

A GREAT SIXTY-INCH REFLECTOR WHICH PHOTOGRAPHS THE STARS

By Mary Proctor.

At last one of my dreams has been realized, for I have seen the great solar observatory, which has been erected on the top of Mount Wilson. Like the Druids of old who tramped along the roadway leading to the magic circle of stones at Stonehenge, we trudged wearily up the narrow trail, nine miles in length, in order to see the great sun temple of modern days, which is situated at an elevation of 5,886 feet above the level of the surrounding plain.

Our party, consisting of four, started at 6 o'clock on the morning of April 18, although it would have been wiser had we begun the ascent at an earlier hour. We found it fairly easy at first, with a good, broad trail sheltered by rocks and overhanging verdure, but as soon as we emerged from this shadowy retreat the trail became more rugged, and was at times exposed to the fierce glare of sunlight.

We were cheered occasionally by messages inscribed on huge boulders with green paint, such as "Two miles to Orchard Camp," "Stop here for a lunch and cup of coffee." Later on, it was, "One mile to Orchard Camp," and, finally, a huge stone with the suggestive motto: "Now smile," for we were within a short distance of what might be termed the half-way house to the summit of the mountain.

We did smile, under the mistaken impression that Orchard Camp was nestled comparatively close to the Observatory, but soon discovered our mistake when we reached that portion of the trail. The cordial welcome of the proprietor of the "hotel" served somewhat to soften the blow, but even so we were overcome when we learned that we had only traversed three miles of the way, and the best part of the trail as far as grading and steepness were concerned.

From now on, we were told, the grade would be far steeper, so we thought it advisable to rest a while before we continued on our way. It was well we did so, for the ascent was more difficult, and with the hot sun beating down on the trail though it was still only 8 o'clock in the morning, our task was an arduous one before we finally reached the summit.

Stopping occasionally for a brief rest, we saw that a transformation scene was gradually taking place in the San Gabriel Valley below. Its outlines were partially hidden beneath a sea of clouds glistening in the sunlight, forming a marvelous contrast with the deep blue of the sky overhead. Far, far away the distant mountains were outlined in a soft, misty haze, blending with the gray tints of the clouds in their vicinity.

Looking upward we obtained our first glimpse of the observatory, gleaming white against the pines and surrounding shrubbery, and we realized that we were at last nearing our destination. Following the winding trail up to the summit, we finally reached the buildings com-

prising the greatest solar observatory in the world.

Owing to the kindness of Prof. Walter S. Adams, we were allowed to enter the dome, which contains the wonderful sixty-inch reflector with which such wonderful photographs have been taken of the Milky Way and nebulae, those great clouds of glowing gas from which stars were originally evolved. These photographs, which are exhibited in the Observatory Museum, are of exquisite sharpness and perfection of detail, fulfilling the highest expectations of the Director, Prof. G. E. Hale. The sixty-inch reflector was erected by the Carnegie Institution of Washington, D. C., and located at Mount Wilson, in a district exempt from cyclones and hurricanes, situated above the fogs, with an agreeable climate and an atmosphere wonderfully clear from disturbance.

Becoming profoundly impressed with the work accomplished by the sixty-inch reflector in disclosing the wonders of the heavens, Mr. John Daggett Hooker, one of the most energetic, public-spirited, and prosperous citizens of Los Angeles, conceived the idea of presenting the sum of \$50,000 for the erection of a still larger reflector. If a sixty-inch reflector will accomplish so much, what will a 100-inch speculum disclose?

Wonderful Instrument Erected by the Carnegie Institution at Mount Wilson, California.

The construction of such an instrument would be the work of a comparatively short time, and a vigorous constitution and years but little past the middle age gave promise that Mr. Hooker might live to explore, through a telescope of this magnitude, the realms far beyond what we now call the outer space. Mr. Hooker entered into communication with the Carnegie Institution, at Washington, and offered to give the sum of \$50,000 for the manufacture of a reflector of that size. The proposition was accepted, and there was no delay in carrying on the work.

