

## THE GRAND CANYON OF THE COLORADO.

BY H. C. HOVEY.

Tourists should know, to begin with, that, as there is but one Niagara, and a single Mammoth Cave, so there is only one Grand Canyon. The next point to be plainly stated is that the canyons washed by the Colorado River on its way to the Gulf of California are not in the State of Colorado, but sweep down from Utah through northern Arizona. This information is by no means superfluous; for travelers of average intelligence and presumable veracity have repeatedly assured me that they had visited the Grand Canyon, when in fact they had not been within 500 miles of it. They were thinking of the Royal Gorge, or other gorges that are commonplace compared with the enormous and magnificent canyons of the Colorado.

Clarence Dutton's costly atlas of this district is rarely found, except in large libraries. The atlas sheets prepared with skill and conscientious care by the U. S. Geological Survey are not yet accessible to the public. Such progress has been made in Arizona, during the past decade, both as regards exploration and development, that the map makers find it hard to keep up. Meanwhile the maps ordinarily found in the schools, and elsewhere, abound in errors. The accompanying sketch, modified from one by R. B. Stanton, C.E., may be found serviceable so far as the modes of approaching the Grand Canyon are concerned.

Whatever might be true for explorers ready for wild marches and desert work, the only points from which the Grand Canyon is accessible for tourists lie along the Atlantic and Pacific division of the Great Santa Fe route. Being the first visitor of the season this year, my experiences may be of use to others. Arriving in Arizona in March, the heavy snow drifts made it impracticable to reach "the Rim" by any route until they had partially melted. But on returning to the Territory, after a fortnight spent in Southern California, I resolved to make the attempt, although warned of its difficulties, and aware that last year there were no visitors prior to May, a month later than the date of my trip.

There are four different routes from the line of the railroad. Each of these has its attractions and enthusiastic advocates. The trail from Peach Springs, over which a line of stages is run by Mr. Julius Farley, has the decided advantage of being far shorter than any other, reaching the Grand Canyon in 18 miles, with an easy grade and plenty of water. It first strikes Diamond Creek, which leads into the main canyon at the apex of a great bend. The scenery is picturesque and impressive; and it was here that Lieutenant Ives, in April, 1858, obtained his first view of this wonderland. It was here also that Professor Newberry descended to the inner gorge. If one had the time, and could afford to make more than one trip, he would be rewarded for including the Peach Springs route in his plans. But the walls are lower here than at places reached by other routes, and therefore few tourists now make the trip. From Williams there are two roads. One leads to the junction of the Cataract Canyon with the Grand, an estimated distance of 65 miles, and is traversed by a good stage line, of which Mr. W. W. Bass is the proprietor. In the side canyon just named are numerous sparkling cascades, the finest of which is the "Bridal Veil." In this vicinity dwell the peaceful Supai Indians, whose boast it is that in all their history as a tribe they have never killed a white man. They gain their living by farming, raising peaches and other fruits, eked out by gathering acorns and the nuts of the edible pine. There is little profit from the chase, now that the bison and antelope are killed off. In reply to my inquiries as to what the government has done for them, I was told by Mr. Bass that appropriations had been made amounting to a total of \$900; but that only \$40 of this money had been paid over to the Indians up to March 10 of this year.

The Supais have a unique burying ground in the Long Canyon. Mr. Louis Buchere, who visited the locality last February, tells me that it is their custom to roll their dead in blankets, along with their guns and accouterments, and deposit them in layers between the rocky shelves under the rim. Their horses are then forced to make the awful leap from the rim to the rocks below, which are actually whitened with the bones of the sacrificed steeds. From others I learned that this heathenish custom is now being abandoned. Mr. Bass kindly offered me every facility for investigation into the condition and customs of this interesting tribe, as well as for exploring more fully the inner

gorge as reached by his route; but it was impracticable for me, at that time, to avail myself fully of his generosity. I shall have occasion, in another connection, to refer to the splendid scenery thus brought to view.

Rowe's stage route also starts from Williams, and reaches the Grand Canyon in 60 miles by the odometer. This is sometimes called the Bright Angel trail, because it enters the canyon opposite the mouth of the Bright Angel creek. Half way down the chasm some singular cliff dwellings are seen, and there are others half a mile west of them. Some of them are easily accessible; while others can be observed only from adjacent crags. The doors being on a miniature scale, only 18 inches high by a foot wide, and the windows correspondingly small, these have been styled "Liliputian houses," and the supposition advanced that they were once inhabited by a race of pygmies. But the probability is, in my opinion, that they were not intended for habitations, but for granaries. A series of elevations taken in April last, at mile intervals, shows the highest altitude above the sea level, between Williams and the canyon, to be 6,700 feet, and the lowest 5,650 feet.

