NEW STREET CAR

In the history of locomotion upon wheels, one of the most important epochs must have been the invention of the common perch-bolt. The old Egyptians, and the Assyrians, seem to have been content to travel upon two wheels, though it may be questioned whether we can, therefore, conclude that they were ignorant of the art of constructing four-wheeled vehicles. But however convenient the two-wheeled chariot may have been deemed for purposes of war, and perchance also for a morning drive in the avenues at Thebes or Memphis, yet the "four-wheeler" was an inevitable necessity, and it is only natural to suppose that in the first attempt to build such vehicles, the second axle would be fixed to the body in the same way as the single axle had always been fixed heretofore. The excessive unhandiness of this rigid "four-wheeler" must have quickly made itself felt. The obstinate tendency of the machine to move in a straight line through space, and its unconquerable aversion to turning a corner, would soon disgust the whips of the period, and the new-fangled drag would be relegated to the slower use of the farmer and country carrier. We have seen it somewhere suggested that the uncompromising straightness of the old Roman roads was dictated by the use of this rigid four wheeler.

But however this may have been, it came in time to be perceived that a pair of wheels will roll in one direction only, *i.e.*, in a direction at right-angles to the line of its axle, and that if the four-wheeler is to be got round a corner, the leading axle must be turned in another direction, and, finally, that if the vehicle is to follow the horse in any direction, the leading axle must be capable of turning in any direction, and the perch-bolt would thus be evolved. Once tried, it would survive under the category of the fittest; and we should to-day think any coach builder insane who should build a carriage without one. Nevertheless, history repeats itself, and in the railway carriages of modern times we have exactly reverted to the old rigid four-wheeler.

No doubt the conditions are essentially different, but cannot the same facility of turning a corner be given to a vehicle running upon rails, without sacrificing its steadiness, or any other essential condition?

This question has been answered in the affirmative by the invention of a tram car of novel design, which has been for some time on trial upon the London Tramway Company's line to Greenwich. The chief peculiarity of the car consists in the mode in which its wheels are mounted. There are three pairs, which are not fitted directly to the under frame, but are so connected by an arrangement of simple construction that they mutually control each other's position, and in such manner that each axle is always held in the right position for rolling along the rail, whether the rail be straight or curved, and whatever the sharpness of the curvature. Thus, when the car is traversing a straight line, the axles are held firmly in a parallel position, and when the car enters a curve the axles are automatically shifted into a radial position—like the wheels of a turntable—and traverse the curve with ease.

The car has now been running for some time in the regular daily service between Westminster and Greenwich, and has been subjected to every test under the varying conditions of weather, state of rails, and abnormal loading, with results which are eminently satisfactory. Although the length of the wheel-base is more than double that of the ordinary cars, yet curves of 30ft. radius are traversed with the same ease and smoothness as a straight line. Owing to the fact that this car was built for use upon a steam tramway, its construction is somewhat heavier than it would be for ordinary work, and it carries a larger number of passengers than usual, yet such is the reduction in tractive resistance obtained by this system that the car runs lighter and distresses the horses less than those in ordinary use. The long wheel-base, beside imparting great steadiness, affords a good support for the under-frame of the car, and prevents that "hogging" effect which is noticeable in ordinary tram-cars, and which is due to their excessive overhang. Experience has entirely dissipated many doubts which were expressed as to its behaviour in passing the open points, and in being put on and off the track, the facility with which the car is handled being in every way superior to that of the rigid four-wheeler.

FEMALE telegraph operators in Berlin are peremptorily forbidden to "paint their faces, or to let their "real, or false, hair wallow' over their backs."

IMPROVED DIAMOND STONE SAW.

It is only necessary to recall the fact, that of all the trades, that of the stone cutter was practically the most lacking in labor-saving inventions, to appreciate the vast progress accomplished therein by the utilization of the diamond as a cutting tool. Days of slow grinding by the sand saw are giving place literally to minutes of swift penetration by the diamond blade. Numerous ingenious applications of the carbon to industrial uses have already appeared in these columns, and it is presumed that the reader is tolerably familiar with the effect of the diamond tool upon materials far more refractory than the metals. In proceeding to examine, therefore, another machine based upon a similar utilization, the questions of adaptation of the diamond to its work, so as to secure the best results, and that of the construction of apparatus to conduce to such an end, are the matters which present themselves most prominently to our investigation. So far as certain points of construction are concerned, to which reference will be made as we proceed, the invention we are about to describe is new, with regard to its essential features, however, the test of experience has been applied, and successful operation over some two years has well demonstrated their efficiency. The machine is a single blade stone saw. Its uses are to divide blocks into slabs, bed ashlar, edge coping, sills, and the like, square up blocks, and all but finish mouldings, accomplishing all this with a remarkable rapidity of execution. Its essential feature is that the diamonds are made to act upon the stone in such a manner as to receive pressure or blow in one direction only. Without this provision, it is found by experience that no amount of ingenuity or care in the setting of the diamonds can prevent their being displaced from the sockets by the alternate reverse action of the blade.

It is first necessary to glance at the mode of securing the carbons in the teeth, as the square bits of steel which are inserted in recesses in the blade, and there held by soft rivets, may be termed. At proper points along the lower edge of the teeth, indentations are made to receive the diamonds, these, inserted, are firmly bound in place with wire, and while thus temporarily secured are brazed in in the usual way, the wire being afterwards removed. This operation, we are assured, fastens the borts or carbons in with certainty, so that no trouble is experienced through their working loose and falling out, so long as the saw is caused to cut, as above noted, in but one direction.

In the machine represented in the engraving on page 37, there is a timber frame formed of eight posts, planted in a concrete foundation and strengthened with the necessary horizontal and transverse bracing. The sash frame is carried by horizontal slides between the posts, and supported on the nuts of eight screws, all of which screws are connected together by gearing to which motion is given by a separate pulley and belt. The effect of turning the screws in one direction is to lower the horizontal slides, and so feed the saw down to its work, the reverse action of course producing the opposite result. The gearing may all be moved, by hand or by belt, when it is desired to adjust the blade vertically, but when the mechanism is feeding, its operation is automatic through suitable arrangements whereby it is moved with the proper degree of rapidity. The horizontal slides above referred to are provided for the sash frame to travel upon, the blade, being mounted in the latter and tightly held by buckles, receives its reciprocating motion from the pitman connecting the crank with the sash.

We have stated that the blade cuts in one direction only. This important point is gained through depressing the saw when it begins its forward motion and then raising it on the return stroke. The mechanism for this purpose is extremely simple, and consist of an eccentric on the crank pin of the pitman, which, through a connecting rod extending along the latter, actuates certain levers and cams, the effect of which is to push the saw down against its own natural spring at the beginning of the stroke, and so to hold it at a given point of depression until the end. The resilience of the metal of course, when the pressure is removed, carries the blade back to its normal position, and so lifts it clear of the bottom of the kerf, during the return stroke.

The above, though general as regards details, is sufficient for the comprehension of the device, to the performances of which attention may next be directed. From those using the machines, we gather the following statement of its average downward feed per hour in various kinds of stone, the figures presented having, in many instances, been borne out by trials un-