

First, the bearing area of the outstanding legs should be sufficient to transmit the column load from the flange.

Second, the thickness of the outstanding leg should be sufficient to prevent buckling of this leg.

Third, the entire cross-sectional area of the angle or angles should be sufficient to carry the load as a column having a length equal to the depth of girder.

Fourth, enough rivets must be placed in these stiffeners to transmit their stress into the web.

The action of stiffeners over an end bearing of a girder is similar to the case here considered, unless there be on top of the girder a column load. In the latter case the stiffeners must not only transmit the shear from the web into the end bearing, but they must also carry the column load from the top flange of the girder to the bearing. While the principles involved in the two examples are the same, their application is slightly different.

A NEW AUSTRALIAN DAM.

The cabled announcement of the formal opening of the Burrinjuck Dam in New South Wales, and the irrigation scheme for which it is to supply the water, is a more than ordinarily interesting event in Australia's domestic history. Burrinjuck is not as large as Assuan Dam, but it is the second largest dam in the world, and it certainly rivals the great Egyptian work in picturesqueness. It is set in between two steep granite hills that rise from opposite sides of the Murrumbidgee River. These mountains are about 2,500 feet high and form the gateway to the long and winding gorge, rugged and rocky, through which the upper Murrumbidgee flows for about 200 miles.

The dam, set in the neck of the gorge, will ultimately rise to a height of 240 feet from the foundation level—ultimately, for the engineers have decided that the irrigation scheme can be started with the dam at only about half the height it will have reached when the entire area is ready to be watered. The areas immediately adjacent to the Yanco diversion channel can easily be served with the dam at a height of only 120 feet, and this land is the portion now formally opened. The dam is expected to reach its full height some time next year. The retaining wall will then be 240 feet high, 784 feet long (curved in plan to a radius of 1,200 feet), with a breadth of 170 feet at the base and 18 feet at the crest. It will back up the waters of the Murrumbidgee for 45 miles in the long gorge, and create an inland sea among the mountains of 20 square miles in area and over 33,000 million cubic feet in content—nearly half as big again, say the mathematicians, as Sydney Harbor. It is calculated that on the average flow the Murrumbidgee will take a year to fill the Burrinjuck reservoir.

From Burrinjuck the water is, under regulation, allowed to flow on for 200 miles down the bed of the river to Berembid Weir, near the town of Narrandera. From Berembid the diversion canals reach out. The Berembid Weir and lock have already been completed. Under the northern irrigation scheme a main diversion canal, now nearly completed to its full length, runs out straight in a north-westerly direction for 132 miles to a point near the town of Gunbar, not far from the Lachlan River (a long but uncertain lower tributary of the Murrumbidgee). The triangular area hemmed in between these two rivers and the canal is to receive particular attention from the irrigationists, but subsidiary channels stretch out to the east of the main canal as well. The area to be served at once is about 125,000 acres, shortly to be increased to about 350,000, and, finally, when the northern irrigation scheme is in full working order, to 1,300,000 acres.

THE ATTITUDE OF THE RAILWAYS TOWARD FOREST FIRES.*

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"Railroads" and "unknown origin" are the two headings under which the causes of a large majority of our forest fires are listed. Even after allowing for inaccuracies in the records, the number of fires resulting from railroad locomotives is unquestionably large. The attitude of the railroads towards the forest fire evil, and the possibilities of reducing this particular source of danger, are therefore questions of interest and importance.

While the railroads for many years have, perhaps, shown too little interest in forest protection, it must be remembered that indifference has characterized most of the other interests, from the Government down to the smallest woodlot owner. The railroads could hardly be expected to worry about forest fires when the States through which they ran had neither laws nor organization to prevent or fight fires. So many of the developments tending toward the solution of forest problems have not taken place until recently, that criticism of any particular interest reflects discredit on all. Practically all of the definite accomplishments in forestry, both in Canada and the United States, have taken place in the last ten years, and the greatest achievements are less than five years old.

Under the latter, the beginning of effective fire protection stands out prominently. Our forests are still far from safe, but Federal, State, and private activity has paved the way, and another decade should remove the fire menace from our remaining forests. In this work, which must be co-operative to succeed, the railroads are doing their full share.

Certain basic causes must underlie any given set of conditions. If the railroads have been the too frequent cause of forest fires, there are various reasons why this has been true. First of all, no spark arresters have been designed which will eliminate flying sparks under all conditions, and at the same time give the locomotive free draft. While the various devices in general use greatly reduce the danger from this source, the fact must be accepted that there are certain mechanical difficulties which have not been entirely overcome.

If it is recognized that sparks capable of starting fire reach the ground, the next logical step would be the removal of inflammable material from the right-of-way. It is easy to advise this, or even to legislate to this end; but to the comparatively new roads which have pushed into the forest regions, the expense of a fireproof right-of-way is a very serious consideration. Most of the main trunk lines now clear their right-of-way twice a year, but this is by no means a guarantee against fires from locomotive sparks. The strip of property owned by the railroads is too narrow for a safe fire belt. Adjoining property offers quite as great a menace, so that, even if the railroads kept a right-of-way of fresh mineral soil, live sparks might easily start fires in the slashings and accumulated litter on adjoining property over which they have no control.

As one other consideration, it may be mentioned that for years the railroads shared in common with the public the attitude of calm indifference as to what happened to our forests. Corporations occasionally lead in developing public sentiment; more frequently they are guided by it. The man on the street even now it is hardly awake to the importance of forest protection; yet, the railroads are taking the matter in hand with an energy in advance of public sentiment.

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