

the present land movement, and to prepare the way for it is the object of the Public Land Commission sent out by the last Congress, with Messrs. Hayden, Powell, and Clarence King in charge. These gentlemen have made their preliminary report, full of desert as usual. The two former are professional desert makers, and Clarence King is a member of the firm of Davis & King, who have a herd of over 20,000 cattle in this desert—"the herdsman's paradise." The report to Congress was, of course, a foregone conclusion."

The prize in this contest is the control of nearly 500,000,000 acres of land, which the herdsmen want to have divided into large tracts and leased at low rates for grazing; while their opponents, who last year carved 100,000 new farms out of the desert, are equally anxious that the present quarter-section system shall be preserved.

The top soil of the larger part of the disputed region is identical with the loess of the Rhine Valley and of the most fertile parts of China, and lies from two to five feet deep, slightly colored with burnt or decayed vegetation. The subsoil is the same in composition but uncolored, showing its original light brownish-yellow hues. During the present year the pioneer farmers promise to exceed the work of last year in winning over a broad belt of the "desert" by covering the ground with crops and making way for a still further advance of rainfall.

#### THE MINING DEBRIS PROBLEM IN CALIFORNIA.

A recent report to the U. S. Chief of Engineers, by Lieutenant-Colonel G. H. Mendell, reviews at considerable length the changes wrought in the Sacramento River and its tributaries by placer and hydraulic mining, and proposes a system of dams for arresting the destruction of those streams and the progressive covering of their valleys with mining debris. Already the alluvial lands thus buried are estimated at 14,600 acres; and the river beds have been raised so high that they are constantly making new channels, causing heavy losses to farmers and the apprehensions of graver disasters in the future. The chief source of the trouble at present is hydraulic mining, placer mining having for the most become a thing of the past, and quartz mining adding but little to the debris. On this point Lieutenant-Colonel Mendell says:

"Although the hydraulic miner is now unquestionably responsible for the continual accretions that raise the levels of the beds of the watercourses year by year, yet the history of these deposits show that he is not responsible for all that is past. Hydraulic mining, in the effective form it now presents, is of quite modern growth. The earlier mining done from 1848 to 1860 was done by manual labor. Water was used to work out the gold, but was not used to excavate to any great extent. The water was not used under pressure. During these years, and especially during the first five or six years, counting from 1848, many thousands of men were employed in placer mining all through the gold districts. During all these years there was no great flood. The winter of 1861-62 was the occasion of the severest flood California has known since 1848. This flood found all the little gulches and the beds of larger streams stored with the material resulting from ten years' mining. This freshet brought the sand and gravel down in immense quantities. Whatever filling of the channel may have taken place previous to this time, it appears to have escaped notice. The winter of 1865, which gave high water, increased the evil. The placer mining had been nearly if not entirely exhausted by this time. Each successive flood has made things worse and worse."

The quantity of earth washed into the rivers by hydraulic mining is shown in the following estimates:

An inch of water running for 24 hours is taken to be 2,230 cubic feet. On the San Juan ridge, between the South and Middle Yuba, the State Engineer reports that in the year beginning November, 1878, 2,819,317 inches of water were used, while the quantity ascertained to have been used during the same time in the drainage basin of the Yuba is 5,893,962 inches.

An inch of water will excavate at all rates from 1 to 7 or 8 cubic yards of earth. The Spring Valley mines at Cherokee have been excavated to the extent of 23,000,000 cubic yards in 7 years, with an average quantity of 2,250 inches. Allowing 310 days to the year, the daily excavation for an inch of water is about 4 yards. The material here is very light, mostly sand, fine gravel, and clay in cliffs 400 feet high. The grades of the sluice is perhaps an average, being 1 foot in 24.

It would, perhaps, be an excessive allowance to apply this rate of excavation to the Yubas. It is, however, within the probable limits of truth to place the amount of material excavated in the basin of the Yuba at  $2\frac{1}{2}$  yards to the inch. This allowance makes their early amount placed in the stream and its tributaries at 14,000,000 or 15,000,000 cubic yards. On the other mining streams, the Feather, Bear, and American, there is no reliable information as to the amount excavated and deposited in the streams.

The attempt has been made to estimate the quantity of material in the Yuba and Bear rivers that has not yet reached the navigation lines, but which lies in the path of the floods, and is, therefore, liable to be washed farther and farther in greater or less degree, by every freshet. These deposits are the result of past mining. If no more were added, they are yet capable of doing a great injury to the water courses below.

