A WHEEL WHICH CARRIES ITS OWN TRACK.

BY DR. FR. HOUSSAY.

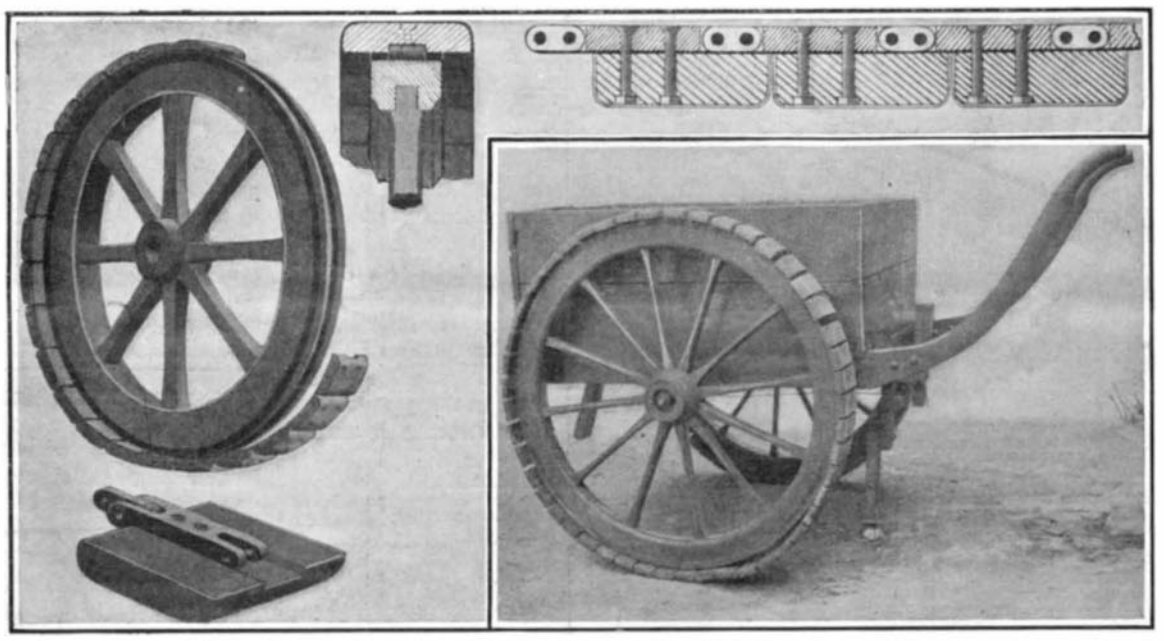
The reduction of tractive effort produced by the use of rails suggested to me the idea of constructing a wheel which should carry its own rail. The difference between traction on rails and traction on roads and fields is enormous. According to Poncelet's experiments, a horse drawing a loaded cart of a total weight of 1,000 kilogrammes (2,200 pounds) over dry, sandy, level ground exerts a pull of 250 kilogrammes (550 pounds), while the traction is reduced on smooth stone pavement to 30 kilogrammes (66 pounds), and on iron rails in good condition to 7 kilogrammes (15.2 pounds), or even to 5 kilogrammes (11 pounds) if the axles are continually lubricated.

The base of my portable track consists of a series of rectangular wooden blocks, with their lower edges rounded and their lower faces shod with sheet iron. In the upper face is a shallow transverse groove, into which a short segment of iron rail is fitted and fastened to the block with two rivets. The length of the rail is equal to the width of the block, but it is placed unsymmetrically, so that one-quarter of its length projects beyond one side of the block. Therefore, if several blocks are laid on the ground, side by side and in contact, with their protruding rails pointing in the same direction, each of these projections will fall in the groove of the next block, and the rail segments will also touch each other, forming a continuous rail. Consecutive segments of rail are then fastened together by short iron bars, which enter mortises in the ends of the segments, and are secured by pins which pass through holes in the ends of the bars and the sides of the mortises. When all the rail segments and their attached wooden blocks have been assembled in this way, the result is an endless chain or band, somewhat longer than the circumference of the wheel to which it is to be applied. The face of the wheel has a groove lined with iron, which the rail enters and which constitutes the bearing surface.

As the jointed rail is longer than the circumference of the wheel, the segments in front of the lower part of the wheel, when the latter is in motion, become separated from it, and are gently deposited on the ground, forming a smooth and straight or nearly straight track, at least two segments long, upon which the wheel can run with all the advantage that would be afforded by a rail of indefinite length.

