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II.


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## A NEW POLICY IN LAW.

The impolicy of buying any species of property, without first making sure that the would-be seller has a legal right to sell, has been pretty thoroughly learned by most men. There are swindlers in every business, who are never better pleased than when they can "sell" an over-coufiding buyer by persuading him to pay for property to which they can giveno title. And when the dishonest seller has taken himself out of the way, and the honest but incautious buyer finds that he has paid for something he cannot hold, the real title being vested in another, the case seems very hard. But the fact that the buyer purchased in good faith is not accepted
in any court as a valid reason for his holding the property against the actual owner. To overturn this just rule of the law would open the way to no end of injustice. It would make it impossible for the owner of any piece of property to retain possession of it, unless he were endowed with practical omniscience and omnipresence, that he might always know when and where he was likely to be defrauded by a false sale in which the purchaser should act in good faith, and at the same time be able to appear on the spot at the critical moment to disprove the fraudulent seller's claim to proprietorship. On such terms no property would be worth the trouble and cost of maintaining possession of it.
For instance, what would any man's farm be worth if any swindler could sell it from under him; or, what amounts to the same thing, if any buyer, purchasing in good faith, could hold the property on that plea alone and in spite of the seller's lack of ownership? Or what would any horse or wagon, plow or thrashing machine be worth, if any thief could sell it and the purchaser's title be good simply because he bought in good faith and for his own use?
It is sheer absurdity to ask such questions; and no one would be quicker than farmers to denounce such a reversal of the rules of law, were such a thing proposed, however much the innocent purchaser might suffer from bis investments in stolen goods. The courts very properly hold that it is the buyer's business to find out whether the man he buys of has a right to sell; and if he neglects so to do, he, and not the true owner, must suffer the consequences. The convicted; but it is no part of its business to make good the buyer's loss-certainly not at the cost of the real owner of the property.
The nature of the property sold does not alter in any way the moral or legal principles involved. The buyer can gain no title beyond that which the seller is able to convey. This is common sense, as it is common law. Yet a body of people styling themselves the National Grange Patrons of Husbandry have had the assurance to petition Congress to reverse this rule in all questions pertaining to patent rights. And the farmers of Northern Indiana have induced their representative, Mr. Baker, to introduce into the House a bill designed to make good faith on the part of the purchaser of a patent right a legal title to ownership, though the seller has no title to convey.
That a great many farmers hàve been swindled by fraudulent patent sellers is only too true. So other men have bought stolen horses in good faith, and town lots to which the seller had no legal title, and mining claims that had been uttered by men without proper authority to issue them, and stolen bonds, and in a thousand ways have paid their money and had no choice but to consider their loss the purchase price of dear experience. It remained for farmers to demand of Congress a special law for their protection, to shift the burden of their unwisdom to the shoulders of the rightful owners of what they thought they were buying.

## THE ATCHISON, TOPEKA AND SANTA FE RAILROAD OVER THE RATON MOUNTAINS.

The railroad over the Raton Mountains, of standard 4 81/2" gauge, is a branch of the Atchison, Topeka and Santa Fé Railroad, under the names of Pueblo and Arkansas Valley, in Colorado, and New Mexico and Southern Pacific, in the Territory of New Mexico. The Ratons, a spur of the Sangre de Christo range, culminate in Raton (or Fisher's) Peak, 9,800 feet above the level of the sea, while the summit of Raton's Pass is reached by the grade line at an elevation of 7,720 feet above the same plane. The following details of grade and curvature are condensed from a paper read by Mr. James D. Burr before the American Society of Civil Engineers:

From La Junta, Col., to Trinidad, a distance of 81 miles, maximum ascending grades of 60 feet per mile have been used, with adverse grades of 30 feet per mile. Curves of 1,146 feet radius are used, with a compensation or reduction of grades on curves at the rate of 0.05 foot each 100 feet for each degree of curvature. Between La Junta and Trinidad there are but three short planes of descending gradients of any considerable moment. In order to locate a line on 30
feet, ascending grades to the north, from La Junta to Trini-dad-compared with the location of the Kansas Pacific surveys made in 1871-2 on 70 feet maximum gradients each way -a loss of 3,000 feet in distance was sustained. From Trinidad the line follows the valley of the Purgatoire thence, turning sharply to the south, it ascends the northern
slope of the mountain proper by Raton Cañon, on two planes. The first plane, from the mouth of Raton Creek to Morley, 8 miles, is nearly a uniform ascent of $105 \cdot 6$ feet per mile. At Morley, with an elevation of 6,727 feet above tide water, a water tank, turn-table, etc, have been established. At the south end of this grade the second inclined plane commences, having 3.5 per cent maximum grades. Between Morley
and Summit there are 3 miles of maximum supported grade. The average ascent is $151 \cdot 4$ feet per mile.

