the alteration of the length must be figured out from a chosen value of the modulus of elasticity, which was fixed at 5,500,-000 lbs. per square inch, after trying different values between 1,500,000 and 8,000,000. This value agrees very well with the laboratory experiments made with the cubes of the sevenyear-old concrete, as shown in Table II. The compression experiments are in this case specially valuable, because the line of pressure for the dead load nearly coincides with the centre line of the arch and, therefore, only produces compression stresses.

As proof of the correctness of the situation of the pressure line and value of stresses found in this way, the sizes figured out by the statical examination serve.

reached in this case by means of the strongly concentrated load over the centre of one part of the arch was 2,740 lbs. per square inch, the concrete originally having been figured out with a permissible stress of 560 lbs. per square inch. By this five times increased stress no indication of the destruction of the concrete could be seen.

2. Although the arch was very flat and the pressure line close to the centre line, it was still possible, in this case by the special arrangement of the loading material, to develop tension cracks. As above mentioned, the tension strength was about 350 lbs. per square inch. As the tensile strength has been entirely neglected in the calculations, the structure has a further safety in this high value.



In Fig. 8. is given a graphical representation of the alteration in the length, found by Frunckle's apparatus and the hereafter calculated stresses, for one section of the loaded part of the arch (above in the Fig.) and one in the unloaded, both situated one-fourth of the span from the springing lines. Under a are given the elongations (and shortenings); under b the stresses (in kg. per c.m.²). P in the diagrams means the normal load found by the experiment and P1 the one found by the calculation. It will be noted that the stresses vary in a very satisfactory manner.

The results of the two different ways of determining the stresses are given in Table III.

As a summary of the test-loading on the bridge the following may be given :---

1. As the bridge is merely constructed to resist compression forces, the compression stresses found by the experiment are of greatest interest. The greatest value of these,

3. For giving an approximation of the weight of steel used, it may be compared with the common 23-ton steam rollers. On the same area, which was filled with steel, four rollers, with a total weight of 92 tons, could be placed; the

423 - = 4.6 times load used by the experiment was thus . 92

greater than this quite exceptional loading.

The bridge, during use, has probably had a still greater bearing strength due to the distributing ability of the fill concrete over the arch and because an increase of the dead load in ratio to the live load moderates the movement of the pressure line.

4. The hinges have been very useful; without them the new stage of equilibrium could not take place, and the bridge would have collapsed under a much smaller load than it was able to carry, as it had free movement at three points.

UNITED STATES STEEL CORPORATION IN CANADA.

Mr. James A. Farrell, president of the United States Steel Corporation in testifying as to the corporation's export trade in the United States Government suit, referred to the Can-

"Through Montreal we sell about 60,000 tons of wire product a year, sheet iron, mine rails, and sometimes standard rails, when they cannot be supplied by their own corporations. We are now supplying the Canadian Northern Railway with

25,000 tons of rails shipped by boat from Chicago and thence by rail to Calgary, where they cost \$47.13, delivered.

"At Vancouver we supply much material, but the freight rate from Pittsburgh there is \$18 a ton. Material from Liver pool or Antwerp may be shipped for \$6 to \$8 a ton. After we established our office there we found it necessary to run a steamship service there. Our ships leave about every two months, making stops all along the line. On the return we go into a general merchandising business."