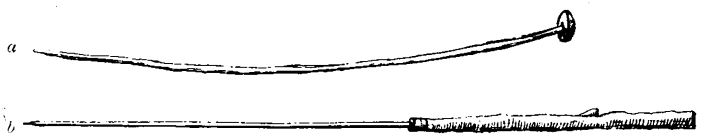
When the native has decided to relinquish his house of ice for one of snow, or on a sledge-journey has decided to go into camp, — in short, is going to build an igloo, — the first thing done is to get out the 'snow-testers,' with which they determine the compactness, depth, and general availability for building-purposes of the snow-drifts. The ancient style of snow-tester, *a*, and



SNOW-TESTERS, ANCIENT AND MODERN.

those yet used by the Esquimaux who have no trading communications with the whalers and explorers, is one made from reindeer-horn, about the diameter of a little finger, and probably three feet long. One end is sharpened, and the other, formed as a button about the size of a quarter of a dollar, is held in the palm of the hand. The modern tester, *b*, is simply the iron rod of the seal-spear with the barb removed.

Having halted on some lake that they know by certain signs has not yet frozen to the bottom,[1] the men scatter out like skirmishers along the deep snow-drifts near the shore, and commence prodding with their testers. Finally a shout from one shows that he has been successful; and, leaving the tester sticking in the snow to mark the spot, he and the others return to the sledges, which are then brought up, and the building commences.

It takes considerable experience, coupled with good judgment, to pick out the best building-site; and, while the constant prodding with the testers oftentimes looks foolish to a spectator, it is no inconsiderable part of the performance. Snow which looks perfect on the crust may be friable beyond use a few inches deeper, and this the tester will reveal. Soft drifting snow may cover a bank of splendid building-material. Again, the drift may be freely interspersed with hidden stones and bowlders, which the testers will bring to light if freely used. This testing for good snow generally occupies from ten minutes to a quarter of an hour: but I have seen it drawn out to an hour, or so long as it takes to build the igloo itself; and, in fact, I have seen them compelled to abandon the most favorable looking lake after having skirted its whole outline, and move on to the next.

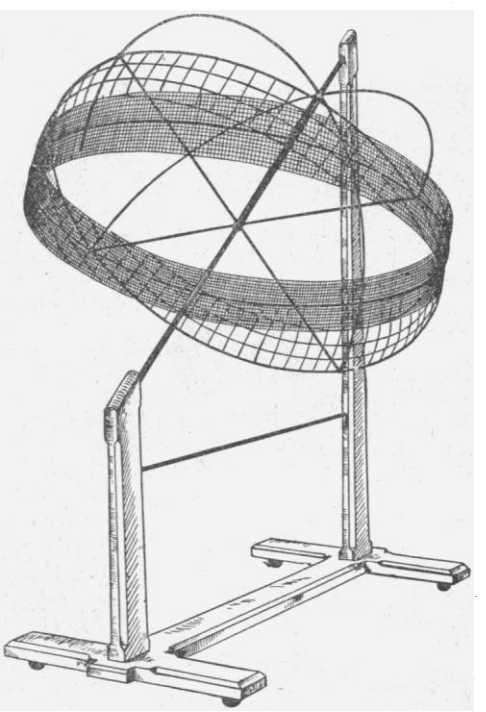
[1] This is generally done by lying flat on the ice, and placing their eyes as close to it as the nose will allow, when some varying peculiarities of the ice-colors decide their conjectures.

(To be continued.)

ILLUSTRATIVE APPARATUS FOR ASTRONOMY.

The accompanying figure represents an apparatus designed for use in teaching astronomy. It is mounted so that the axis on which it rotates is parallel to the earth's axis. Two circles represent the equinoctial and ecliptic, and on the latter is a strip of wire cloth to represent the zodiac. The circles are of such a size that the meshes of the cloth (in this case a half-inch) are one degree in size, and larger meshes of five degrees are made, extending to the circle of the equinoctial. The northern halves of the two colures help to hold all in position. The lower part of these latter circles are dispensed with, so that one may conveniently stand near the centre, the frame being of such a height as to bring the centre nearly on a level with the eye.

It helps the beginner to obtain a clear conception of the fundamental circles so often referred to, of their actual position in the



heavens, and their apparent diurnal change of motion. It enables him also to represent the sun, moon, and planets in their correct

positions at any time, their right ascensions and declinations (or longitudes and latitudes) being given. For this purpose I use disks of cardboard, with small hooks attached by which they may be readily fastened to the wires. It is, besides, very convenient to use in the explanation of many questions and topics that arise in the course of the subject. A light rod or wire attached to a standard serves as a horizon when required.

