test load of 12,000 lbs. and under this load measure the deflection, which is desired to be 1-16 or 0.0625 in., but should not exceeed 0.07 in. The beam must then be loaded to 24,000 lbs., after which the set shall not exceed 1-100 in. The brake beam shall stand a total motion of the head of the machine of not less than 2 in. without failure at any point. This change is recommended because it is more in accordance with engineering practice to determine the strength and stiffness of structures at or below the elastic limit rather than to determine the load which will produce actual failure or destruction, it being understood that no part or structure will safely withstand repeated stresses above the elastic limit. It is apparent that the latter forms the proper criterion for safety. It is assumed in the above specifications that 12,000 lbs. represents the maximum working load and 24,000 lbs. the load corresponding to the elastic limit of the beam, corresponding respectively to approximately 15,000 and 30,000 lbs. fibre stress.

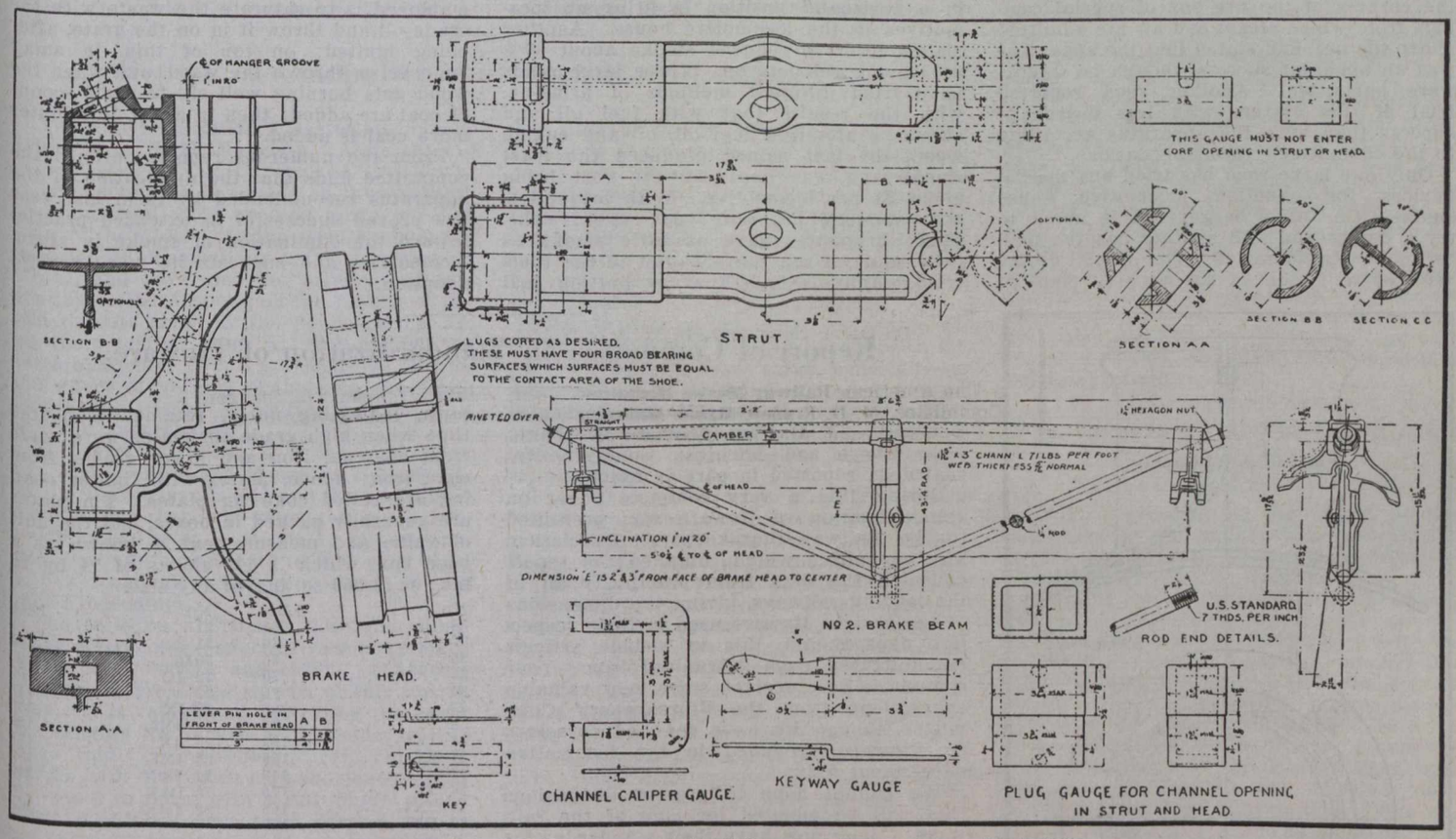
Consideration of the desirability of adding to the specifications a limitation as to the minimum weight of heads and struts allowable show a considerable variation in weights of struts and heads, due largely to variations in design. The Pennsylvania Rd. reports 9 lbs. for the head and 11 lbs. for the strut as a fair average. The list furnished by a firm which supplies nearly half a million brake beams to nine different railways shows head varying from 9 to 11 lbs. each and struts varying from 9 to 12 lbs. each, with an average of about 10 lbs. for either head or strut. Prof. L. E. Endsley has called attention to the fact that, while the average distance between compression and tension members is about 12½ ins., there is some variation in this length which would affect the strength of the strut. In other words, longer struts would need a greater weight for the same strength.

