end, so that the sections may be fitted together to form a continuous tube, securely and effectively holding the conductor.

Of our illustrations, Fig. 1 is a perspective view and Fig. 2 a sectional view, both showing the insulator in position.

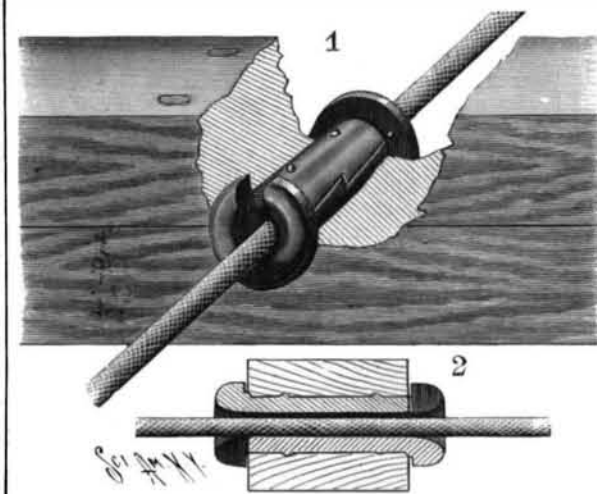
The insulator is made in two duplicate sections, each having its edges provided with interlocking shoulders, as shown in Figs. 1 and 2. By this means the two sections can be made to fit exactly together. The head of each section is outwardly beveled to prevent chafing of the wire, and is provided with a notch through which the wire may be passed. Projections on the sections are adapted to be embedded in the material and hold the insulator, to prevent the sections from turning and, therefore, displacing the insulator. As indicated in the engraving, the insulator is adapted to be held in the joist or other framing of a building through which the wire is to be passed.

By means of this device, the wires may be securely held and leakage prevented. The insulator may be applied after the wiring is done, or the insulator may be first placed in position and the wire then run through it. When once in place the insulator cannot be accidentally removed.

The device is the invention of Charles L. Wingard, Walla Walla, Washington.

top of the stand, the other joining the condenser at the bottom and left hand side of the tank and at the same time acting as a guide. A water pipe is connected in reverse order. In the generator shown in the larger engraving a water tank is added to the stand above the upper set of holders. Otherwise the details of the two machines are identical.

In setting up the Colt acetylene generator, the pipes between gasometer tank and stand are connected, and also the water supply pipes, carbide is introduced into the holders, and the water turned on. Meantime the stopcock and condenser drip is opened to allow free exit for contained air, permitting the gasometer to sink to its lowest level. Gas from the holder, entering



WINGARD'S INSULATOR.

THE CRITERION AUTOMATIC ACETYLENE HOUSE GENERATOR.

Herewith are presented illustrations of two styles of acetylene gas generators manufactured by J. B. Colt & Company, and especially intended for lighting single dwelling houses, country seats and outbuildings, small and medium manufacturing plants, etc., though the system can be made to embrace larger establishments. There appears to be no limit in this direction.

The first illustration represents machines with a single set of four carbide holders. The form shown in the second illustration shows the possibility of doubling the charge of carbide without increasing the floor space, by employing a double row of holders.

It is obvious that several stands, either with a single or double row of holders, may be used with the one gas holder and water valve, thus enabling a very large charge of carbide to be used.

These machines are so simple that they can be managed by any one having ordinary intelligence, and the convenience and rapidity with which they can be loaded are among the special advantages. The automatic arrangements whereby the production of gas and the regulation of its flow is governed in consonance with the necessities of demand and supply, are positive in their action, and no gas is wasted. The machines are strong and durable.

Each apparatus consists of a gasometer, a stand supporting the carbide holders, connections between the two being had by means of a pipe, one end of which springs from the

connecting pipes, expels the air from the machine, when stopcock and water regulator are closed, causing the gas to flow into the gasometer, which immediately begins to rise. When sufficient quantity of gas has been secured in this way, gas is admitted to the service pipe, the residual air is forced out through different burners which are opened for this purpose. When the flame no longer reveals a bluish tinge, the last trace of residual air has been got rid of.

