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NEW YORK, SATURDAY, JANUARY 3, 1880.

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(Illustrated articles are marked with an asterisk.)

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For the Week ending January 3, 1880. Price 10 cents. For sale by all newsdealers.

Table of contents for the supplement, categorized by I. ENGINEERING AND MECHANICS, II. TECHNOLOGY AND CHEMISTRY, III. GEOGRAPHY, IV. ELECTRICITY, etc.

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-confiding buyer by persuading him to pay for property to which they can give no title.

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?

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 his investments in stolen goods.

That a great many farmers have 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 no legal standing, and railway stocks which 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.

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.

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

The railroad over the Raton Mountains, of standard 4 3/4" gauge, is a branch of the Atchison, Topeka and Santa Fe Railroad, under the names of Pueblo and Arkansas Valley, in Colorado, and New Mexico and Southern Pacific, in the Territory of New Mexico.

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.

and Summit there are 3 miles of maximum supported grade. The average ascent is 151.4 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 the sea, the line commences to descend the southern slope of the 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 uniform gradient of 2.58 per cent.

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 completion of the tunnel must be hastened or a temporary track built over the mountains to avoid delay.

The ordinary round trip, 5 1/2 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 120,000 pounds. Eight loaded cars can be taken over at one time 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.

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.

These studies have been serviceable in two directions—in correcting popular errors with regard to climatic changes, and in solving great problems in connection with the general sweep and movement of atmospheric changes.

Of the former sort may be mentioned the researches proving that, contrary to popular impression, the clearing of land 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.

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 accurate.

The entire outfit of a working observatory is covered by