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Scientific American.

AMERICAN AND ENGLISH RAILROAD TRACK. in the columns of the English Engineer, and the varipast few years, by a large number of more or less qualified writers and correspondents. In an editorial review like finality has been arrived at." It further concludes that we provide a road "very difficult to repair;" and we are gravely assured that "a gang of platelayers" (section men) "could replace a couple of lengths of rail before an American gang would get the spikes out." Last, and most remarkable statement of all, we are assured that "very great difficulty is experienced with the joints," and that " one of the most serious objections to the flanged rail is that it is next to impossible to fish it satisfactorily"(!) After such an arraignment of the alternative system, we are quite prepared for the writer's comfortable conclusion that he cannot "concede for a moment" that the English engineers have "anything to learn from American practice."

Among the many points of difference between American and English railroad practice, whether in roadbed or rolling stock, there are none so radical as those pertaining to the rail, ties and fastenings. With few exceptions, all the railroads of the world use one or the other of the two systems, and while the Ameri- to receive the load than one with its ties a yard apart. can is the most common, there are so many thousands some measure from the charge of being antiquated or " behind the times."

The English roads use a double-headed or "bull-head" rail, which, instead of having the base flattened out to form a bearing surface on the ties, has its base formed into a rounded ball-shaped section similar to the head of the rail, but not so deep. Such a rail evidently has generally about 7 inches by 10 inches, or 8 inches by 12 inches, which has two vertical jaws or braces. one of which is curved to fit snugly against the inside of the rail, the other being flat on its inside | face and adapted to receive a hardwood key, which is driven in tightly between the jaw and the outside of the rail, and holds the rail in a vertical position. This was found that the chairs wore out a hollow in the base of the rail where it was seated upon them, and that lish road with the greatest ease. when the rail was reversed the old base-now the head -presented a roughened surface, which made very noisy and uncomfortable riding. When the theory of the double-headed rail was proved to be wrong, it would have been natural to throw it aside and design a new rail, whose section should be determined solely by the work it had to perform. For some reason, however -probably an instinctive dislike to change-this was never done. What the English engineer did was to reduce the amount of metal in the base, and maintain this type-founded upon a wrong theory though it was -as the standard rail of English practice.

From these considerations, which are simple facts of

The raison d'être of the English bull-headed rail is sentimental reasons why these people in the south simply that it is a paternal legacy from the early days should prefer to trade with us rather than with the naof railroading. What excellence the English track may tions of the old world. The Pan-American Congress possess to-day is obtained in spite of the inherent de- was directed to this end; so was the great projected fects of the system, and is due to thorough, very care- north and south railway through the isthmus to join ful, and, it is needless to say, very costly maintenance. our system to that of South America; and the remarka-If the chairs were thrown out altogether, and the ble interest shown by visiting delegates from that coun- 2 weight of metal put into the rail itself; if their wide try during the World's fair at Chicago, in 1893, proved ties were split in half and more closely spaced beneath that the field is open and may be occupied, if a systethe rails, and if the miserably inadequate fishplates at matic effort be made to capture it. the joints were replaced by heavy angle bars of the Diplomacy can accomplish much in the way of pre-American type, the English engineers would find that, liminary work. It can remove artificial obstructions for the same total cost of construction they would and rough out a roadway on which the wheels of coms secure a quieter, stiffer and smoother riding track. merce may travel; but it is to the joint efforts of commercial associations and the individual manufacturers During a recent trip over some of the best English ² roads, we noticed that, while the level and alignment that we must look for the actual development of trade. Nor can this work be done at home. It is necessary to appeared to be perfect, there was a roughness and a noisiness of riding, as compared with our best Ameribe on the spot. If our merchants have better goods to can track, which could not be accounted for merely sell they must be prepared to prove it by exhibiting them by the stiff springs and disconnected axles of the roll- in the various countries side by side with the manufacing stock. We are satisfied that this is largely due to tured products of other competitors. Nor should the

