far greater values than those given in his paper (though the writer disagrees with the procedure by which Dr. Eddy arrives at these high values).

In spite of this, to state that they do not need to be taken into consideration and resisted by reinforcement is rather strange. It must be granted to Dr. Eddy that so far no flat slab in reinforced concrete has failed on account of lack of this reinforcement, but at the same time, no well-trained structural engineer would consider this circumstance to be a proof that this reinforcement was unnecessary and neither is any proof contained in the fact that flat slabs, designed without this reinforcement, are able "to carry twice the live load without failure, and have done this for months at a time without signs of distress, a kind of test to which no other form of structure could be safely subjected." These last lines, quoted from Dr. Eddy's discussion above, together with the following lines

> "It may be an open question as to what should be regarded as a sufficient and satisfactory test of a given type of structure. But it would seem as though one which no other type of structure could equal should be so regarded."

certainly form the most astonishing engineering statement that the writer has ever seen in print.

First of all, it is not sufficient for an engineer to know that a structure is still standing carrying twice the live load; the important thing to know is how much greater load it would be able to carry without failing. Furthermore, the writer would like to show Dr. Eddy that there is nothing extraordinary when a flat slab carries twice the live load for such a period as "months at a time." That load is only a comparatively small percentage of what it ought to be able to carry before failing. Dr. Eddy might, perhaps, know that numerous very careful experiments have shown that reinforced concrete slabs, reinforced with the usual percentage and kind of steel, are able to carry at least three times the total load (live + dead) for which it has been calculated. The load Dr. Eddy is so proud of is

$$P = 2 \times \textit{live load} + 1 \times \textit{dead load};$$

or, $P = 2 \times p + 1 \times g;$

but it should be possible to load these slabs—of course only when properly designed—with,

$$Q = 3 \times p + 3 \times g.$$

Taking $g = \frac{1}{2} p$, we obtain,

$$P = 2.5\, p,$$

and, $Q = 4.5\, p;$

thus P is only about 55% of what a correctly reinforced flat slab should carry before failing.

Dr. Eddy's statement that "no other form of structure could be safely subjected to a test load equal to twice the live load" is, in the writer's knowledge, incorrect; it seems to indicate that Dr. Eddy's design would not be effective beyond that test load. A remedy for this could no doubt be effected if Dr. Eddy were to adopt the reinforcement as advised in the writer's paper, and take the positive bending moment at the centre of the slab, $\frac{Wl}{23}$, as derived in the paper, to be about ——, which is also close to the bending moment, given in the new building regulations for the city of Cleveland. The writer noticed on page 878, Vol. 24, of this paper that Dr. Eddy figures with $\frac{Wl}{50}$. It is also stated "that Mr. Turner's design is extremely light and seems somewhat daring when compared with designs made by other engineers.

(2) The test loading, conducted by Prof. Talbot, that the writer especially had in mind, was that in the Deere and Webber building, described fully in Bulletin 64 of the University of Illinois, published January, 1913, (Tests of Reinforced Concrete Buildings Under Load, page 88 and following). This test loading appears to the writer to have been carried through in a careful way and to be of unusual importance as it has been conducted in an actual building with almost the same exactness in studying the results as can be obtained in a laboratory test.

The floors were calculated for 225 lbs. for sq. ft.; at a test load of 350 lbs. per sq. ft. cracks appeared along the sides of the panels which plainly indicated the negative bending moments. These cracks are plotted in Fig. 75 of the Bulletin.

In conclusion, the writer would quote what Prof. Talbot says with regard to these cracks: "Another set of cracks (besides those about the column heads) which developed only under the maximum load of 350 lbs. per sq. ft. is significant. These cracks ran along the centre line of the cross bands, being easily traced in the portion about half way between columns, growing fainter towards the columns, and disappearing entirely in most cases before reaching the crack over the edge of the capital. Evidently there is negative bending moment at these sections. These cracks, we believe, had not been observed before, probably because other building tests have not been so extensive, and because cracks have not ordinarily been very carefully observed."

V. J. ELMONT.

Montreal, Que., Oct. 17th, 1913.

WIRELESS TELEPHONY IN BRITISH MINE.

An invention of Josef Heinrich Reineke, a system of wireless telephony, which has been installed in the Dinnington colliery, near Rotheram, has been found to give excellent results. The invention is used widely in Germany; and now that the British home office order for the installation of underground telephones in mines has come into force, an English company has been formed to work the patent, and the Postmaster's license to use the patent has been granted to W. Holmes, M.I.E.E. Its chief merit is that signalling can take place through solid rock over a distance of at least one mile. At the Dinnington colliery, stationary instruments are fixed at given points in the mine, and each station can communicate with any other station. In addition, each gang of colliers may be provided with a portable telephone, which can be brought into communication with the stationary telephones in case of need. A further advantage is that communication can be maintained from the pit head or the pit bottom with the moving cage. The apparatus is described as follows:—

"The instruments are exactly like those used in ordinary telephoning, consisting of receiver, transmitter and battery. The battery is of the dry-cell type, and has a life of three years. The portable instrument contains the same parts as the fixed one, and weights about twenty pounds. It is enclosed in a box, and can be carried from one part of the mine to the other. The instruments are fixed up like ordinary telephones, but instead of a wire connection two wires are connected from each instrument to some metallic substance buried in the ground. Connection can be made to the tramway lines in the pit or to water pipes or any convenient metallic substance in the workings."