SCIENCE.

FRIDAY, NOVEMBER 9, 1883.

THE LICK TRUST.

It will be remembered that a certain portion of the large estate of Mr. Lick was to be devoted to the uses of science. A specific sum of seven hundred thousand dollars was to be expended in the purchase of the most powerful telescope attainable, and in the construction of an observatory on Mount Hamilton; and the unexpended balance of this sum was to constitute a permanent fund for the maintenance of the observatory. Many specific bequests were made for other purposes not scientific; and after all these specific sums had been paid, it was provided that the sum remaining over should be divided between the Society of pioneers of California and the California academy of sciences. Science is interested, also, in this last bequest. It will be remembered that many changes of trustees, and also of the form of the gift, were made in the early years of the trust; and that vexatious suits were entered by supposed heirs of Mr. Lick, which were successively decided by the courts. At present a definite construction of the deed of trust has been made by the supreme court of California, from which there is naturally no appeal; and the trustees are acting under this construction.

During the period of years over which the preliminary litigation extended, a great shrinkage in the values of real estate took place in California, as well as elsewhere in the United States. At the end of these litigations, the trustees found themselves in control of much valuable property, which could be sold only at a great loss. If it had been sold at that time, there would have been no money left to divide between the pioneers and the academy; and not only this, but some of the specific bequests would have remained unfulfilled: it was therefore the policy of the trustees to manage the estate carefully, and to sell only to advantage. In this way only, would the residuary legatees receive any considerable sum. The estate has certainly been well managed: for from Dec. 1, 1876, to Oct. 1, 1883, the aggregate net profits have been $453,458, or over $66,000 per year. There was no surplus to divide in 1876; while, at the present time, some $192,000 remains over, free of all specific bequests. It therefore would appear that the trustees have deserved well of science for their careful administration of the trust.

Their policy has clearly been wise, when looked at without prejudice: but it has not been acceptable to the residuary legatees, since they have not yet received any immediate benefit; nor can they, under the decision of the court, until the whole estate is settled, and all specific bequests are fulfilled.

This is no doubt annoying to the academy of sciences, which has so many useful purposes which could be served by an increased income. It is specially annoying to the pioneers, who all came to California in 1849–50, and who, therefore, are all men in middle life. When the French countess heard of the Montgolfiers' balloon ascension, she exclaimed that these men would certainly invent the art of never dying; but she added pensively, 'It will be when I am dead.' This is the very natural attitude of the pioneers; and it is this that has led to a recent savage attack on the trustees, reports of which have appeared in the San Francisco and other papers. These attacks have been directed against the whole action of the trustees, without discrimination. It is, however, clear, that the actions of the trustees must be considered in two ways. Most of their official acts have been done under specific directions of the courts of law. These acts are much complained of by the residuary legatees: but it is obvious that such complaints are idle; for, if the trustees had not obeyed the orders of the courts, they would

have been long since expelled from their responsible positions. The remaining acts complained of have been done in pursuance of the general policy just outlined. It seems equally clear that these complaints, though natural, are unjust. The residuary legatees have now $192,000 to divide. It is not long since they had nothing. Science is certainly grateful to the trustees, since their economical policy has already saved a large sum which will eventually go to making the California academy of sciences more powerful and useful than it now is.

With regard to the other bequest in which science is interested, — namely, the Lick observatory, — there is every reason to be extremely grateful to the trustees for their wise administration of the trust.

Their economy has certainly been remarkable. They have expended on the observatory to Oct. 1, 1883, $154,527.98; and they have remaining $545,472.02. This $155,000 has done the following things: the top of a bleak mountain four thousand feet above the sea, and twenty-seven miles from a town, has been levelled off so as to give a sufficient area for the buildings (forty thousand tons of rock have been removed for this purpose alone); brick enough to complete the whole of the buildings has been made on the side of the mountain, and delivered at the top, at a total cost less than the price of hauling the same amount from the nearest town; a handsome and well-built main building is now nearly finished (the large dome alone remains; a small dome, containing a very perfect twelve-inch equatorial by Clark, has been in use since November, 1881); a four-inch transit instrument, in a convenient house, is in complete working-order; a photoheliograph in a permanent house has been in use since December, 1882; the house for the meridian circle is begun; the meridian circle is half paid for, and a payment has been made on the large telescope. This is the work which is to be seen on the mountain-top proper. Just below this are the houses for the workmen, shops, stables, etc., all in good condition, and a very complete system of water-supply in full working-order.

It will appear to any competent person that this work has been done thoroughly, and that it has been done economically. At the same rate of expenditure, at least $300,000 will remain as a permanent fund for the support of the observatory.

It therefore appears that the trustees have deserved well of science in their administration of their trust, not only in regard to the California academy of sciences, but also in relation to the Lick observatory; and it should be the desire of all interested in the administration of this trust to strengthen the hands of the trustees in the continuance of their wise policy.

WHIRLWINDS, CYCLONES, AND TORNADOES.[1] — II.

The further growth of the desert-whirl may be briefly described. The air standing quietly on a flat, dry surface allows the lower strata to be quickly warmed to a high temperature. If the air were in motion, no part of it would remain long enough close to the ground to be greatly warmed; if the surface were not flat, the lower air would flow up the slopes as soon as it was a little heated, and not wait to acquire a high temperature; if the surface were wet, much of the sun's heat would be occupied in evaporating the water (as will be explained below), and would so be lost to the lower air: it is therefore only in calm weather, on a desert plain, that the sun can succeed in warming the lower air to excess, and so produce a very unstable equilibrium, and a strong updraught when the upsetting begins. The longer the delay before the overturning, the more heat-energy is accumulated, and the more violent the motion when it begins. The lower air rises at some point against the oppression of the upper layers. The surrounding warm air flows in from all sides toward this central point, and follows the leader. Soon the motion becomes general and lively, dust and sand are blown along toward the centre, lifted and carried aloft with the ascending air in its rapidly rising current, and then the whirling column becomes visible. When thus established, the increased velocity and the rotary motion of the air near the centre are constant characteristics of the upsetting. Thirty

[1] Continued from No. 39.