The hardness and smoothness of the jointed rail diminish the tractive effort, and the wide wooden blocks prevent the sinking of the rail in loose soil, and practically efface the inequalities of the ground by forming an inclined plane before every obstacle and depression. A portable rail of this construction is applicable everywhere except in very wet ground and roads badly washed by floods. Sand and mud forced between the blocks are usually dislodged by the motion of the vehicle, and in any case are easily removed. For this reason I have not attempted to cover the joints, and have thus avoided a useless complication.

The jointed rail may be applied to vehicles of every form and size, from the railway truck and hand cart to the heaviest of automobile or other wagons. Its advantages increase with the size of the vehicle, provided that the strength of the rails is proportioned to the load, a condition which is easily satisfied by using two rails instead of one, for each wheel. The system was first applied, however, to the hand cart or two-wheeled barrow, which may assume various forms according to the use to which it is to be put. One of these forms, shown in the accompanying illustrations, is a box cart for sand, earth, etc., which is propelled by pushing, and may be dumped by throwing up the shafts and removing the board at the end opposite to them. A platform cart, with racks, for hay, straw, and other bulky articles has also been devised; it cannot be pushed, as the load obstructs the view of the operator, but is drawn.



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The direction of motion is indicated by the slack of the jointed rail, which is always in front of the moving wheel.

As the rail allows a greatly increased load to be moved with the same effort, these carts may be made much larger and stronger than those in common use. The principal dimensions, in meters and decimals, are the following: For example, the diameter of the wheel is 80 centimeters (32 inches) and the width of its felloes 5 centimeters (2 inches). Of this width, 3 centimeters (1.2 inches) are occupied by two iron hoops of rectangular cross section, each 1.5 centimeters (0.6 inch) wide and 1 centimeter (0.4 inch) thick, which are bolted to the felloes. A band of thin strap iron of sufficient width is applied over these hoops, and bent into the valley between them, the width of which, 2 centimeters (0.8 inch) is sufficient to accommodate this lining in addition to the rail, which is 1.5 centimeters (0.6 inch) wide. The rail segments are 7 centimeters (2.8 inches) and the coupling pieces 2 centimeters (0.8 inch) in length. The wooden blocks measure 7 by 12 centimeters (2.8 by 4.8 inches), the smaller dimension being equal to the length of the rail segments, and the greater one equaling the width of the trace which the blocks make on the ground. Carts of this construction, furnished with brakes, would be very useful on farms and in factories, quarries, etc., where the business does not warrant the installation of even a portable railway of the Décauville type.

I have seen two workmen transport, with the aid of these carts, hundreds of cubic yards of earth for the purpose of filling up an abandoned limestone quarry. They accomplished the task with little fatigue, and in one-third of the time that would have been required with the means previously at their disposal.

AN AUTOMATIC STREET SWEEPER AND SPRINKLER.

The street-cleaning machine shown in the accompanying illustration is a recent French invention, patented by Muller de Cardevar. One of its special merits is the placing of the scraper and the revolving brush within the rectangle formed by the wheels. This arrangement secures a proper distribution of the weight among the wheels. simplifies the transmission of power, and, in particular, eliminates the tendency to tilt which is manifested by machines of this sort, in which these working parts are placed before or behind the wheels. All the machinery is mounted on a steel chassis. In front, under the driver's seat, is the two-cylinder, 12-horse-power motor, which is adjustable to three speeds—5, 11, and 15½ miles per hour. The lower speeds are made by the machine at work, according to circumstances; the highest speed, 15½ miles, is that with which the machine can travel when not working and empty.

The brush is driven by a chain and sprocket, and is raised and lowered by a lever at the driver's side. It sweeps a strip 6 feet wide. Behind the brush and parallel with it is a scraper formed of an India-rubber blade stiffened by a steel frame.

The chassis also carries a water tank of about 600 gallons capacity, the contents of which are applied to the pavement by means of a sprinkling pipe parallel to the brush and in front of it. The flow of water is controlled by a handle within reach of the driver.

Behind the reservoir and the hind wheels are two side spindles, one on each side, which may be put into operation, together or singly, from the driver's seat. When all three sprinklers are in action, the width of the sprinkled strip is about 20 feet.