The order for the casting of the glass disk was given in September, 1906, to the French plate-glass companies at St. Gobain, France, and during the year between the Spring of 1907 and June, 1908, six or eight castings were made. On Dec. 2, 1908, the perfect disk arrived from France and was deposited in the Hooker Building at Pasadena, but upon being unpacked it

was immediately seen that the lens was imperfect.

A second attempt was made, and, although not a perfect success, it is hoped by means of grinding and polishing that the disk may be rendered fit for its important task of photographing the wonders of the star depths.

This mammoth lens is about 18 inches thick, and weighs over four tons, and we saw it at the laboratory at Pasadena where it is now undergoing the polishing process. The task of conveying it up the trail and installing it within the Dome, which is to be its abiding place, is not the least of the difficulties to be surmounted before it starts on its labors. The famous trail along which the 60-inch reflector was taken, cost twenty-five thousand dollars in the process of widening.

The mirror was removed on a huge, long, red automobile car, run by a gasoline engine of 40 horse-power, connected

with a dynamo, which generated the electric current.

Turning our attention from the great reflector, we were allowed the unusual privilege of visiting the canvas-covered building, containing the 5-foot spectroheliograph of the Snow telescope, with which over one thousand photographs of the sun were taken during the year 1909. We were enabled to watch the process of the sun having its picture taken, and later obtained a glimpse of the rainbow-colored band of light, which reveals such marvellous facts concerning the constitution of the sun. These rainbow tinted bands of light which bridge the distance between the sun and the shores of our tiny isle in space, are the special study of the astronomers at the Mount Wilson Observatory.

In learning something of the origin, nature, development, and destiny of our own particular sun, we are becoming better acquainted with the peculiarities of

other suns, young and old, great, and small, which glitter by millions in the depths of space. With the spectroscope, spectrograph, and spectroheliograph at Mount Wilson, the astronomer detects the nature of the substances contained in the sun and stars, and ascertains the character of the changes going on in these bodies.

Fain would we have lingered on the summit of Mount Wilson until the next day, so as to watch the sun rise, but we had made arrangements to return to Los Angeles that same evening. Retracing our steps downward was a comparatively easy matter, more deftly accomplished by running rather than walking.

In two hours we reached the Orchard Camp, lingering there for a refreshing cup of coffee and sandwiches. The proprietor of the hotel urged us to hasten on our way, as it was growing late and he feared we might be overtaken by the darkness. He also insisted upon giving us a candle to light us on our way, though it was bright daylight at the time and only 6 o'clock, but later on we were sincerely grateful for his gift, especially during the latter part of our downward trip.

Leaving Orchard Camp we hurried down the trail, running the greater part of the

way, and when presently we observed the evening star glowing brightly in the sky we knew it boded no good, for it heralded the approach of the darkness of night, which soon enveloped the valley like a shroud. By the fitful gleam of candle light we managed to find our way along the trail. A misstep would surely have been fatal, plunging us into the canyon below.

The roar of the cataract, and the remembrance of the steep cliffs and jagged precipices, which would have been our final resting place, made us specially careful. Occasionally we were compelled to rest a while, for we were footsore and weary after our long tramp. Looking down into the depths of the canyon we felt anything but reassured, so turning our gaze in the direction of the stars, which now glowed with unwonted splendor overhead, we took comfort in their presence.

Finally we came in sight of the lights of the valley of Pasadena, more welcome at that time than the brightest constellation in the sky, and soon reached the end of the trail in safety.