The amount lying in the bed of the main Yuba and its branches, above the Yuba mill, is 49,263,200 cubic yards. The amount below the Yuba mill as far as Marysville, 14,600

acres covered, average depth assumed to be 4 feet, is 94,288,664. Total, 143,551,864.

On the Bear River the estimate is 148,248,000, of which 62,088,000 lies in the plains, and 86,160,000 cubic yards are in the bed of the stream above the foothills. This estimate makes the total amount in the two streams to be 291,799,864 cubic yards. It is not pretended that this estimate is accurate. It could not be so without boring the deposits in thousands of places. It is made from the best information available. Its use, in its imperfect accuracy, is to convey to those who have not the opportunity of seeing it some conception of the enormous dimensions of the phenomenon.

The character of this deposit has already been defined. It is sand, gravel, "slickens" (fine sand and clay), and stones.

The part that has reached the plains to this time is sand, gravel, and slickens. The layer of gravel and cobbles remain, as yet, in the foothills. There is some coarse gravel in the Yuba, four or five miles below the Yuba mills.

The Yuba having been filled 125 feet at Smartsville, and perhaps 15 feet at Marysville, the slope of the river between these points, a distance of 18 miles, has been increased 110 feet, which is about 6 feet per mile. This about doubles the original slope.

This tendency to increase the slope of this part of the river brings the gravel lower and lower. This is counteracted, to some extent, by the great breadth of the stream in the plains at high water. Small gravel is, however, found now in small quantities within three or four miles of Marysville. With the increase of slope under the influence of freshets we must expect this gravel to reach first the Feather, and in due time the Sacramento. Once in either of these streams in considerable quantities, it cannot be expected to move under the influence of the current, or if it did, the effect would be to transfer it to a more objectionable place. In the Feather the pools that formerly alternated with ripples have been filled. It is estimated by the State Engineer Department that there is a deposit in the Feather River of 40,000,000 cubic yards, and in the Sacramento below the mouth of the Feather something like 100,000,000 cubic yards.

Great as are the quantities of sand and gravel already washed into the streams, the remaining gold-bearing gravel ranges contain vastly more, which future mining is sure to displace. It thus becomes a matter of vital importance to arrest the flow of detritus into and upon the river valleys, which can be done only by storing it in places where it can do little harm. To this end storage reservoirs are proposed in the foothills of the Sierra Nevadas, to be formed by throwing dams, or more correctly rip-rap obstructions, across the streams into which the material is discharged from them. The stones required are found abundantly in the foothills, and they have only to be loosely piled together, the slopes of the mass to depend upon the size of the material.

The construction of dams of this sort is inexpensive, involving no skilled labor. It is estimated that in the first three dams of the Yuba River 1 cubic yard of stone will impound 242 cubic yards of detritus. For the other dams, six or more in number, 1 cubic yard of stone will impound about 580 yards. The estimated average cost of the first three dams is put at \$1.50 per yard; for the remaining dams \$2.50 a yard. For the lower dams the total average cost will be about three-fifths of a cent for each cubic yard of detritus stored. For the upper dams, the bed of the stream having been brought to a slope of 10 feet to the mile, the expense of storage will be reduced to less than half a cent a yard. No calculation has been made for the American or the Bear River, but the cost for these is thought to be less, for the reason that the amount of mining on them is less than on the Yuba.

For the further protection of the Sacramento River the filling up of one of the low districts between the Feather and the American river by its conversion into a storage basin, is suggested. Some parts of this land are represented to lie as much as 20 feet below the banks. The average depth has been estimated at 12 feet. The area is said to be in the neighborhood of 60 square miles. Admitting these statements to be exact, the storage capacity of this basin, filled to the banks, will be about 700,000,000 cubic yards.

It is believed to be practicable to turn the Feather and American rivers into this basin, and make them deposit therein the sands which they bring down. No objection is now seen to turning the American in this way. It is not navigable. The diversion could not fail to be beneficial to the Sacramento.

The Feather differs from the Sacramento in being a larger stream, and consequently likely to be more expensive to divert, and also in being navigable. It is now the outlet for a certain district of country and maintains a small commerce.

It is recommended that a full investigation of this problem be made as soon as possible for future guidance.

The only alternative to these works for arresting the flow of mining debris is the entire cessation of hydraulic mining; and even with that heroic remedy it would still be necessary to restrain the many millions of cubic yards of detritus already lying in the path of freshets, which year by year bear down vast quantities of sand and gravel to the destruction of the lower valleys.