It is believed that some specification which shall define the strength of these two important members should be added to the other specifications, but that specifying a minimum weight would not be sufficiently definite.

The subject of a standard no. 2 brake beam for recommended practice was reopened by a letter of inquiry, which, with replies, is as follows:

Is it desirable at this time to adopt a standard no. 2 brake beam as recommended practice? 22 yes; 8 no. If so, would you consider the beam in sheet M.C.B. 17-B a suitable standard for this purpose? 19 yes; 11 no. If you deem the proposed standard unsuitable, please indicate your reasons. 5 prefer the use of present standard dimensions and see no need of standard detail; 5 do not like the design proposed, and consider it inferior to some now in use. It is recommended that this beam be adopted as recommended practice.

About 75% of the defective brake beams found on the Pennsylvania Rd. were removed on account of worn brake heads, indicating that if beams were properly hung and the locations for hanger holes and hanger brackets were standardized, a large number of failures could be prevented. Failure of the compression and tension members is further shown to be due largely to poor fits between the heads and struts and the other members. In other words, it is apparent that a more careful standardization of brake beams would result in a much smaller percentage of failures and much less expense to the railway companies.



Sheet M. C. B. 17B Recommended No. 2 Standard Brake Beam with Details.

Report of Committee on Smoke Prevention.

The American Railway Master Mechanics' Committee, E. W. Pratt, Assistant Superintendent of Motive Power, Chicago and North Western Ry., chairman, reported in part as follows:

A set of five questions was submitted to members, and answers were received from 25 lines, representing nearly 32,000 locomotives.

Four roads having 4,000 locomotives have complete equipment according to M. M. recommendations and are having excellent results. Seven have installed no devices, one on account of using fuel oil entirely. One finds no particular value in the quick opening blower valve as a smoke reducer, but agrees that the other recommendations are smoke reducers. One, after extended tests of quick opening blower valves, finds that the smoke can be eliminated 33% quicker with such valve in use, and as a result of its tests it has decided to adopt quick opening blower valves. Several others agree that its use is effective, especially when unexpected stops are made. Fifteen with about 18,500 locomotives have installed jets and consider that with ordinary handling these are undoubted smoke reducers. Side installations appear to be more in favor than back head, and are also less expensive; one large road considers that with side installations the jets nearest the front of the fire box are most effective. Two with over 1,000 locomotives, report that arches effect a smoke reduction while working, but produce no noticeable effect while standing. One with over 1,800 locomotives reports the application of side jets and blower to all its locomotives switching or running into Chicago, and the extension of such application to all switchers and a large proportion of all road locomotives on its entire line; the quick opening blower valve was applied to only a small portion of these.

Only seven roads, with about 10,000 locomotives, have tried any special devices other than those recommended. Two refer to a different style of arch with a combustion chamber; one considers that the mechanical stoker which it is using, when working properly, is an excellent smoke reducer. Two have tried other devices without success.