The Flagstaff route is somewhat longer than any of the others, being 67 miles by odometric measurement. This distance might be considerably shortened by a resurvey of the road, as it now makes some quite needless windings among the buttes and mesas. Its highest elevation above sea level is 7,436 feet and its lowest is 6,261 feet. These figures are official, having been taken under the direction of Mr. T. R. Gabel,

with four other practical miners, spent last winter in the profound depths of the Grand Canyon, where there is eternal summer even though the drifts in the upper chasms under the rim may be many feet deep.

Later in the season the trip might be made in carriages, or a large party might charter an omnibus. But my preference was a substantial "buckboard," which I hired from the stables of Mr. E. S. Wilcox, who also accompanied me as driver. We took bedding, rations and fodder, and of course my kodak and geological kit, but as few extras as possible, in anticipation of miry roads and snow drifts.

Winding around the foot of Mt. Eldon, a singular mass of columnar basalt, we took a northwesterly course, following the track made by last year's visitors. West of us sprang aloft the snowy peaks of the San Francisco Mountains, part of a broken range known as the Mogollon Mountains, which were in sight all the first day. These are said to be the highest hills in Arizona. The road, instead of being muddy, was naturally paved with volcanic cinders. Huge blocks of red and black lava lay scattered in wild confusion. These in turn made way for billows of ashes and cinders extending as far as the eye could reach. But it was not a barren region; for these ashes were fertile when irrigated by the melting snows. Our way lay through a vast park adorned by sturdy pines (*Pinus ponderosa*) from 60 to 100 feet high, and from two to six feet in diameter. These trees stand well apart, as if planted by some prehistoric landscape gardener;

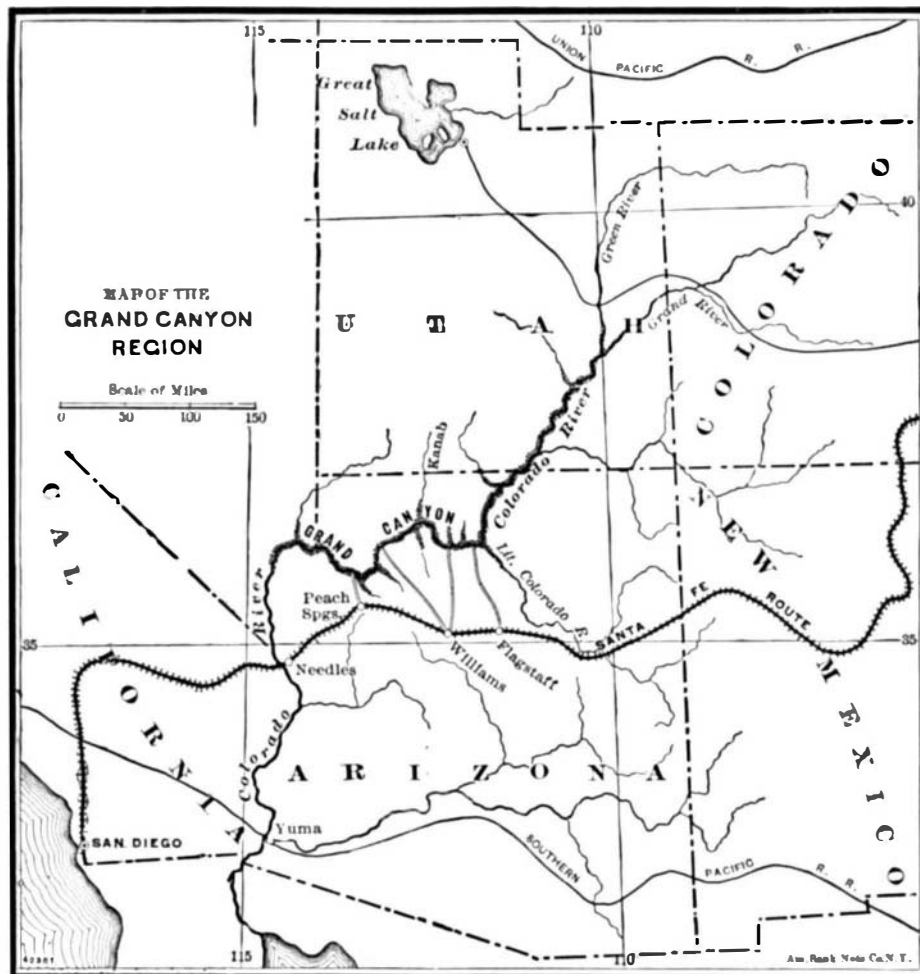
and they often rise, like noble shafts of brown marble, for 40 feet before sending out their lowest branches. Except near the railroad this magnificent domain has not yet been invaded by the ruthless lumberman.

