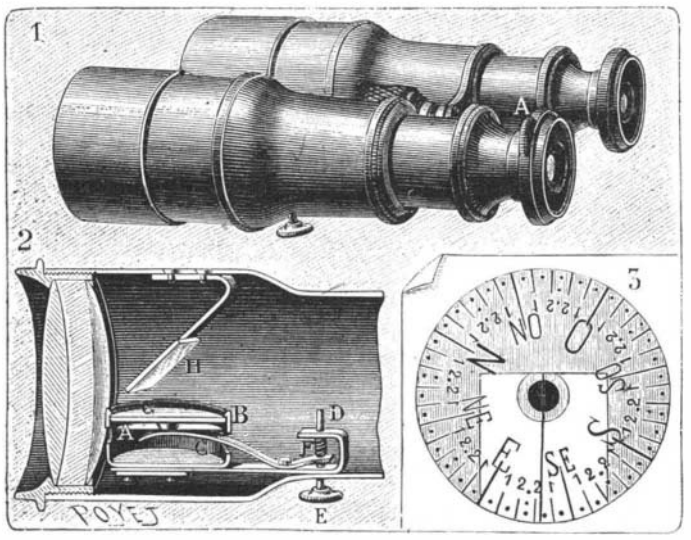
THE COMPASS FIELD GLASS.

All of our readers are acquainted with the wonderful instrument called a field glass, that permits of distinguishing objects at a distance with great distinctness. This apparatus is much used by our officers in military reconnoissances. Up to the present, however, it has had one great fault, that of giving no indication as to the exact situation of the point observed. This latter could be designated only by a few vague terms, such as to the right, to the left, etc. Mr. Geraud, a cavalry officer, has just overcome this defect by adapting to the ordinary field glass a compass that exactly determines the directions in which the observations are made.

The compass field glass, the general appearance of which is shown in Fig. 1, consists of an ordinary double field glass, in one of the parts of which is inclosed a compass with its rose arranged horizontally. Fig. 2 shows the details of construction. At A we observe, mounted upon a pivot, the movable rose upon which is fixed the magnetized needle. A flexible strip, C, terminates at F, where a spring held by a rod, D, keeps it constantly pressed against the rose, A. On the outside of the field glass there is a button, E, which permits of annulling the action of the spring, F, and of setting the rose free. The pivot and the compass are inclosed in a box, B, placed in the field glass, usually on the left side. At the upper part there is a glass, G, upon which is traced a line that serves as a datum mark for the readings. This line is directed according to the axis of the field glass, and, consequently, according to the line of sight At H there is a properly inclined mirror which reflects the rose of the compass and sends the rays in a horizontal direction.

The rose is provided with peculiar divisions for clearly fixing the positions of the objects observed. It is formed of a circle divided into eight equal sectors through four diameters. Four divisions correspond to the cardinal directions N., S., E., and W., and the four others to the collateral diameters. Fig. 3 gives the plan of this rose. One will remark the illuminated part, which is the only one visible in the apparatus. The angle comprised between a cardinal division and the contiguous collateral division is divided into ten equal parts, each of five grades.* We have entire lines marked 1 and 2 to the left and right of a median division designated by three dots. The other intermediate divisions are indicated by one dot. The reading is done by first enunciating the cardinal or collateral direction nearest the datum line, then the following direction, and by indicating the exact division occupied by the datum line. For example, in the position of the rose represented in Fig. 3 we read S. E.—E. 17 grades. Such determination will permit of finding exactly again upon a map the situation of the place observed.



THE COMPASS FIELD GLASS.

In order to render the vision very clear, it has been necessary to adopt an optical arrangement that allows the divisions of the rose of the compass to be read with great ease without, however, interfering with the binocular vision. To this effect, the head of the field glass is provided with a double convex lens set into a movable collar, A (Fig. 1). The refracting power of this lens is so calculated as to annul the concave ocular of the field glass on the one hand and, on the other, to form a magnifying lens for facilitating the reading of the compass. This lens can be easily shifted by pressing upon the movable head, A, and is therefore capable of rendering to the field glass its special properties for binocular vision.

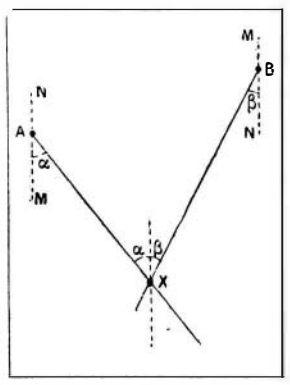


FIG. 4.—Construction to permit of obtaining the exact position of the point × upon a map by means of the observed angles α and β.

All these modifications can be easily introduced into the ordinary field glass. The instrument under consideration lends itself to a most interesting series of determinations. It is possible to recognize upon a map the point where one chances to be, to make a hasty survey upon horseback, to establish an optical post at an indicated point upon a map, etc. We shall select an example of the most practical problems for making it known to our readers.