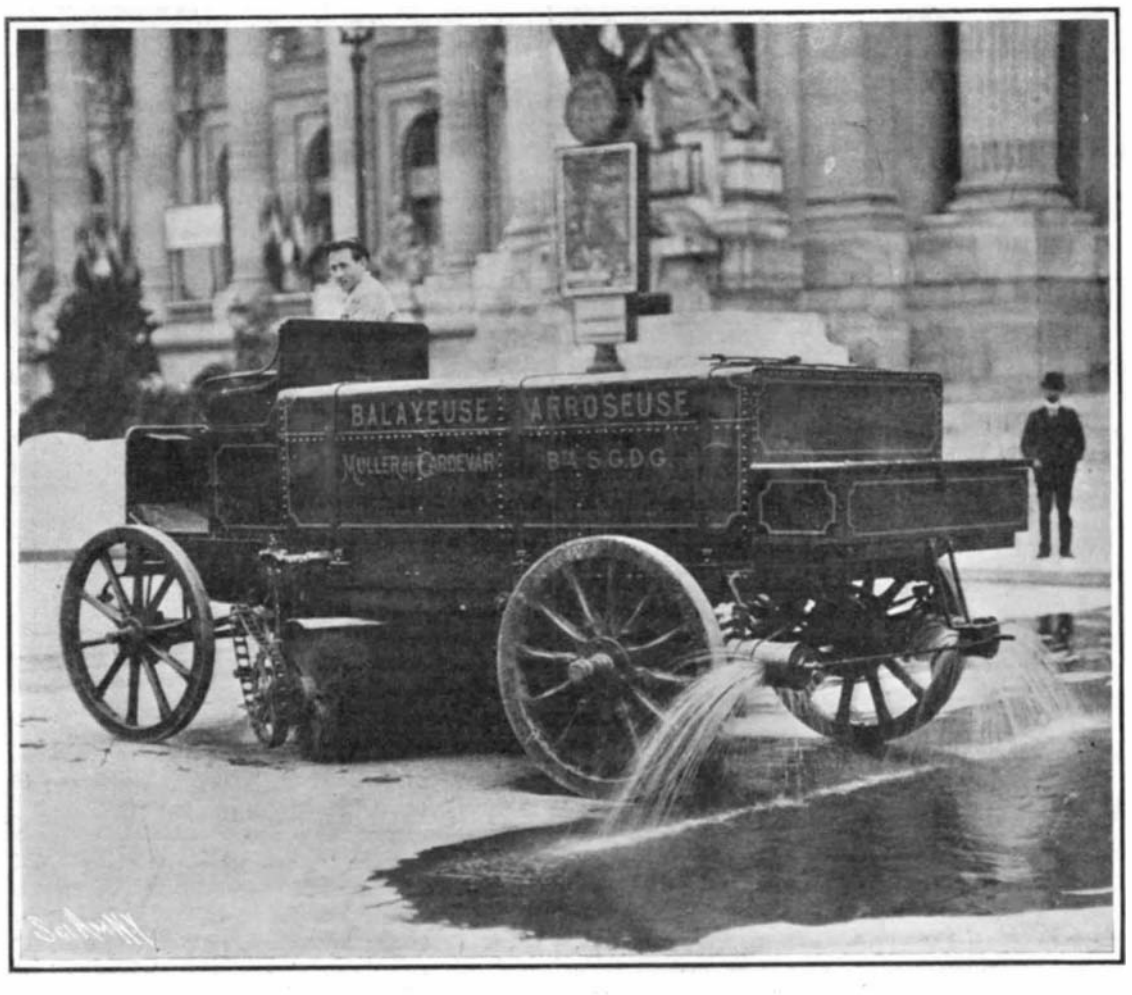
The operation of the machine is as follows:

When it is simply traveling without either sweeping or sprinkling, the brush and the scraper are raised. With an empty tank, the speed may attain 15 or 16 miles an hour.

For sweeping and sprinkling, the cock of the front sprinkler is opened, and the brush and scraper are lowered to the pavement by means of their respective levers. If the street is already wet with rain, the brush and scraper are used without the sprinkler.

For sprinkling only, the brush and scraper are raised and one, two, or all three sprinklers used.

The advantages in compactness, convenience, and efficiency obtained by placing all the apparatus between the wheels have already been mentioned. In machines in which the brush, etc., are placed at the back, their weight tends to raise the front wheels. and therefore to diminish the tractive effect. A further advantage is obtained by the addition of the rubber scraper, which is usually an independent hand tool, even when sweeping machines are employed.



AUTOMOBILE STREET SWEEPER AND SPRINKLER.