The apparatus grew out of the need felt of something besides the celestial globe and the usual means of illustration for use in the lecture-room. The idea of it was suggested by a description of something like it which some one had seen; but the description was so vague, I am unable to say how nearly similar is this design, or whether it is any improvement or not on what may be used elsewhere. But I have found it to serve a very good purpose in the lecture-room, and think it may be serviceable to other teachers. G. B. MERRIMAN.

HELL'S OBSERVATIONS OF THE TRANSIT OF VENUS IN 1769.

PROFESSOR NEWCOMB has lately taken advantage of a visit to the Imperial observatory of Vienna to make, with the consent and support of its director, Prof. E. Weiss, an examination of Father Hell's manuscript record, with reference to deciding on the alleged falsification of these observations by Hell himself. The result of his examination was so different from that generally accepted, that Professor Newcomb prepared and presented to the Royal astronomical society a statement of the evidence and his conclusions. The story of Hell's supposed tampering with his observations of the transit, made at Wardhus in 1769, is, in substance, that he delayed publishing them so long as to give rise to the suspicion of intending to alter them; that he showed them to no one until after he had received the observations made at other stations; that a cloud was thus thrown over their genuineness; that the suspicions thus excited were confirmed in 1835 through the discovery and publication by Littrow of Hell's original manuscript journal, which its author had neglected to destroy; and that the examination of this journal showed numerous cases of alteration and erasure of the original observed figures, including the seconds of first interior contact, which had been completely erased, and replaced by new numbers inserted with different ink at some subsequent time. And the reason for all this was supposed to be, that Hell desired to publish, not his true observations, but results which should be in the best possible accordance with the observations of others. More precise statements on some points are these: the transit occurred 1769, June 3; Hell's party sailed from Wardhus, June 27, but meeting with delays from adverse weather, and stopping to make observations, they did not reach Drontheim until Aug. 30; after some stay here and in Christiania, Copenhagen was reached on Sept. 17; the observations were communicated to the Danish academy of sciences in November or December; the printing commenced Dec. 13, and on Jan. 13, 1770, Hell received twenty printed copies. Professor Newcomb remarks that he does not know the original authority for the statement that Hell was loudly called upon for his observations before he would consent to their publication.

The document which Professor Newcomb has scrutinized is a thin manuscript volume in folio, containing twenty-seven finely written pages, and nearly as many blank ones, bearing the heading "Observationes Astronomicae et Caetera in Itinere litterario Viennâ Wardöehusium factae. 1768. A. M. Hell." This volume is assumed to be in Hell's own writing, and to be his original journal of his observations. Littrow apparently treats of it as the actual first record of the observations, but to Professor Newcomb this seems very improbable. He concludes that the writing of this journal was done at the observing-station, probably at the close of each day's work or each set of observations. What Hell sent to press in December, 1769, was not a transcript of this journal, but a more copious account, containing eighty-one printed pages, with only an occasional identity of language. But, with a single unimportant exception, the numbers are all printed without change from the original manuscript journal, whether corrected or uncorrected in that journal. It is very clear to Professor Newcomb that nearly all the alterations were made at the station — two, at least, before the ink got dry. And he further concludes, that, *whatever the sources from which the corrections were derived, the numbers as printed by Hell were all but one or two obtained at Wardhus.* Going into these manuscript corrections more in detail, it seems quite clear to Professor Newcomb that the alterations in the numbers representing the observations of first contact were made with the same ink as the original; and he regards only one conclusion as certain, — that the corrections were made at the time of writing, and without the slightest intention of giving any thing but the actually observed moment when Venus was first seen.

Coming now to the much disputed observations of internal contact, the figures of seconds seem at first sight to be corrected. Littrow says that the paper bears marks of having been scraped, and that the original figures of seconds had been carefully erased, the ink, in consequence, spreading in the paper. Professor Newcomb remarks, that one sees at a glance that the latter statement is erroneous; and he applies to the question of erasure the test of viewing the paper by oblique sunlight, and proves the texture of the surface to be still uninjured. The evidence thus leads to the certain conclusion, that no different figures from those now visible were ever written there. If, then, they are in any way the result of calculation from other observations, the place must have been left blank until Hell got back to Copen-