

subject of the secular variation so much attention from the purely *practical* standpoint, as in this country. All the earlier surveys were referred to the magnetic meridian instead of the true meridian. And since in but very few cases the deviation of the magnetic meridian from the true one was determined by the early surveyor, it becomes a *practical* problem to know how much allowance shall be made for the shifting of the reference meridian of the early survey in order that the "metes and bounds" of the original plat can be re-located at some future date. One of the Eastern states is still so far behind the times as to recognize on its statute-book the *magnetic* meridian as the meridian of reference for land surveys! Even in Maryland no systematic effort has been made by the state to put the matter of its land surveying on a practical and scientific basis, so as to prevent costly and annoying litigations as far as possible in the future.

We are now acquainted with two of the practical objects of a magnetic survey:

- a. The determination of the angle between the *true* north and south line and the *magnetic* north and south line.
- b. The determination of the angle by which the magnetic meridian has shifted its direction during given intervals of time.

The accomplishment of these two objects suffices for the *practical* needs of the surveyor. The prosecution of a magnetic survey along these lines alone, however, will never materially advance our knowledge of the laws underlying and controlling the secular variation. There are, namely, other manifestations of the earth's magnetic force which demand recognition if we desire to make continued progress in the hope of being able ultimately to improve and perfect the laws which at present must be wholly empirical.

#### THE MAGNETIC INCLINATION.

In the year 1576 a London mathematical instrument maker, Robert Norman, made the following important discovery, the account of which I shall give in his own words:<sup>1</sup>

<sup>1</sup> Quoted from his book: *The New Attractive shewing the Nature, Propertie, and manifold Vertues of the Loadstone with the Declination of the Needle touched therewith under the Plaine of the Horizon, found out and*