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NEW SERIES

GATLING'S MACHINE FOR PULVERIZING THE SOIL.

Like all perfected inventions the practical steam plow is to be reached by a series of improvements in successive steps, and to this end we call attention to the invention here illustrated. It is essentially a revolving cultivator, which is to be drawn over the ground by animals, reserving its power of a steam engine attached to the machine, to dig up and pulverize the soil by revolving the cultivator head as hereafter described. A stout frame, running upon low wheels, carries the small steam engine, A, upon its forward part, and has the revolving, hollow, lens-shaped box, B, hung in close proximity to

turning the box, B, so that a line joining the two rows of teeth will be in a horizontal position.

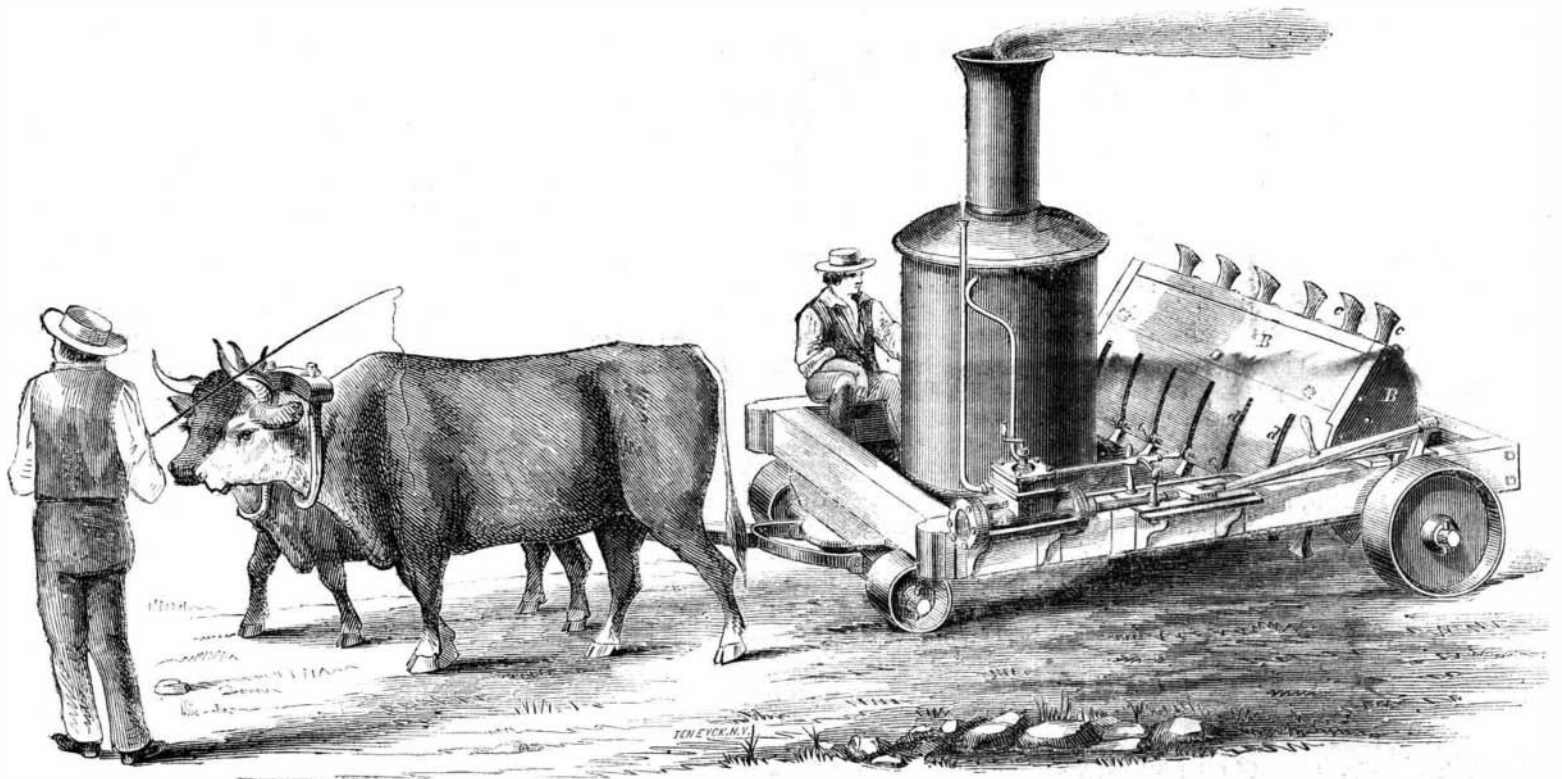
The patent for this invention was granted through the Scientific American Patent Agency, on the 29th of May, 1860, and further information in relation to it may be obtained by addressing the inventor, R. J. Gatling, at Indianapolis, Ind.

