

The Chairman : Do you mean a surface-slip?

613. *Mr. Blair.*] No, from the slip which has appeared behind. I wish Mr. Hay to give us his view as to how that slip would act, and what are his reasons for thinking that the slip has not so acted—that the subsidence is due just to settlement and not to a slip?—Behind the building we have some 95ft. of level ground, and on the rising land behind that there is a little slip of rather small extent. I assume that slip to have extended to the depth of the foundations of the building—12ft. deep. On that supposition you have a pressure of 3 tons per lineal foot.

614. *The Chairman.*] You mean on the vertical 12ft. of earth?—That pressure, before it can affect the building, has to shift the rectangular prism of earth in front of it, 95ft. by 12ft. Assuming the same angle of repose in the two cases, you would have frictional resistance along that 95ft. amounting to over 20 tons; so that you have 3 tons to overcome 20 tons before the building can be touched. For this reason it is evident, I think, that it can have had no effect on the building; also, the slip is very much less than I have assumed. Again, the slip might have bulged the earth up; but it has not been large enough to do this. Then, again, the pressure of the earth that abuts directly on the back wall, according to the best rule for estimating such pressure, is only about $1\frac{1}{2}$ tons per lineal foot along the back wall, and that is not above a fourth or a fifth part of what is required to push the structure bodily through the earth, and to overcome the friction of the concrete on the earth; so that here again you have no power adequate to account for what has taken place. And, again, supposing it had been possible, the straining of the building is not such as would arise from such a cause. You would have had the ceiling and the lower floor bent, as an ordinary beam would bend, into a circular form, and, instead of the cracks in the ceiling being parallel, as we have shown them, the direction would have been reversed at the two ends—the ceilings would have been cracked across the lines of tension, and we should thus have had quite a different set of ceiling-cracks from those I have shown. The above is supposing the slip was acting on the building at right angles to the back wall. Now, suppose we had a slip coming diagonally, we should have had this northern portion pulled towards the north, and these ceiling-cracks would have been reversed, because the opposite diagonals of the day-rooms and cells must have been lengthened. Of course, there is another slip you can take into account—that is, the whole of the north wing going bodily forward—and that would give rise to another set of cracks in the back wall and cracks in the front wall—cracks which do not exist, and of which there is not the slightest sign in any way; and it is such an assumption to make that it has only to be mentioned to refute itself. Then, again, as I said before, these partition-walls of the cellars and the front walls are tumbling away from the back wall or walls; that is, of course, the only supposition to make, because if the back concrete wall has moved uphill it has overcome the earth-pressure behind, which would at least take 15 tons per lineal foot. Of course the first assumption is the simplest one; the second one is improbable or impossible.

615. *Mr. Blair.*] Then you contend that the front walls have gone away from the back?—The front walls have gone away from the back walls.

616. Or the back wall has gone away from the front walls?—The front walls have gone away from the back wall, so far as there has been any movement. The back wall remains where it was.

617. It is impossible for it to?—It is impossible for it to go back.

618. Consequently, the space between the back wall and the front wall must have been caused by a movement of the front wall?—Yes.

619. Mr. Hay can give us evidence as to the water in the pits that were sunk—as to what he saw. Was the water running into those pits clean or dirty?—It was clean, running from the foundation. Evidently a good few voids in the concrete were at that time pretty full of water, for in several pits we took the water out by the bucketful. That is, at both ends of the colonnade and along the south wall of the north wing the pits were all very wet, and at the point marked *r*, at the north wall of the north wing, there was a very wet place. These pits were opened again during my last visit, on the 4th of this month, and you opened them again when you were out at the asylum, and there was very much less water in them; in fact, they were comparatively dry—some of them—compared to what they were when I saw them. On that account I think my first visit about cleared the concrete of water.

620. *The Chairman.*] You mentioned that you plumbed the walls, and give the result of your measurement?—Yes.

621. Could you describe how you plumbed the walls—in what manner?—I plumbed with a very heavy plummet and a fine copper wire. The string was fastened round a rule 6in. from the end, and held at the top of the wall. We measured various points round the wall, and Mr. Hunter was always at the plummet. We were very careful, and wherever there was any oscillation the measurement was stopped till the plummet was again steady.

622. I suppose you did not continue your observations when it was blowing—in windy weather. You are satisfied that your measurements are correct?—Perfectly satisfied that the measurements are correct. The north wall was taken in a different manner—I think even more accurately than plumbing. We plumbed down the two ends very carefully, put in spikes, and wherever the plumb-line hit these spikes we marked points; and afterwards wires were stretched along the wall, and we measured it horizontally.

623. You mentioned that you had measured the concrete on the floor of the ambulatory, and described the concrete as having been built at different depths?—Yes.

624. Do you know if that concrete had been either altered or replaced since the building has been occupied, or if it is the original concrete?—I could not say. Mr. Hunter would tell that. I simply took the concrete as it stands. There are no cracks to account for the difference of position.

625. You referred to the carrying-powers of that sort of foundation: what did you allow per square foot?—I did not allow anything, I simply compared the two foundations.

626. On Rankin's rules?—Taking Rankin's rule that the carrying-power is proportional to the depth of the foundation below the surface.