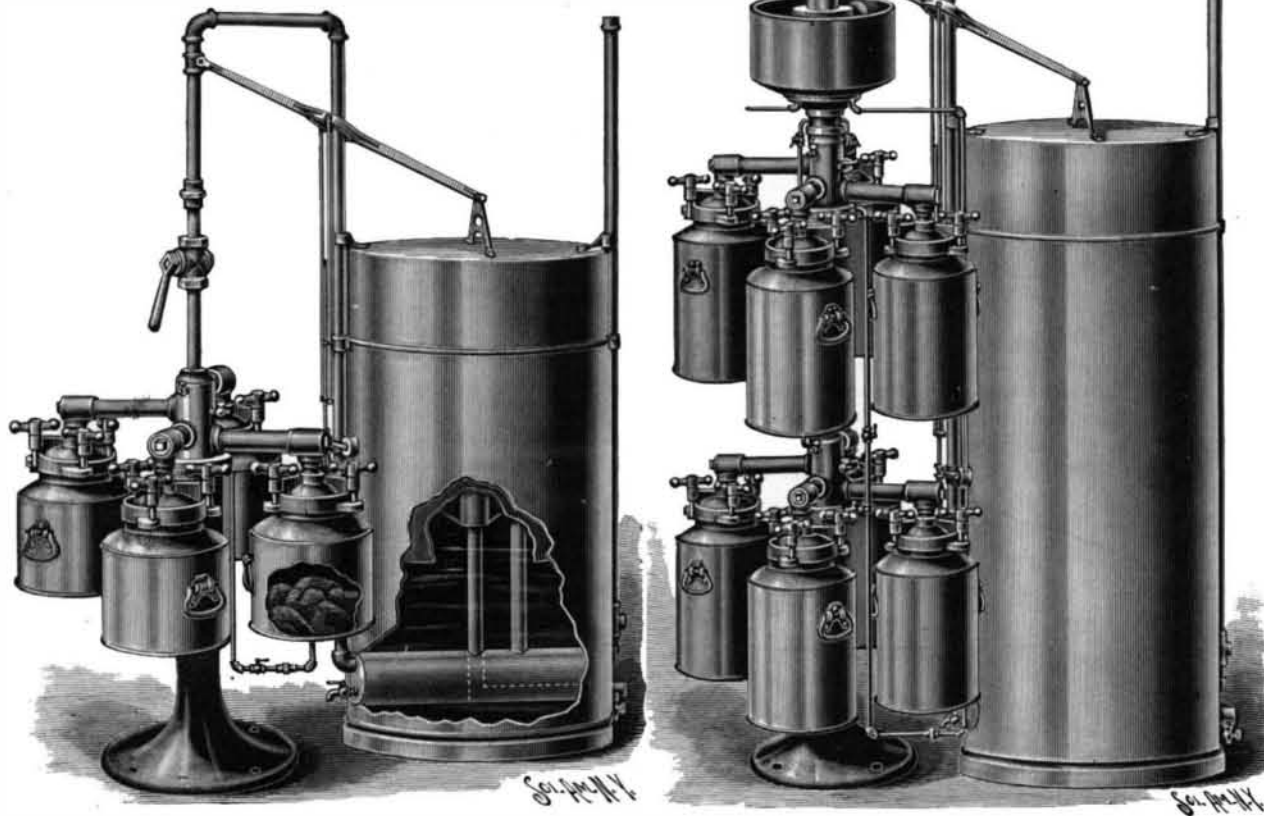
When water is admitted to a carbide holder, gas is immediately but slowly and gradually evolved. Water, however, can only reach one holder at a time, and it is only when the carbide has been thoroughly exhausted, and its receptacle filled with water, that the water can enter the next one of the series; and whenever the flow of the gas is too great, or the gas too rapidly evolved, water ceases to flow into the holder, it being forced back by the flow of the gas.

The gas produced in the holder passes out through the pipe connecting to the stand and is conveyed into condenser, where it is cooled and parts with its moisture. It then rises into the gasometer, where it is stored, or passes on through the service pipes for combustion. When an excess of gas is being sent to the gasometer it rises, and by means of levers closes the water supply, when the production of gas ceases; but when consumption is again begun and the gasometer falls, the lever descends and the water is again turned

on. The complete isolation of the holders is effected without the use of valves. By this means the carbide in each holder is entirely protected from moisture until it is required for the production of gas.

The gas pressure may be increased by placing weights on top of the gasometer; this is often rendered necessary when gas has to be forced to considerable distances, or through many diverging service pipes. The gas is preferably used under a pressure of from two to three inches of water. Water requires to be renewed in the tank only as often as the holders are charged with carbide. The carbide expands when slaked to twice its volume; therefore, the receptacle should be filled only about one-half.

The greatest convenience about the machine is the ease of reloading it is not necessary to



AUTOMATIC MULTICHARGE ACETYLENE GENERATOR.