ENGLISH AND AMERICAN RAILROADS.

We find the following article in the London *Engineer*, which extracts it from the London *Spectator* :—

Even with these qualifications, we English, who take so great a pride in the prosperity of our country, in the

English railways at 4.1 per cent, for American railways at 6.7 per cent. If we compare the aggregate of several railways in the two countries, the results are even more striking. We take fifty English railways, including the metropolitan lines, and fifty American railways in what we may call the midland district. Here we find that, as usual, the cost of the English exceeds the American, being £247,000,000 sterling here against £54,500,000 there. The gross revenue in England is £20,000,000, in America nearly £9,250,000. The aggregate net revenue in England is £10,500,000; in America, nearly £4,500,000. But what is the dividend per cent?—for that is the point which most concerns the



GATLING'S MACHINE FOR BREAKING AND PULVERIZING THE SOIL.

its rear axle. The steam engine is connected by a rod with a crank upon the axle of the box, B, so that it may cause the latter to rotate. Upon each edge of the box, B, is a row of cultivator teeth, c c, which, as the box rotates, are forced through the soil, pulverizing it in the most effectual manner. The teeth are so arranged in the two edges of the box, that each tooth in one row may pass between the tracks of two teeth in the other row, so as to leave no portion of the soil unwrought. The shanks of the teeth are fastened at their inner ends by pivots, so that they may swing back in the long slots, d d, in the sides of the box, and they are held in place and prevented from thus swinging back by the wooden pins, e e. The object of this arrangement is to prevent the teeth from being broken in case they should encounter a stump or other rigid object, as the wooden pins would give way and allow the teeth to swing back. The pivots of the teeth-shanks are placed eccentric to the shaft of the box, B, so that as the teeth swing back they may be carried above the obstruction. Whenever a wooden pin is thus broken the damage can be quickly and cheaply repaired. The revolutions of the box, B, it will be seen, aid in propelling the machine along on its course. The teeth are thrown out of work by simply

returns of capital invested upon our land, and in the certainty of our commercial transactions, may look with some respect upon the actual results of railway enterprise in the United States. Considering the immense spread of the American territory, it is not surprising that the extent of railroads should exceed ours as it does—26,210 miles there against 9,119 here. But the comparison holds good even with regard to population; for every million of people in England, there are 378 miles of railway open; in the United States, 674. The Americans manage to make their railways cheaper for all classes; the average charge for first-class carriages in England is 2d. per mile; in America, 1d. The charge for second-class passengers there is one-third of our average, and for third-class passengers a trifle more than one-third. Yet it is notorious that in convenience and comfort the American carriages greatly exceed the English. The total cost of all the railways in use in England is £304,000,000; in America, £216,000,000. There, 26,000 miles have cost little more than two-thirds of the money paid for 9,000 here. In America, there has been a larger draught upon capital for the purpose of construction and working, and what are the returns? Captain Galton states the net earnings for

shareholder—it is, in England, 4.25 per cent, in America, 8.06 per cent.

SPHEROIDAL CONDITION OF BODIES.—M. Boutigny d'Eyroux, whose work on the spheroidal state of bodies has gained him a wide reputation, in a recent communication to the Paris Academy of Sciences, makes objection to the limited manner in which this spheroidal state is recorded in many works on physics. The term should not be exclusively applied to liquids, for solids are likewise susceptible of assuming it. Wax, suet, camphor, bi-chloride of mercury, chloride of ammonium, nitrate of ammonia, stearic acid, margaric acid, and other substances, pass directly to a spheroidal state without at first becoming liquid. If a piece of ice be made to take the spheroidal state, and then be thrown upon the back of the hand—in which experiment the product is partly in the spheroidal state and partly solid—two very distinct sensations will be produced at short intervals: first, that of a temperature nearly that of boiling water; and next, that of cold—nearly two degrees. These changes in temperature are easily determined by a thermometer, if larger quantities be operated upon.