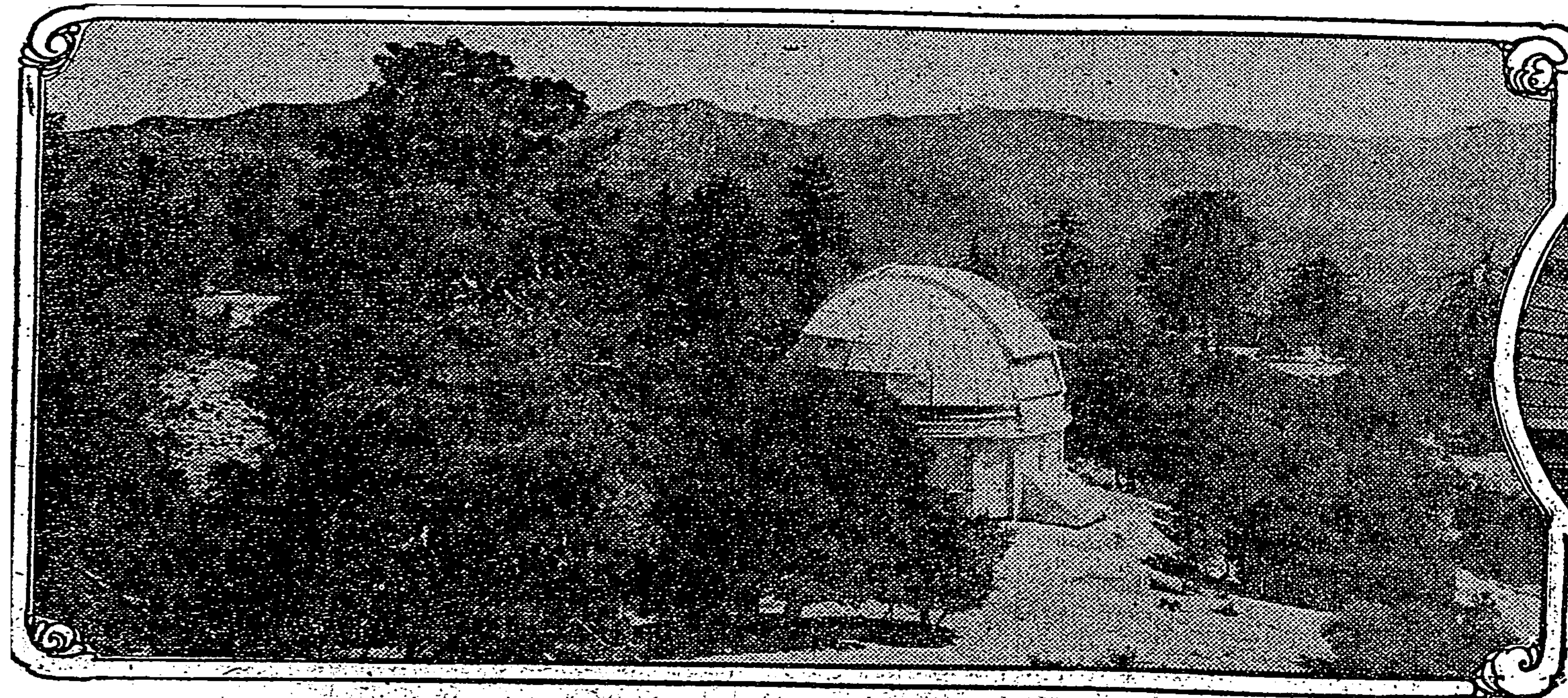
A few evenings later the writer had an interview with John Daggett Hooker, the generous donor of funds for the new reflector, and he showed us some of the photographs taken at Mount Wilson, by means of an ingenious device he has invented, and which he terms an electro-transparency.

It is illuminated with sixteen electric lights, which shine through opalescent glass. In front of this is placed one of the photographs taken with the 60-inch reflector, and the bright light endows the starlike points besmearing the photographic plate with a glow somewhat resembling their own inherent light. This creates the illusion that one is in very truth gazing at the stars themselves.