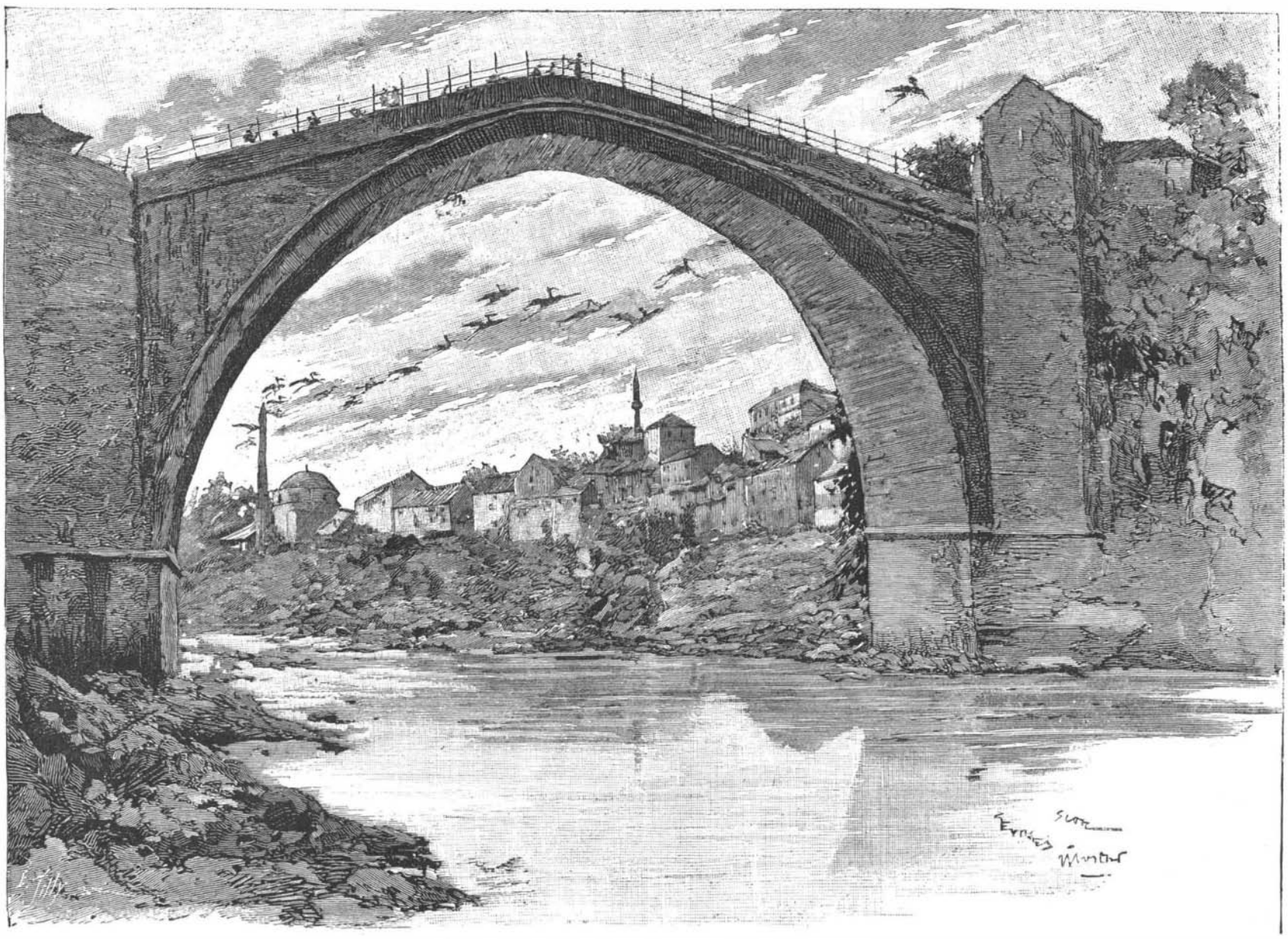
We find ourselves at a point, χ (Fig. 4), whose situation is totally unknown to us, and we desire to determine such point. In the vicinity there are two other points, A and B, such as a city, a tower, a hill, etc.—in a word, two points that we can easily observe. We take a look at these two points in succession, and note in each case the divisions indicated by the position of the compass with the datum line. Supposing α and β to be the divisions observed upon a map, let us fix the points, A and B, whose positions are known. Through each of them let us pass a line, M N, parallel with the N S direction, which is the line of the magnetic meridian in these places. The correction relative to the magnetic declination is made, and, consequently, the geographical meridian is confounded with the magnetic. Starting from M A, let us inscribe the angle, α, and from N B the angle, β. Let us draw two straight lines forming such angles. They will meet each other at a point, χ, which is the exact position of the point sought.

As may be seen from this brief description, the compass field glass is destined to render great services. The apparatus, which is very ingenious and based upon the simplest principles, permits of fixing, by measurements sufficiently precise for practice, the vague and uncertain results that up to the present have been furnished only by observations left to the appreciation of each person.—La Nature.

* The "grade" is the division adopted in the army. The circumference is divided into 400 grades.

THE ROMAN BRIDGE OF MOSTAR.

The border lands of civilization are nearly always interesting, and Herzegovina is no exception to the rule. This province of Europe forms a part of Bosnia and is surrounded by Dalmatia, Croatia, Bosnia, Servia and Montenegro. The chief town of Herzegovina is Mostar, the meaning of this word being "old bridge." When Sir Gardner Wilkinson visited Mostar shortly before the publication of his work on Dalmatia and Montenegro, in 1848, the difficulties which were thrown in his way were almost insurmountable · but now Mos-



THE ANCIENT ROMAN BRIDGE AT MOSTAR.