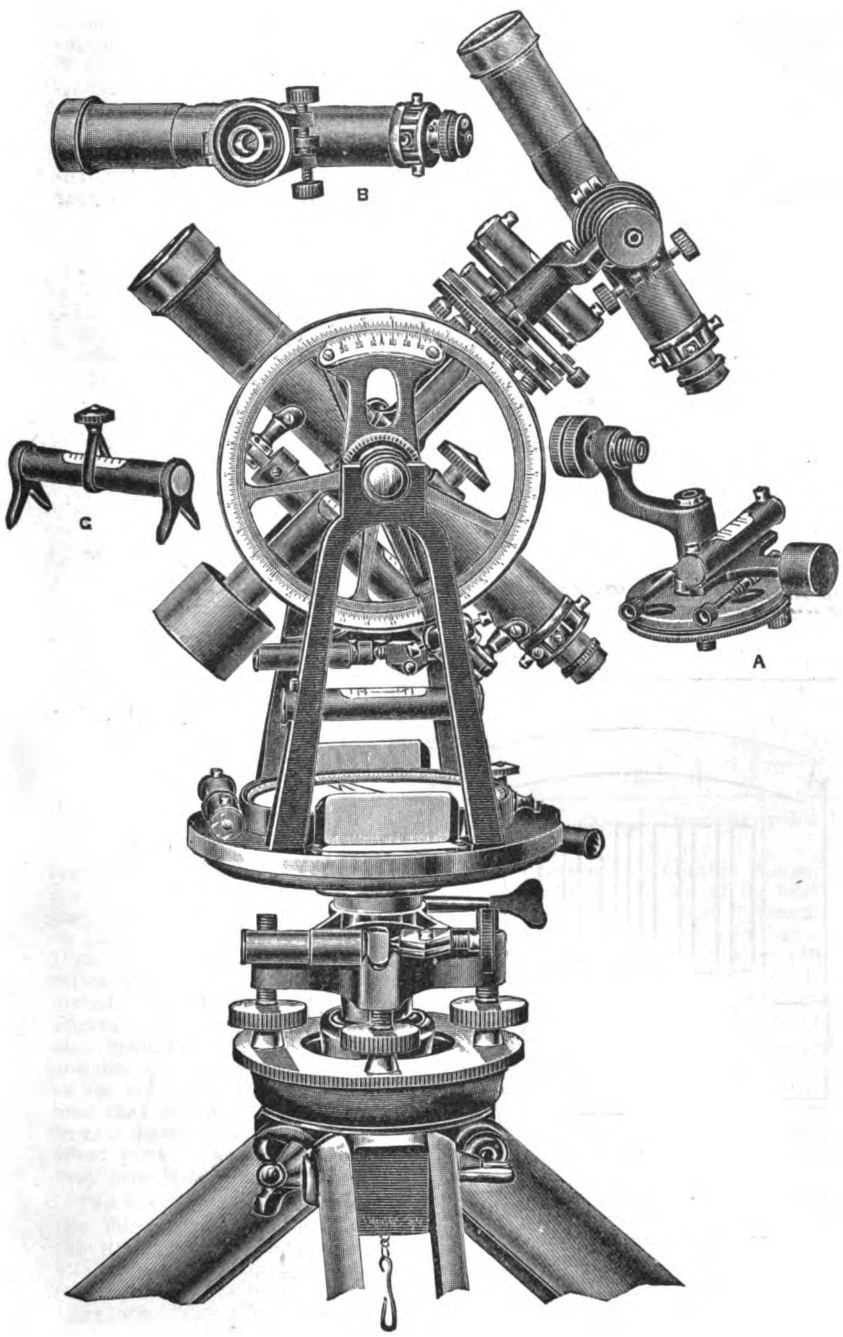
THE BERGER SOLAR ATTACHMENT FOR TRANSITS.

The accompanying illustration shows an instrument made by C. L. Berger & Sons, successors of Buff & Berger, as a modification of the Berger solar transit. With a view of reducing the weight and cost of this attachment the declination arc is dispensed with, and in its stead the latitude or vertical arc is used for setting off the declination and refraction. To attain a greater degree of precision and simplicity of manipulation the more powerful auxiliary telescope which is used with their improved mining transits for top and side observations is used in place of the solar telescope, and thus also is avoided the necessity of carrying a third telescope into the fields. The auxiliary telescope in this case, besides the usual fine crosswires, is provided with four coarse wires, equidistant from those wires forming a square which is slightly smaller than the disk of the sun, thus permitting the observer to bisect the sun's center by equal chords. The solar attachment consists of the patented equatorial adapter, A, so named because when properly adjusted to the transit it becomes the means by which the auxiliary telescope, B, can be made to revolve in the equatorial circle, or in a plane



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parallel to the earth's equator, and of the striding level C, which when placed upon the auxiliary telescope enables it to be levelled, thus affording the means of setting off the deductions and refraction of the sun at any hour by using the vertical circle of the transit.

The equatorial adapter consists of two parallel plates provided with two leveling screws working against opposite springs. The cover plate screws upon the central part of their mining transit, which was designed to carry the auxiliary telescope when used as a top telescope. The upper plate carries the polar axis around, which moves a socket controlled by a clamp and a tangent screw carrying a level and supporting an arm in which revolves the declination axis. The screw at the end of the declination axis serves to connect firmly the solar telescope with the declination axis, which latter permits the telescope to be pointed and clamped so that it may revolve in the declination circle whether above or below the equator. The declination axis is held to the arm by a socket. The motion of the declination axis and solar telescope is arrested by a nut between the head of the screw and the arm, and adjusted by the two vertical opposing screws.