the wide spacing of the ties and the weakness of the The long standing controversy as to the respective joints. In regard to the first point, the ties are laid 3 merits of the American and English systems of railroad feet apart, as against 2 feet and less in this country. track has lately been revived with considerable vigor | Now the ideal track for smooth running is that which provides a continuous, longitudinal tie or "sleeper' ous stock arguments have been brought out of the beneath each rail. The great Brunel knew this, and pigeonhole and presented, in company with such new built the Great Western Railway accordingly. If facts as have developed with the improvements of the it were not for difficulties of maintenance, such as occur in drainage and level, we think this system would be more largely in use to-day. The old broad gage of the discussion our esteemed contemporary betrays a road had a smoothness of running that was very noticewoeful ignorance of the actual behavior of American | able after riding upon a cross tie track. The cause of track, in the construction of which it believes "nothing this was that the steel rail was evenly supported throughout its entire length, and hence (provided the tamping of the ballast had been evenly done), the elasticity of the rail was constant at all points. In the cross tie system, on the other hand, the rail is elastic between the ties and comparatively inelastic above them, the result of which is that there is a certain measure of shock as the wheel passes each tie. If the ties are spaced closely, this effect will be diminished to a point at which it can be neglected, as in the close spacing which obtains on American roads, where the distance between centers is less than 2 feet; but when they are spaced as in England, fully a yard apart, the effect must be sufficient to have a marked effect on the running. It may be claimed that this is pushing theory a little too far: but, if our English friends will apply the theory to the case of the single driver of one of their Great Northern engines, with its concentration of over twenty tons, they will at least agree that the rail with the closer spaced ties is in a better condition

But by all odds the weakest place in the English of miles of the other system to be found outside of track is at the joints, where the fishplates, answering Great Britain and her dependencies as to save it in to our angle bars, are singularly inefficient. This weakness is inherent in the bull-head system, and cannot be avoided. Owing to the space between head and base The radical difference between the two systems lies of rail being taken up by the jaws of the chairs above in the shape of the steel rail itself : for it is this that mentioned, it is impossible to extend the fishplates determines the details of joints, ties and fastenings, across the joint ties, as we do, and they are only a trifle longer than the distance between the inner edges of these ties, a matter of some 18 or 20 inches.

The arrangement cannot claim to be even a suspended or bridge joint, as the plates never reach the ties; and what stiffness the joint may have results from no power to stand up by itself, and it is necessary to the cantilever action of the rail ends that project from provide cast iron bearers, known as "chairs," for the the adjoining chairs. Moreover, the standard fishplate rail to rest in. These consist of a flat base, measuring is without any lateral flanges, and consequently, has very little lateral stiffness to keep the rails in alignment. The result of this inefficient design is seen the moment the train is in motion, especially if one is seated over a wheel in one of the six-wheeled "coaches." The joints give out a loud click as they feel the passing blow of the wheel, and the "hammering" is kept up with a painful monotony. It has been our custom to time the form of rail was chosen in the days of iron rails from speed of a train by the click of the joints. When lighter motives of economy, the idea being that, when the rails were in use in this country, this was a ready means upper head had been worn down by the traffic, the rail of ascertaining the speed; but to-day, on our best track, could be taken out and reversed in the chairs. The it cannot be done, for the reason that our joints no theory was good; but the performance was bad. It | longer "hammer." There is never a time when one cannot sit in his seat and count the joints on an Eng-

> The track of the New Haven road, from New York to New Haven, consists of 100 pound rail, 6 inches in depth, laid with 18 oak ties to the rail (as compared with 10 to the rail in England), upon 18 to 20 inches of broken stone ballast.

> If it should ever be the privilege of the editor of our esteemed contemporary to take the run over this 80 miles of track, we think he would hasten to revise his opinion that "English engineers have nothing to learn from American practice."

OUR TRADE WITH THE SOUTH AMERICAN REPUBLICS.

The commercial alliance of the United States with history, it is evident that a strong prima facie case is made out in favor of the standard tee rail, whose secthe many sister republics which are strung out along tion has been designed with a single view to carrying the eastern seaboard of the southern continent was a favorite theme with the late James G. Blaine. Such load, and is not modified, as is that of the doubleheaded rail, by any exploded theories of economy in an alliance would be natural; it is suggested by our geographical position; and there are historical and operation.

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