the fuel, making a kind of hollow fire, to prevent the bars from burning. The firebars he used were $\frac{7}{8}$ -inch thick at top and $\frac{1}{2}$ -inch at bottom, with $\frac{3}{4}$ to $\frac{1}{8}$ -inch air spaces, and when placed alternately raised, they could be brought still closer.

Mr. J. E. CLIFT inquired whether a pan of water had been tried under the firegrate, to prevent the bars being burnt; that plan was frequently used in stationary engines with good results, and by this means he had had firebars in constant use for two years with intense coal fires under gas retorts, without the bars burning away. There was constantly a supply of water under the firegrate, and the steam rising from it served to keep the bars continually protected and cool.

Mr. TOMLINSON said he had tried a jet of water from the boiler kept continually running under the firegrate of a locomotive during the whole trip, but it did not serve to protect the bars from burning; he had not tried a pan of water, but with the jet there was so much water constantly supplied as to keep the ashpan full of steam, and he thought the effect would be the same as in the use of a pan of water.

Mr. C. W. SIEMENS observed that the efficiency of the water below the firegrate would depend a good deal upon the quantity of ashes falling from the fire; if the ashes fell easily they would keep up a supply of steam from the ashpan and preserve the bars from injury; but if much clinker were formed on the firegrate, the water pan would not answer, as there would not be steam enough to keep the bars cool.

*On a New System of Axle Boxes, not requiring Lubricating, and without Liability to Heating.** By ALPHONSE DE BRUSSAUT.

The author first recapitulated the liability to accident arising from inattention to the constant greasing of the ordinary axle boxes and journals of carriages and of machinery, the inconvenience of accumulating dust and grit on the bearings, and the friction and wear and tear arising from these causes. He then reviewed the numerous inventions and attempts to remedy these evils, showing that none of them had hitherto successfully abolished the necessity for the expensive and uncleanly use of some lubricating matter. He next proceeded to describe the system which he had introduced, and had applied somewhat extensively in France to various classes of machinery in which the use of grease had hitherto been considered indispensable. The new apparatus was described to consist of a series of four, six, eight, or any other convenient number of cylindrical rollers of the length of the journal, retained at certain distances apart from each other, yet still united by elastic bands of vulcanized india rubber. These rollers, thus united, and placed around the journal, would be set in motion by the pressure of the axle, without the possibility of collision with or friction against each other, or of rubbing upon the surface of the journal or of the bearing, and thus avoiding as much as possible any friction or opposi-

* From the Lond. Civ. Eng. and Arch. Journal, May, 1859.

tion to the motion of the journal. The action of rolling being thus substituted for sliding, there could not be any abrasion of the substances, and lubricating became unnecessary. The machines so fitted were stated to work with remarkable ease and steadiness, and to be set in motion and the speed to be kept up with considerable facility. No inconvenience had been experienced from the fracture of the elastic bands and shafts, making 450 to 500 revolutions per minute, working perfectly well, without any symptom of heating.

The reasons for this action were stated in a plain and comprehensive manner by showing that in moving a body of an octagonal form along a plane the action must be either by sliding or by rolling; in the former lubrication was necessary, whereas in the latter the presence of any lubricating matter would be prejudicial. Extending the latter principle to the cylindrical form, which was merely a body having an indefinite number of sides, it was evident that by retaining these cylinders apart by means of the elastic bands, so as to avoid friction against each other or upon the journal or the bearing surface, a practically perfect rolling motion would be obtained, and it was contended that by M. Brussaut's system the two material results of rapid rotation without heating, and a complete suppression of the use of grease in all journals of machinery were arrived at.

*Cheap Railway Fare.**

We see by the time tables that the South Western Company are carrying passengers in covered carriages on Sundays to Portsmouth and back for 4s. each. We do not say that this is any thing extraordinary for a railway company in these days to do, but as the distance to Portsmouth is $94\frac{1}{2}$ miles, a passenger is thus carried 189 miles for 4s., or just about $\frac{1}{4}d.$ per mile, which surely is cheap enough.

It is difficult to run a train, especially a long one, for less than 2s. per mile, including every expense commercially chargeable against it. It would therefore require 200 passengers at $\frac{1}{4}d.$ per mile per passenger to be in a train, in order to work at about 50 per cent. expense; to net half the receipts as profits. We do not know how many passengers these very cheap trains (to Portsmouth, Salisbury, &c.,) average, but we dare to say it is not less than 200. It is work almost as cheap as carrying coals at $\frac{1}{2}d.$ per ton per mile. If no more passengers than 200 are found in such train, it is in point of fact cheaper than coals at $\frac{1}{2}d.$ a ton a mile.

Such cheap fares are calculated to render railway traveling popular, and if the million can be attracted to the railway, benefit will follow to the railway companies and the public, for nothing is more healthy than a trip every now and then in the country, and as it is the case, that as many as 500 or 600 persons can be easily conveyed in one train, fares of only $\frac{1}{4}d.$ per mile per passenger would be handsomely remunerative obtained from a train filled with so many passengers.

* From Herapath's Railway Journal, No. 948.