The Comimg Modification of the Macadam Road.

(From Our American Correspondent.)

Road construction has had the attention of leading engineers for very many years; the macadam process was introduced into England by John McAdam about the year 1816, and has been the only form of road building practicable for country highways that sustained a heavy traffic, and under the conditions that existed with slow horse drawn vehicles this was eminently successful. The advent of the automobile has, however, created a new order of things. The stone, dust and water, bound and held the macadam road together, but the low-hung, rapidly moving body of the automobile sweeps away all dust, and hence, the cause of the world-wide search to discover a way to preserve the thousands of miles of macadam roads from destruction.

The existence of macadam roads depends upon the reduction of the road dust formed by the wearing of the surface; but the action of rubber-tired motor cars moving at high speed, soon strips the macadam road of all fine material, the result being that the road soon disintegrates. With unfailing patience and unswerving purpose, experts have worked at the problem of obtaining a dustless road. The experiments of using oil in road construction carried on in Southern California for many years, have proved the most valuable contribution to the science of road building made anywhere in the world in recent years, inasmuch as it is being generally conceded by eminent engineers and road builders of the United States, that sufficient evidence has now accumulated to clearly indicate that the relief is the California practice. About the year 1900 John Fitzgerald, of Bakersfield, invented a method of asphaltic oil road building and a rolling tamper which seems destined to make his name and that by which the process has become known, namely the petrolithic process, not only historic but household words.

Experiment has now given place to practical experience, after continued test that the remedy is simple and effective. It consists in giving the road of John McAdam, first, a better foundation, and, second, of binding and compacting his road with heavy asphaltic oil, into a dustless pavement. To Mr. McAdam belongs the broken stone part of the road, and to Fitzgerald, the foundation and the binding properties.

This modern modification of macadam is, first, a better foundation, and, second, a cementing of the road surface into a monolithic mass. The ideal consolidation of a road foundation has never been secured with a smooth roller inasmuch as it has a tendency to produce a waved surface and to consolidate a surface crust which inevitably bridges over certain spots which, after the pavement has been completed, ultimately settle and cause depressions in the pavement itself. A smooth roller must exert compressive action from the surface downwards, the crusts it forms soon support the weight of the roller and its compressive action ceases.

The action of the rolling tamper, reverses this process solidifying the bottom of the foundation first, and it kneads, puddles and compacts the entire foundation layer from bottom to top—produces no waves, bridges no spots, and gives a density to the foundation stratum never before attained with any form or weight of roller. The compression shoes of the roller tamper are nine inches long, yet their compressive action is exerted to a greater depth, for where the opportunity has arisen to see a section of pavement and foundation made by use of the rolling tamper, as in the case of wash-outs, it has been observed that the compression of the earth extended fully three inches below the reach of the shoes of the tamper.

This sub-foundation tamping is abetted by the liberal use of water, whereby the surface is kept too wet to solidify, or by the constant use of cultivators which keep the top loose, thus allowing the tamper feet to sink through it and thus work upon the sub-foundation. In this way the petrolithic foundation more homogeneous than heretofore made, is secured.

The cementing of the road surface into a firm monolithic mass is the second important matter. The kneading, mixing and puddling action of the rolling tamper secures results towards this end heretofore never secured.

The surface or wearing coat of the roadway is constructed about 6 inches in thickness, and is solidified from the bottom up by means of the rolling tamper. The top six inches of the roadway is thoroughly pulverised, dampened with water, and is given three separate applications of hot, heavy asphaltic oil, each application of oil being separately cultivated and mixed into the soil. The liberal use of water materially assists in disseminating and mixing the oil throughout the mass.

When the oil is so thoroughly mixed with the soil by means of cultivators that it can scarcely be detected with the eye, the whole mass is turned over by a plough that thoroughly turns over the furrows, and after a proper cultivation or harrowing, the tamping with the rolling tamper is begun, the top being constantly stirred with a cultivator so that the base only is tamped.

The tamping is prolonged, and meantime the top layer is maintained in a soft condition by the liberal use of water, or by the constant use of the cultivator, in order to secure as dense a compaction of the substratum as possible. When the bottom has been compacted to the farthest limit, two, three or four inches of crushed rock is added to the surface, which, after being sprinkled with water, is coated with an application of heavy asphaltic oil, and mixed with the top soil of the street. The rolling tamper is again brought into action and by the judicious use of the cultivator and water, this macadam mass is compacted solidly from the bottom upwards until the tamper rides upon the surface without indentation. Thus the old style of macadam pavement is cemented into a homogeneous, tenacious, water-proof, frost-proof, resilient and resisting wearing surface, which will hold up heavy traffic, withstand the action of the rapidly driven automobiles, and is freer from dust and mud than any surface heretofore constructed. Upon the surface completed in this way, is spread a light coat of heavy asphaltic oil. This is covered with a coat of screened gravel or rock screenings free from dust, which is thoroughly sprinkled and rolled into the oil with a smooth roller This creates a tenacious and water-proof wearing surface that not only protects the roadway, but forms a firm surface well adapted to all manner of vehicular and automobile traffic. This surface is familiar to all who have recently been over the boulevard extending from Los Angeles to Pasadena. It is safe to say, excepting only the asphalt pavements within the cities, that this highway is the finest speedway in California.

The world does not realise that one State in the Union has experimented for many years along this line, and that heavy Californian asphaltic oil, which is really liquid asphalt, is that remedy .

CORRESPONDENCE.

(To the Editor PROGRESS.)

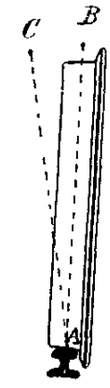
Sir,—Argument often arises as to whether the top of a locomotive wheel moves at a different speed to the bottom or not. Will you kindly tell me per medium of your valuable paper, whether there is a difference, and, if so, at what speed would the top, centre, and bottom, of a wheel be moving supposing the locomotive to which the wheel is attached to be travelling at fifty miles per hour?.

Also would you kindly say whether engineers generally agree on that point and have they any recognised means of demonstration whether there is or is not a difference?. If so, what are these means?.

Thanking you in anticipation and wishing you all *progress* to your excellent journal.—Yours, etc.,

H. W. POOLMAN.

The idea that any portion of the circumference of a locomotive wheel travels at a different speed to any other portion is quite a fallacy. If we could neglect the axle and consider the point of contact between the wheel and the rail as the turning point it would appear to the ordinary layman quite possible. Thus, A.B. representing the centre line of a wheel it would appear quite possible to move the centre line of wheel to C. while A. remained in contact with the rail, but this would be rather a hinging movement than a roll.



To prove that all portions of the circumference of a locomotive wheel move at the same speed it is only necessary to carry the diagram a little further. Let A.B. represent the centre line of wheel with centre of axle at D. If the upper portion of the centre line be moved to C., the centre of axle B. must also be moved to a point on the line drawn from C. to A., and as the true point of support for any load on the wheel can only be in a direct vertical position under the centre of the axle, it is easy to demonstrate that the movement of the bottom and the top of the wheel is equal; by drawing a vertical line E.F. at right angles to the rail through the altered position of the axle at D' and it will be found that the displacement on the circumference of the wheel at F., A. (bottom) is exactly equal to C.E. at the top.—Ed. P.