NEW YORK'S STEEL ROADWAY.

The laying of a track of broad, flat, steel rails on Murray Street, between Broadway and Church Street, which was accomplished the middle of last December, was the second step in the opening of a new era of transportation in this country. The first step was the introduction of automobiles; the second is the building of good roads for them—roads that shall be suitable for horse-drawn vehicles as well.

The steel road, strange as it may seem, was first tried in unprogressive Spain, where a section of it two miles long has undergone the abuses of the heaviest kind of wagon traffic for over ten years, and yet has stood the test well. At the end of seven years, the average cost per year of maintaining the sides and center of the roadway was found to be but $380, as against $5,470 per annum paid to maintain the flint stone paving or surfacing previously used. The wear of the rails themselves was but 0.1 mm., or 0.003 inch a year.

Gen. Roy Stone was the first to see the possibilities of this form of road and to advocate its use in this country, which he did most urgently a year ago, in an address before the Automobile Club of America. President Charles M. Schwab, of the United States Steel Corporation, had some rails rolled after Gen. Stone's designs, and presented them to the Automobile Club, in order that it might lay and test them. It was thought that Murray Street offered the severest testing ground, on account of the heavy trucking through that thoroughfare. Consequently, that was the street chosen in which to make the first test. The rails have been in use two months now, and teamsters driving through Murray Street have learned the advantage in using them. Our illustration gives a good idea of the appearance of the street at present.

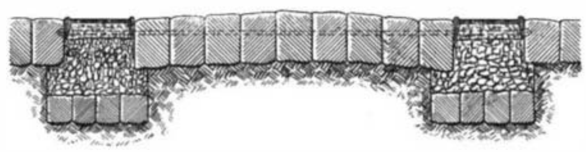
A glance at the cross-sectional cut will show the reader how the roadbed is prepared for laying the rails. Two 18 x 18-inch trenches are dug and filled with 1½-inch broken stone laid over a layer of old paving stones, and top-dressed with 3 inches of fine gravel. The rails are laid on this and fastened together at their ends with fish plates on the sides and bottom, while ¾-inch tie rods at intervals keep them parallel and properly spaced. In building a country road, the earth is graded up to the rail on each side and filled in slightly higher in the center, so as to give the general contour shown in the cross-section.

The rails used in Murray Street are 40 feet long and 1 foot wide, with flanges 3 inches wide on the under side and ⅝ inch wide on the top. The rail is ⅜-inch thick near the flanges, and a trifle thicker in the center. The slight flange on each side of the top of the rail tends to keep a wagon wheel from running off with any slight side-pull, while it can nevertheless easily surmount the flange when the driver wishes to run on or off the track. The rails are laid with the alternate joints on opposite sides, similar to those of a railroad track. The distance from center to center is 5 feet, 6 inches. The weight of the rails is 25 pounds to the foot, or 132 tons per mile, and the estimated cost of a mile of track, including laying, is $4,000. Gen. Stone believes, however, that on country roads lighter and narrower rails weighing but 100 tons per mile can be used, and, with steel at $18 per ton, as it is in times of depression, this figure can be cut in half. When once built, a road of this type will last a generation if the earthen part of it is kept in repair at slight expense.

Comparative tractive tests have demonstrated that the power required to haul a wagon on a steel roadway is less than one-fourth that needed on the ordinary stone road. According to the report of a Pittsburg, Pa., engineer, Mr. F. Melberger, who made some tests with a 1,350-pound wagon on a steel road, the average drawbar pull per ton was but 3.23 pounds, as against 41 pounds per ton on macadam and from 75 to 102 pounds per ton on hard earth roads, as demonstrated by previous experiments made in Atlanta, Ga., under similar conditions. This means that 12 times as much power is required on macadam as on steel, and from 23 to 31 times as much on dirt roads. Experiments also show that the tractive force required on steel is considerably less than on asphalt.

These figures, coupled with those secured by the government as to the cost per ton-mile for haulage on country roads, viz., 25 cents, as against 8 cents per ton-mile in Europe, only go to show how wasteful our present roads are. Of the $90,000,000 expended annually for road transportation of farm products, etc., fully two-thirds is chargeable to poor roads.

With such facts as these before it, it is to be hoped that Congress will have the wisdom to pass the Brownlow bill appropriating $50,000,000 for assisting in building good roads, which, according to the provisions of the bill, may be built with steel rails if desired.



CROSS-SECTION OF STEEL ROADWAY.

APPEARANCE OF STEEL ROADWAY IN MURRAY STREET, NEW YORK.

A CURIOUS CASE OF REGELATION.