#### Sudden Death from Electric Shock.

A serious illustration of the risk attending electric shocks, even when apparently slight, occurred recently in New Haven, Conn. A gentleman was induced to try a shock "just for fun," from the machine of an itinerant peddler of

electricity. He turned away, but had not gone far when he was seen to stagger and fall. He was picked up unconscious, and remained so until he died, two days after. The physicians pronounced it a case of apoplexy, superinduced by the electric shock.

#### Those Dreadful Moles.

On a visit to the country, a few miles from the city, the other day, we crossed a lawn perforated with holes, and the entire surface so ridged by moles that in walking over it the foot sank deep into the sod at every step. We have never before known these pests to pursue their digging operations through the winter, in this region, and are led to inquire if it is owing to the open winter, or to an increase in the number of these rodents, which has caused the apparent destruction of a cherished lawn. It is discouraging enough to have to contend with these pestiferous diggers from May till November, but now to find them burrowing along the surface in midwinter is an annoyance only the best of natures can cheerfully endure.

Many agricultural writers contend that moles are beneficial to the farm and garden. They may be, but their usefulness is a subject we are not disposed to discuss at this time; but what we would like to know is, what better methods there are for producing mortality among them than the various kinds of traps and other appliances which have been described in these columns. Inventors will find mole annihilators a profitable field for their genius.

#### Artesian Well at the Fifth Avenue Hotel, New York.

For some time past a drill has been gradually working its way down toward the center of the earth from the basement of the Fifth Avenue Hotel, whose proprietors hope to reach a supply of fresh water for that establishment and avoid having to pay the tax for croton. The well has already reached a depth of more than 1,000 feet, and is deepening at the rate of about 20 feet per day. A *Tribune* reporter called to see the drilling recently, and gives the following account:

Passing through the wide entrance on Twenty-fourth street, where the marketing of the hotel is delivered, and picking his way through a labyrinth of wagons laden with dressed meats, fowls, vegetables, etc., the reporter found himself in front of a partially inclosed space in which the engine, steam pump, and drill were at work. The drill proper, as the engineer explained, consists of a steel pipe,  $\frac{1}{4}$  inch in thickness,  $2\frac{1}{2}$  inches in diameter, and about 11 feet long, in the cutting end of which are set fifteen diamonds, ranging in size from one to three and one-half carats. These cut a circle down into the rock, of which the "core" goes into the pipe—to be drawn up when the section is filled. The drill has section after section screwed to it as the depth of the well increases; it is forced downward by hydraulic pressure, and is turned by the engine. Whenever the drill requires examination, or the removal of the core, each section must be unscrewed as it is brought up, and joined again, piece by piece, when the drill is to be lowered for further work. The diamonds become blunted after a certain amount of cutting, and must either be reset or replaced. The durability of the drill varies with the character of the rock which it penetrates. In this well the average wear has been 110 feet, though in one passage of 137 feet, through almost pure quartz, it had to be withdrawn and renewed for every 8 feet passed through. In sandstone the same drill would have endured through about 900 feet.

The core which has been taken from the drill shows the strata of the island; thus far it has been principally of granite and gneiss, with the stratum of quartz referred to. At its present depth the rock is more broken and pebbly, and recently several narrow veins of sandstone have been encountered, so that the immediate prospect seems encouraging.

"There is water down there somewhere," said the engineer in charge, and we intend to keep on down until we reach it, no matter how far we must continue." He then referred to a well in Chicago in which the boring had been continued more than 2,000 feet, and the result had been gratifying.

#### A Large Block of Sandstone.

At the Dark Hollow stone quarry, near Bedford, O., one of the largest stones ever blasted in this country was "lifted" a week or two ago. The stone is 40 by 50 feet square and about 30 feet thick, and it required 185 slip wedges to make a successful blast. When cut up into pieces it will make nearly 300 car loads of building stone. Immense blocks of stone are frequently taken out of the quarries here which would make the stones in Solomon's Temple mere pebbles in comparison. Its weight was estimated to be about 6,000,000 pounds.

#### Petroleum for Coughs.

Dr. Moubre, writing to the *Gazette des Hopitaux*, gives his experience of petroleum capsules in simple and chronic bronchitis. This balsamic had been brought before the Therapeutic Society by Dr. Blache a year ago, at the suggestion of a Paris chemist, who named it Gabian oil, in order to prevent public prejudice. Each capsule contains 25 centigrammes of pure petroleum, the ordinary oil not being used, as it has to be distilled in contact with sulphuric acid to render it fit for lighting purposes. At the Hospital Beaujon, where these capsules have been freely ordered for chronic bronchitis, a rapid diminution of the secretion and fits of coughing were observed. In tuberculosis this medicine gave encouraging results.