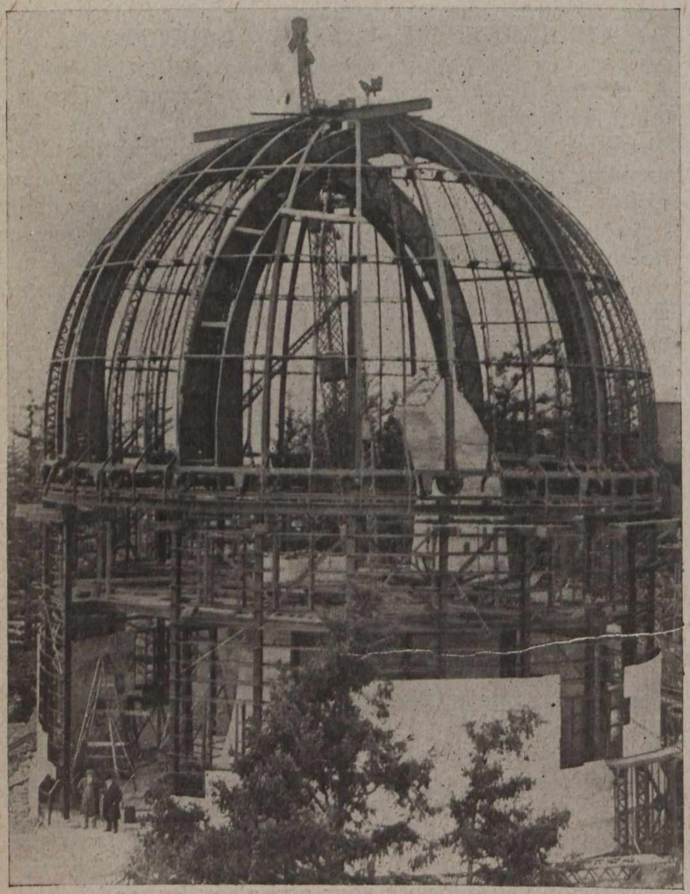
THE GREAT DOMINION TELESCOPE.

UNDER the above heading, *The Canadian Engineer* published, last week, a brief description of the 72-inch reflecting telescope installation at Victoria, B.C. In an article prepared for the July 20th issue of Canadian Machinery, through whose courtesy we reproduce the four accompanying illustrations, Prof. J. S. Plaskett, of the Dominion Astronomical Branch, who will be in charge of the Victoria Observatory, gives some further interesting details from which the following notes have been abstracted:—

The New Observatory.—The road to the summit of Saamih Hill, the site of the new observatory, which is about seven miles north of Victoria, B.C., was completed

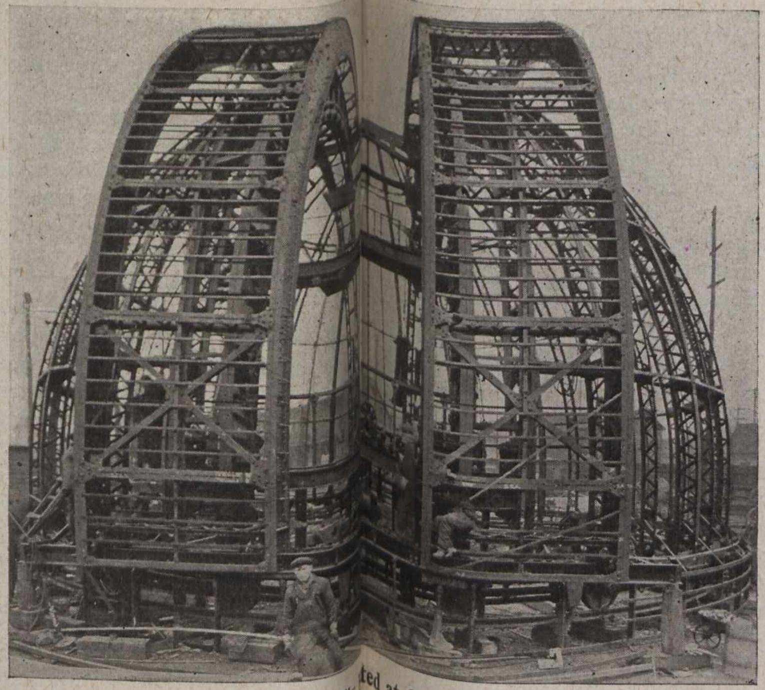


Dome of Telescope Building, May 5th, 1916.

early in the spring of 1915, by the government of British Columbia, who contributed $10,000 towards the purchase of the site and had agreed to build a road from the present main road to the summit of the hill where the observatory building was to be located. Although the first source of water supply was a failure, this important question is now satisfactorily solved.

The concrete pier for carrying the telescope and the surrounding circular steel building whose wall serves to support the dome, was commenced last summer and is now completed except for some minor details which were delayed awaiting arrival of the telescope. One of the essential features about the building and dome is that they are entirely of steel construction, which allows them to rapidly assume the air temperature. They are provided with double walls and a system of louvres at the top of the dome, ensuring a thorough circulation of the air and the maintenance of the interior at the shade temperature.

