A "ROLL-WAY," AND WHAT IT IS.

At a recent meeting of the Civil Engineers Club of Chicago, one of their members, Mr. S. A. Clemens, read a very interesting paper on a novel mode of conveyance which he terms a "roll-way." The author is a practical engineer, and therefore deserves to be heard. He begins by claiming for it greater safety and durability and equal speed than the ordinary railway. After the scheme has been tried and found successful, the claims may be admitted, but at present it will be wise to withhold judgment. The following is an outline of the system:—

The track of this newly-invented roadway consists of a series of pairs of small wheels or rollers, each supported by journal boxes, or equivalents, bolted to timbers, like railroad ties, which are placed side by side and set fast in the ground. The way-rollers of each pair are placed parallel—from 3 to 5 feet apart, according to any determined gauge — and the pairs of rollers may be 8 to 16 feet apart on the line. Midway between the rollers—thus ranged in two parallel rows, is a single guide-rail, the top of which is 3 or 4 inches above the level of the rollers, and its connected sections are strongly fastened to the ground-timbers to which the rollers are secured — thus tying the entire superstructure longitudinally together.

The way-rollers, made of chilled iron, or converted steel castings, are about 5 inches diameter, with 3-inch faces, and have on each side journals of 2½ inches in diameter and length, which revolve on small steel, anti-friction rollers, in chilled-iron journal-boxes, so closed as to exclude both dust and rain. Or, preferably, the way-rollers may be steel or wrought iron tubes about 5 inches long by 4 inches outside diameter, and five-eighths of an inch thick, revolving on steel anti-friction rollers of about three-eighths of an inch diameter, which encircle and roll around a short fixed steel shaft 2 inches in diameter, the ends of which are held in supports of hard wood or iron, bolted to the ground-timbers. These tubular way-rollers are designed of three-fold capacity to safely endure the train-weights at highest speed to which they are to be subjected, while combining low resistance from friction and inertia.

For the purpose of securing favourable grades and curves the ground-line is prepared like the ordinary road-bed, with the exception that the grade is not necessarily required to be continuous.

The cars are to be from 30 to 50 feet in length, with timber-runners shod with steel, and elastic rubber cushions to run over the rollers, while a system of guide-rollers provided with flanges run along the central or guide-rail to keep the cars from leaving the track. The outside rollers are placed at intervals, so that the runners of the car overlap at least three of them at the same time, while they may be placed closer together if it is found to be desirable.

The locomotives have an under construction similar to the cars, with steel-shod runners upon the outer lines of rollers, and secured to the central or guide rail by flanged rollers. The driving-wheels of the locomotive are horizontal, in pairs, and bear on opposite sides of the double-headed guide-rail. They may be of about 18 inches diameter, and are fastened on the lower ends of vertical shafts, to the upper ends of which the steam-power is applied by direct attachment. Adjustable pressure, for tractive adhesion of the driving-wheels to the guide-rail, is obtained by a spring-cushioned screw or eccentric rolling pressure, at the control of the engineman. This is similar to apparatus for a like purpose used on the middle-rail railway system, devised and applied in America nearly thirty-five years ago by Mr. G. E. Sellers, and recently in use on the Mont Cenis railway.

The roll-way car-brakes are arranged to act directly on opposite sides of the guide-rail, and they may be made on any operating principle now approved by railway usage. At road crossings of the roll-way a section of the guide-rail is left out, and the crossing space between adjacent pairs of the way-rollers is open and unobstructed by any part of the superstructure. This is made practicable by providing flanges on two or three pairs of the way-rollers on each side of the crossing. The flanged rollers guide the car-runners in straight lines over the crossing, on the further side of which the driving-wheels and guide-rollers again come into position on the opposite sides of the guide-rail. In this way obviously the crossing can be made at any desired height above the intersecting road, be it of whatever class, a desideratum which is not practicable with railways, aside from the cost and wear of crossing-rails in the latter.