To convert the mining transit into an instrument providing equatorial motion for the auxiliary telescope, screw the adapter to the upright post, designed for the top telescope, and screw in place the counterpoise; connect the auxiliary telescope with the declination axis, and the instrument is ready for service. To make an observation for meridian, assuming that the latitude of the place is known, and the sun's declination and refraction is correctly ascertained for the day and hour, level the vernier plate, and the main telescope, with both circles set at zero. Adjust the polar axis of the adapter to be vertical, by using its level and leveling screws. Set the auxiliary telescope in the vertical plane of the main telescope by bisecting some distant object. Elevate or depress the main telescope, as the case may be, by using the vertical circle, to an angle with the horizon equal to the angle of declination and refraction for the time of observation. Use the striding level and level the auxiliary telescope, thus causing the two telescopes to represent the angle between the equatorial and the declination circle. If now the true meridian were known and the main telescope pointed in that plane, it would only be necessary to elevate the telescope at an angle above the horizon equal to the co-latitude of the place of observation to make it parallel to the earth's equator and to bisect the equatorial circle. The polar axis of the adapter will then point to the pole of the celestial sphere and the auxiliary telescope is properly set to follow the declination circle. Trial will demonstrate that if the main telescope is moved from the plane of the meridian the auxiliary telescope is no longer adjusted to revolve in the declination circle. The line of the true meridian being sought and not known, the observer elevates the main telescope at an angle above the horizon equal to the co-latitude of the place of observation, loosens the clamp of lower plate and the clamp of polar axis socket and then moves the lower plate about its vertical center, and the auxiliary telescope about the polar axis, until the latter bisects the disk of the sun. Trial will demonstrate that when the solar telescope is pointed towards the sun and follows its course the main telescope remains stationary. If it is clamped there it may be known to bisect the meridian in the equatorial circle. By releasing the clamp of the main telescope and again leveling the main telescope, it will bisect the meridian in the plane of the horizon. Unclamp the upper plate of the transit and the azimuth of any distant object from the place of observation may be measured by reading the vernier of horizontal circle.

The equatorial adapter is in part constructed of aluminum and only weighs 9 oz., so that by careful manipulation the counterpoise of the top telescope of the mining transit will be found sufficient to balance it. The auxiliary telescope is provided with a prism and colored glass shades to facilitate solar observations.

In furnishing engineers and surveyors with this device Messrs. C. L. Berger & Sons believe that it will appeal to them from its simplicity of construction, its light weight, and its general effectiveness in accomplishing a desired end converting a mining transit into an astronomical instrument.

AN ONTARIO EXHIBIT FOR PARIS.

During the past summer the Bureau of Mines has forwarded representative samples of ore from all the working mines in Ontario to the Geological Survey Department at Ottawa, for shipment to the Paris Exposition to be held in 1900. The samples consist of free-milling gold ores from the various mines and developed prospects in the Rat Portage, Seine River, Shoal Lake, Wabigoon and Manitou Districts; also from the Michipicoten, Wahnapitae and North Hastings Districts. Iron ores, magnetites, and hematites from the Mattawin and Atikokan ranges, which will shortly be tapped by the Ontario & Rainy River Railway under construction, together with hematite ores from the deposits being opened up in the Michipicoten District by the Algoma Central Railway, will form a collection of interest. Eastern Ontario also sends a few hematites and magnetites. The Sudbury District is represented by samples of nickel-copper bearing pyrrhotites from the extensive deposits which have been worked for several years by the Canadian Copper Company, the Vivian Company of Swansea, and other concerns.

Probably the most attractive samples in the collection are the peacock copper ores from the Parry Sound District which are rich in copper. carrying small gold values.

Eastern Ontario is represented by samples from the following working mines or prospects so far opened up as to be called mines: Arsenical gold ores, partially free-milling, from the Deloro Mine, Gatling, the Diamond Mine, the James property in North Hastings; free-milling gold ores from the Belmont Mine in Peterboro County, the Boerth Mine and Little Doris in Frontenac County, the Craig, Crescent, Landenberger and other properties in North Hastings. Hematite iron ores from the Wallbridge, Welsh, Cook and St. Charles Mines in North Hastings, also from the large deposits at Calabogie and Wilbur in Frontenac County. Magnetic iron ores from the Dufferin, Coe Hill and Irondale deposits in North Hastings, also from the Bedford and Robertsville Mines in Frontenac. The collection also includes zinc blende from the Hogan Mine at Millbridge, galena from the Hollindia and tetrahedrite copper ore from the Chisholm Mine near Cloyne, upon which extensive exploratory work is being done by New York capitalists.

The non-metalliferous minerals of commercial value are also represented by rough and thumb-dressed amber mica from Frontenac County, where seven deposits are being worked at present. Other economic minerals such as phosphate, felspar, barite and graphite, are included.

The corundum deposits in North Hastings are represented by a series of specimens prepared by W. G. Miller, professor of geology, Queen's University, Kingston, who conducted the exploratory survey for the Ontario Government. These samples range from almost pure corundum as found in Carlow to the low grade running about 12 per cent. corundum.

With the specimens of crude ore there is a series of concentration products of various grades, being the results of the treatment of 18 tons of ore in the laboratory of the Kingston School of Mines.

Building stones in Eastern Ontario are represented by the Crookston and Point Anne quarries near Belleville. The sample from the latter