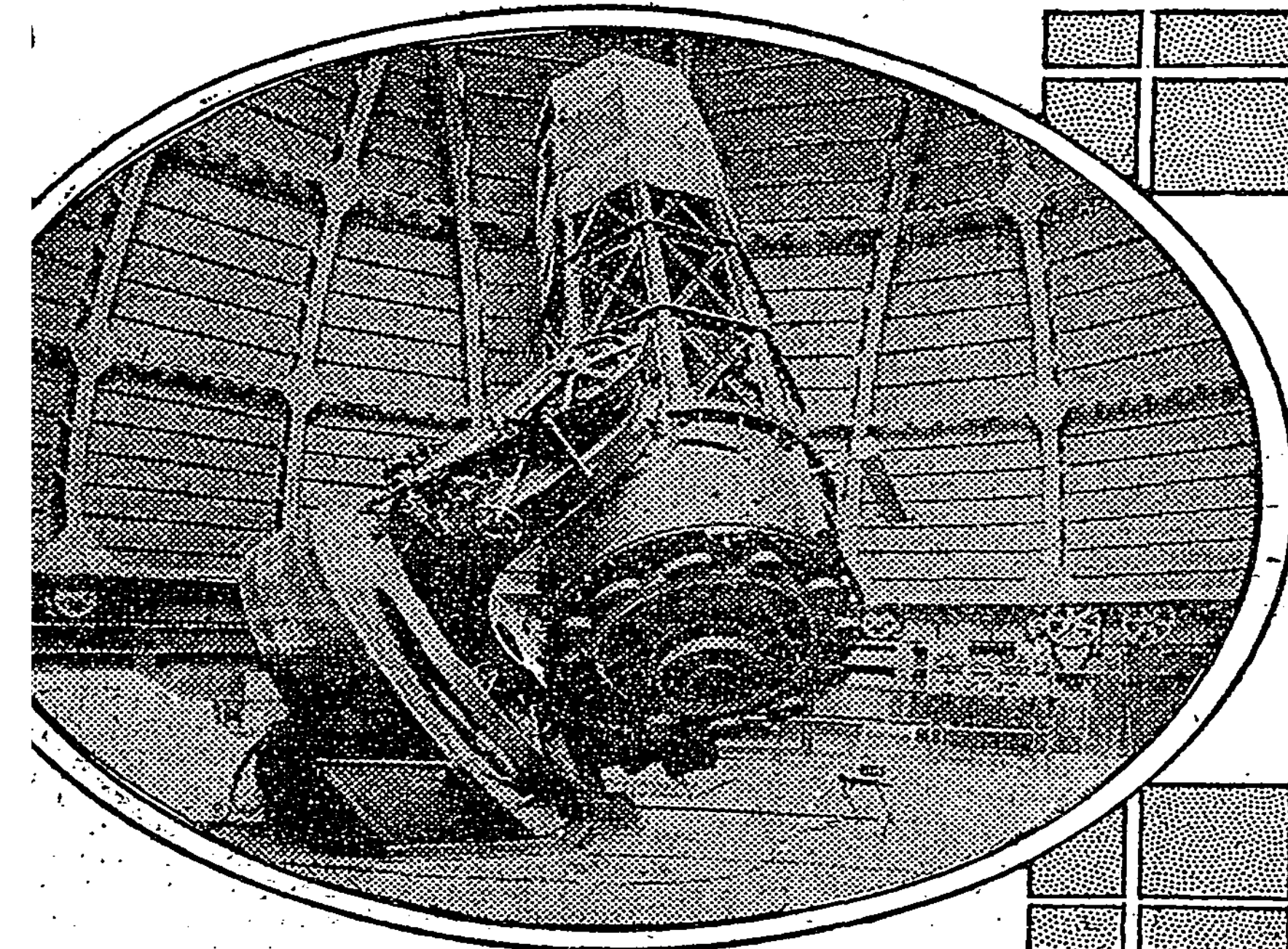
Regions of lucid matter taking form, Brushes of fire, hazy gleams, clusters and beds of worlds, And beelike swarms of suns and starry streams.

No longer is it necessary for the student to endure the discomforts of an all-night watch with the telescope, but by means of photography the wonders of the heavens can be enjoyed at leisure when and where we please. It was the examination of these photographs, revealing the power of the 60-inch reflector, which filled Mr. Hooker with a desire to have a larger reflector made, in which still more stars may be shown, and it is his fervent hope that some day soon his dream may be realized.

From early boyhood, when he was awakened from sleep one night by his father to look at a total eclipse of the moon, he has been an enthusiast regarding astronomy, and now by means of the new reflector in course of construction he hopes that it may be possible to explore new realms far beyond what we now know of the borderland of the stellar universe.



Dome of the 60-Inch Reflecting Telescope at Mount Wilson.



Mounting of the 60-Inch Telescope.