For switching this new style of cars and locomotives, the inventor has a section of guide-rail on the line, which, being pivoted at one end, is swung outward at the opposite end, to meet in line with an outside section of switch guide-rail which is swung inwardly, both moving simultaneously, by mutual connection to the same switch-lever. Pairs of way-rollers are so placed to form the switch or turn-out line, upon which the car-runners are directed, by the guide-wheels of the train bearing against the switch guide-rail. In this way all costly, destructible apparatus like a railway switch-frog is avoided.

The timber-plant for supporting each pair of way-rollers may consist of two common railroad-ties, laid side by side across the line, and resting on three short sleepers of like material, sunk below the surface of the ground. To this the guide-rail and way-rollers are fastened by long, strong lag-screws. Otherwise, three pile-posts of length and size to carry the grade over moderate undulations may be driven deep below frost, and two transverse connecting cap-timbers, on opposite sides of the pile-heads, serve for the attachment of the guide rail and of the journal-boxes of the rollers. The roll way can thus be carried above the general surface, unobstructed by deep snow on the occurrence of inundations in valleys. Furthermore, in this mode of making the roadway, it is unnecessary to move the ground for grading, save in places requiring deep cutting or embankment. The economy of cost can be increased by using steam-power machinery to drive and dress the heads of the pile-posts, for fitting on the cap-pieces, the apparatus being carried on the structure, which is made as it progresses.

Steep grades are to be overcome by having stationary auxiliary steam-power, by connecting on the same shaft a pair of way-rollers, and this is repeated at intervals of three or five hundred feet on the line of ascent. On one extended end of each shaft a simple form of rotary engine is attached, to operate which steam is supplied by a protected steam-pipe underground along the line, connected with stationary boilers suitably located. For this use reversible, reactory engines on the Parker-mill rotary plan, are preferable for their simplicity and cheapness. The weight of the train resting on the rollers affords adhesion to the runners, and the attached rotary engine causes the connected rollers to revolve and propel the train. Arrangements are provided for the automatic admission of steam to each rotary successively on the approach of the train, and also to shut off steam as the rear end of the train passes over. For underground and elevated lines of transit the system is especially urged for its cheapness and security.

The claim is set up in its behalf that the cost of constructing the roll-way is from one-half to two-thirds less than the ordinary railway, while the cost of equipment is proportionately smaller. The following are the inventor's comparative estimates of roll-way superstructures: — 3½ railroad ties, $1 40 c; 42 feet 4 by 8 inches pine scantling, 67 c.; 14 feet oak, 4 by 5 inches, 42 c; 160 pounds iron guide-rail, $7 20 c.; 18 pounds bolts and lag-screws at 8 c., $1 34 c.; 4 pounds spikes at 5 c., 20 c.; 1 pair way-rollers, $4; 1 day labour. $2 50 c.; cost per mile, $17 83 c. × 330, or $5,883 90 c.

When the superstructure is made on short pile-posts, as previously described, the cost of materials does not exceed that on ties, given in the column above, while the estimated expense for labour on track-work and grading is less. The following is a comparison of cost per mile of superstructure, including ties on roll-ways and railways:—

Railway, standard 4 feet 8½ inch gauge, $11,735; Roll-way, 5 feet gauge, $5,883.90c.; ratio, as 1 to 0·5. Cost of freight trains of 200 tons load capacity:— Railway, 20 box cars, $13,700; engine $12,000.—$35,700; roll-way, 13 box cars, $6,500; engine, $5,000.—$11,500; ratio, as 1 to 0·44 dols. Dead weights of trains of 200 tons load capacity: — Railway, 20 cars, weight 190 tons, 1 engine and tender, 35 tons, 225 tons; roll-way, 13 cars, weight 91 tons, 1 engine, 15 tons, 106 tons; ratio, as 1 to 0·47. Resistance of loaded trains at 30 miles an hour, on level: — Railway, 225 + 200 425 tons, 13 lb. coefficient per ton, 5,525 lb.; roll-way, 106 + 200 — 306 tons 7 lb. estimated per ton, 2,149 lb, ratio, as 1 to 0·38. Starting resistance of loaded trains on level way: Railway is 425 tons, 18 lb. coefficient of starting R, 7,650 lb.; roll-way is 306 tons, 6 lb. coefficient of starting R, 1,836 lb., ratio, as 1 to 0·24.