A contract for the 66-foot revolving dome, which, in the case of a large reflecting telescope, is a most important part of the equipment, as it has to be provided with many accessories required in the handling of and observation with the telescope, was awarded in May, 1915, to the Warner & Swasey Co., so that dome and telescope were designed together, and should work in proper relation to one another. This dome is now being erected on its building at the observatory site, and although it has not yet been operated, its temporary erection at Cleveland sufficed to show that it will be the most complete and convenient in every operating detail of any ever built.



Dome Temporarily Erected at Cleveland, Ohio.

One of the observer's houses is completed, but none of the other buildings required have yet been begun.

The Telescope.—The telescope, whose general form follows the English type of equatorial mounting, has a long polar axis supported at its north and south ends by bearings, in a direction parallel to the earth's axis. The declination axis, to which the tube is attached at right angles, passes rectangularly through the central cubical portion of the polar axis, the weight of the tube on one side being counterpoised by the declination gearing and housing on the other.

The polar axis is composed of three sections, all of the best steel castings, firmly bolted together, namely, the central cubical section above mentioned and north and south conical tubular sections. It is nearly 23 feet long and weighs about 10 tons. The declination axis is a steel forging, 5¼ tons in weight, 14½ ft. long by 15½ ins. in diameter, with a flange 41 ins. in diameter by 4 ins. thick, to which the tube is bolted. The tube is also in three sections, the central cylindrical steel castings, about 7½ ft. in diameter by 6 ft. long, weighing 7 tons, being attached to the flange of declination axis; to the bottom flange of this central section is bolted the steel mirror cell, weighing with mirror counterpoises and mirror, 6 tons; while to its upper end is firmly attached the skeleton tube, a beautifully designed and extremely rigid piece of structural work, upwards of 23 ft. long by 7½ ft. in diameter, and weighing, with attachments, about two tons.

Structural Steel Work of Telescope Building.

Spectograph and Visual Appliances.—Below the mirror cell the spectograph and visual appliances for use at the Cassegrain focus are attached. At the upper end of the skeleton tube an exceedingly ingenious arrangement, avoiding the use of several heavy and awkward extensions of the skeleton tube, which were necessary with all previous reflectors, enables either the prime focus, Newtonian or Cassegrain attachments to be used at will and with the minimum of trouble and delay in changing from one to the other.

The driving clock, similar in design to that which has been so successful in the Lick and Yerkes telescopes, moves the telescope in right ascension by means of an accurately cut worm-wheel 9 feet in diameter, mounted on the polar axis by ball and ball thrust bearings and clamped to it when required by an electric motor.

Telescope Electrically Operated.—The telescope is moved from one position to another and set and guided wholly by electric power, no less than seven motors besides several solenoids and magnetic clutches being required for these motions. The quick-motion motors move the telescope at the rate of 45 degrees per minute, one revolution in 8 minutes, in both co-ordinates. The slow motions have two speeds, a fast one for fine setting at the rate of one revolution in 36 hours, and a slow one for guiding, one revolution in 720 hours or 30 days. With the Cassegrain focal length of 108 ft., the guiding speed of the star image at the focal plane is 1/300th in. per sec. or 1/5th in. per min.

The electric wiring and control systems have been carefully worked out, all sliding brush contacts avoided, and the whole system installed in a permanent and yet easily accessible form, giving the maximum of convenience in operation with the minimum of attention and repair. The method of operation will be as follows: An operator on the observing floor controls the quick motion and clamps of the telescope and the rotation of the dome from the most convenient of the switchboards, one on the east and the other on the west side of the south pier, the telescope being quickly set approximately to the tabular position of the desired object by the sideral and declination setting circles. The observer at either the upper or lower ends of the tube can clamp or unclamp the telescope, make the fine settings and guide by means of push buttons located on a small keyboard which he can carry around with him or attach to any convenient place.

High-grade Workmanship.—The mechanical workmanship throughout is of the very highest grade, such indeed being necessary for the proper performance of the required operations. The principal mechanical feature wherein it differs from other telescope mountings is in the main bearings, in the skeleton tube, in the accurate cutting of the driving worm wheel and in the extensive use of steel castings for the principal parts.

It has always been considered necessary hitherto by astronomers to have the alignment or collimation of the polar and declination axes determined by cylindrical journals and bearings and to reduce the friction on these

Telescope Pier and Telescope Building Foundation.

sliding contacts by ball or roller relieving devices. The perfection of modern ball bearings has rendered this arrangement unnecessary and the main bearings are wholly of the self-aligning ball form, the S.K.F. Swedish bearing. The friction is thus much reduced and a very slight pressure on the tube is sufficient to set it in motion. The amount of current consumed in moving the telescope in quick motion would only be sufficient to light one 16-c.p. incandescent lamp.

The Skeleton Tube.—The essential features about the skeleton tube are its lightness, its great stiffness and the new method of interchanging the attachments at the upper end. It is built up of ordinary structural members, the stiffness being given by diagonal steel tension rods which are screwed up sufficiently tight so that they are always under tension, even the lower set when the tube is horizontal. The interchanging of the Newtonian & Cassegrain mirrors at the upper end of this tube, previously