The summit is passed by a tunnel, which will be 2,011 feet long. At the south portal of this, 7,584 feet above ths sea, the line commences to descend the southern slope of th: mountain, on 3.32 per cent maximum gradients, to Willow Springs, which has an elevation of 6,595 feet above tide, having made a descent of 990 feet in 38,400 feet, or a un form gradient of 2.58 per cent. On the mountain divisiof, from Trinidad to Willow Springs, maximum curves of $573 \cdot 7$ feet radius are freely used. Maximum grades are compensated for curvature at a rate of 0.05 feet per degree of curva ture, each 100 feet. The outer rail has been elevated at the rate of $1 / 2$ inch per degree of curvature. From Willow Springs to Las Vegas, 110 miles beyond, the line has been located on 70 foot maximum gradients, with $6^{\circ}$ curves from aximum curvature.
The excavation at each end of the tunnel being very deep, 56 feet at the north portal and 50 feet at the south end, mostly in solid rock; a shaft near the south portal was begun on June 1. The shaft reached the roof of the tunnel section July 9. Up to August 31 the track had reached a point 65 miles south of La Junta, and it became evident that the com pletion of the tunnel must be hastened or a temporary track built over the mountains to avoid delay. It was, therefore, decided to build the mountain track, and a location for a "switch-back" was made at once. Before the close of De cember, 1878, the track had been laid, and the work of transporting material for the construction of 118 miles of the N. M. and S. P. Railroad began. At first the switch back was operated by the ordinary eight-wheeled American en gines, with 17 inch by 24 inch cylinders, 60 inch driving wheels, weighing about 35 tons; but the advent of the " Uncle Dick," a "consolidation" eight wheeled connected engine from the Baldwin shops, revolutionized transportation on the "Mountain Top" line.
The ordinary round trip, $51 / 2$ miles, requires 50 minutes. The ordinary train consists of 7 loaded cars, of 43,000 pounds each; tank of coal, 44,000 pounds; and engine, say 120,030 pounds. Eight loaded cars can be taken over at one tinae quite readily, and at one time 9 loaded cars were taken at one trip, so that during the day of ten hours $6,020,000$ pounds could very readily be moved over the mountain with one engine. The capacity of engines of this class is more han double that of the two engines of 16 inch by 24 inch cylinders, while the quantity of coal consumed is but little more than that consumed by a single light engine. As to controlling trains on these steep inclines it is a question of brake and adhesion to the rail. Under fair conditions of rail one single hand-brake to each car, together with the drive and tank brake, with three brakemen to a train of eight cars, is sufficient for safety, unless the train should acquire a speed of 18 . to 20 miles per hour, in which event all the wheels in the train might be skidded far enough to lead to disaster. In the "Uncle Dick" this is reduced to a mini mum; for, as sand can be delivered ałong the rails in front of all the wheels, and two sets of air brakes may act on all drivers simultaneously with sufficient force to slide all the wheels, the maximum of adhesion is obtained.

## DR. DANIEL DRAPER'S CONTRIBUTIONS TO

 METEOROLOGY.In his report as Director of the New York Meteorological Observatory, for 1878, Dr. Daniel Draper takes occasion to review-briefly the work done by him in the observatory during the ten years since it was founded and placed in his charge. The high value of this work can be fully appreciated only by those familiar with the influence which his inventions have had in promoting the constant and exact re cording of weather changes by automatic apparatus, and the important bearing which his special studies of climate have had on the recent rapid progress of the science of meteorology.

These studies have been serviceable in two directions-in orrecting popular errors with regard to climatic changes, and in solving great problems in connection with the gene ral sweep and movement of atmospheric changes.
Of the former sort may be mentioned the researches provng that, contrary to popular impression, the clearing of and does not diminish the fall of rain; that the climate of the Atlantic States is not undergoing appreciable change and that, considered in periods of five years, the summer temperature of the United States has not undergone any modification.
Of the latter sort are the determination of the great law that a very large proportion of the atmospheric fluctuations of the United States cross the country from west to east; that these fluctuations continue across the Atlantic, and that the time of their arrival on the European coast may be predicted. It is on the basis of these studies that the suc cessful prediction of the arrival of American storms in Europe has been made possible, an achievement of the high est scientific and practical value.
In the meantime Dr. Draper has, as already remarked, invented and improved a variety of meteorological apparatus by which the work of meteorological observation has been turned over to automatic machinery, and the records of atmospheric fluctuations made continuous and unerringly ac curate. The several pieces of apparatus employed in the observatory are minutely described by Dr. Draper in his report, and the descriptions, with engravings, appear in the current issue of the Scientific American Supplement
The entire outfit of a working observatory is covered by