Mr. Howard, of Hillsboro, Ohio, sends us a photograph of a lump of ice whose genesis is somewhat puzzling. His account of the affair is as follows:

"During a cold spell several evenings ago, I left one night a graniteware cup full of hydrant water on the floor of a wooden outhouse. There was nothing in the room to disturb it. In the morning the water was frozen, and I was greatly surprised to see a spur two inches long projecting from the block of ice on one side. The cup is about four inches across."

A CURIOUS ICE FORMATION.

Perhaps some of our readers may be able to point out some explanation; meanwhile the following theory has been suggested: The cause of this phenomenon may be somewhat as follows: The water was rapidly cooled, and a layer of ice formed at first on the surface. Then, owing probably to an unusually rapid fall in the temperature and to the fact that the granite basin is a better conductor of heat than the ice and water, a crust of ice formed lining the granite cup, and inclosing, together with the ice on the free surface, a quantity of unfrozen water in the cavity so formed. Any further freezing of water contained in this cavity must now create a pressure there, since the ice formed occupies more space than the water. But as the pressure increases the freezing point falls, as is well known, so that there would be contained within the cavity of the block of ice a quantity of water at a temperature below 32 deg. F., that is to say, below the normal freezing point. A further fall of the temperature caused the formation of some more ice, and, consequently, a further increase in the pressure within the block, until at last this pressure became sufficient to burst the ice, and the water was squirted out in a jet. At the same time the pressure was relieved, and thus the freezing point of the water rose to its normal value, so that the water of the jet, being some degrees below this point, immediately froze as it stood.

A somewhat similar occurrence is described in La Nature as having been observed about the middle of December last. D. Crispo, director of the government laboratories at Antwerp, writes that some of the specimens of water in his laboratory froze in the bottles containing them, and one of the bottles presented a most curious appearance, the ice protruding from its neck in a long, smooth worm, capped by the cork, which was forced out. Mr. Crispo thinks that in this case the ice was gradually squeezed out by the increasing pressure in the bottle, behaving like a viscid liquid in consequence of fusion under pressure and subsequent regelation. He does not think it likely that the water was squirted out suddenly. But it must be noted that the casé recorded by our correspondent offers something different from this. The ice in the bottle might be squeezed through the unyielding glass nozzle, but if we suppose that the spur on the block of ice of our illustration was gradually forced through a hole in the block we are faced by the difficulty that here the aperture itself, having edges of ice and not of hard glass, would itself be melted by the pressure and would widen out, so that no spur could be formed.

We should be interested to hear the views of some of our readers on this matter.

THE ORANGE IN NORTHERN CALIFORNIA.

BY ENOS BROWN.

Planting of the first orange tree in the Sacramento Valley was coincident, almost, with its permanent occupation by Americans. Very few of the early miners dreamed of more than a temporary settlement in the land of gold. They had but one purpose—the sudden acquisition of wealth and a return to their distant homes to enjoy it. To most persons the character and resources of the new country were not even conjectured. Geographical science, fifty-four years ago, probably knew less about California than is now universally known about the interior of Africa. A few years' residence by the new settlers, however, was sufficient to demonstrate the transcendent charm of the climate and the exuberant fertility of the soil, and to convince them of the wonderful agricultural resources of the new land.

Cultivation of the orange as a commercial proposition in these northerly regions was one of the results of the sequestration of placer mining under the anti-debris law—the golden fruit to supply resources that had hitherto been drawn from golden sands. Progress has been rapid. In 1893, but four cars were shipped from the Sacramento Valley. In 1896, shipments had increased to 81 cars, but, in 1901, the total cars shipped out numbered 2,341, a number which fairly entitles northern California to more than a respectable position in the orange fruit trade.

The city of Oroville, Butte County, may be fairly regarded as the center of orange cultivation in the Sacramento Valley. It is 450 miles north of Los Angeles, and in about the latitude of Philadelphia. Soil and climatic conditions are especially favorable here, and the orange tree reaches its fullest proportions and the fruit its most perfect flavor. The mean annual temperature here, as in all the orange growing counties of the valley, averages but four-tenths of a degree below that of Los Angeles. So mild is the climate that frost never damages the orange groves of the locality, neither do pests, which southern orange growers have ceaselessly to combat, ever prove a serious menace. The orange growers of the Sacramento Valley boast that their fruit ripens two months earlier than in southern California, which lies 7 degrees farther south. By the time the northern orange crop is gathered, shipped, and sold, the southern orchardist is beginning to pick his fruit.

Throughout the Sacramento and San Joaquin valleys plantations of orange trees are located on the