Suddenly we came to the margin of what resembled a broad black sea—a cinder plain without the slightest sign of life. Above it swelled the cone of an extinct volcano. As I had heard that there were ancient cave dwellings near the summit, we resolved to explore. Leaving our horses at the foot, an easy climb brought us to the apex, perhaps 600 feet above the plain. Here, in the rugged tuff, were thirty or more rude grottoes of artificial excavation. Their former occupants had a wide prospect, and could hardly have been surprised by any ordinary foe. The only relics we found were countless fragments of water jars. Some of these are chiseled, not painted; others painted inside but not outside; others the reverse. Mr. Wilcox kindly gave me an entire jar exhumed in the vicinity, of elegant proportions, and elaborately decorated with geometric designs resembling the well known "Grecian key." Similar jars were afterward shown to me by Mr. D. M. Riordan; the workmanship in every way excelling the pottery made by the most skillful modern Indians.

At Smith's Tank, where we dined, we met Superintendent Gabel and his surveying party, on their homeward way. Resuming our journey, we presently found the great forest yielding to detached groves of junipers and

pinyons, the nut-bearing pine, whose young cones already gave promise of an abundant harvest. On our right a trail branched off leading to the Moqui reservation, beyond the Colorado Chiquito. Soon climbing the crest of the divide, we were surprised by one of the finest imaginable landscapes. The mesas were clad by the groves already described. But the broad plain expanded before us clothed with the crisp and silvery buffalo grass not yet entered on its brief term of verdure, with here and there a flowering cactus, or a truculent Spanish bayonet. Myriads of prairie dogs had their singular villages on this ample area, with occasionally the larger burrows of the badger and coyote. Above the plain arose the dome-like cones of numerous extinct volcanoes, their flanks somber with black cinders, but their tops as radiant as sunset clouds with fiery red lava; while the horizon was bounded by snowy mountain chains. In some of the ancient craters there are lakes, along whose borders may be gathered specimens of native sulphur and various rare minerals.

Night found us at Cedar Ranch, one of the trysting places of the jolly cowboys in the employ of the Arizona Cattle Company, whose hospitality was ample, though primitive. Grouped around a blazing fire of pine knots, we found them ready for conversation on politics, religion, science, commerce, or war. By day-break they were off for the Coconino Basin, mounted like centaurs, belted and spurred, heavily armed, and each with a lasso at his saddle-bow ready for a "round-up." While they sped away like the wind, we plodded on with our buckboard. We soon entered



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superintendent of the Atlantic and Pacific Railroad at about the time of my own visit. The conclusion necessarily is that we strike the rim at its highest altitude, and where the widest view is commanded of the system of gorges combining to make the Grand Canyon so wonderful. This route was chosen for the members of the International Geological Congress when they visited this region last fall, by invitation of Major J. W. Powell. It has also been selected by the authorities for the projected Grand Canyon railroad branch from Flagstaff, of which a beginning has already been made. Meanwhile, as I was told, a line of first-class coaches is to be immediately established. Hence I shall describe this mode of approach more fully than the others.

Flagstaff is a good starting point. It stands amid a noble forest of yellow pines that are rapidly being converted into lumber by the Arizona Lumber and Timber Company, of which Mr. D. M. Riordan is the manager, with about 500 employees. The tall tree yet stands to whose top a flag was fastened one Fourth of July—a circumstance suggesting the odd name of the young city. There is an extensive brown sandstone quarry here, from which blocks of any desired size can be taken without flaw or seam. The town is the rendezvous for lumbermen, ranchmen, miners, and cowboys from a wide region around. The Bank Hotel, kept by Mr. Coalter, is the best in Northern Arizona. In its parlors I met Dr. Dorchester, the U. S. Superintendent of Indian Schools; Judge J. M. Sanford, of Williams, who has been familiar with the canyon district for thirty years; and Mr. C. H. McClure, who,

a small canyon, whose right wall was rugged lava, while the left was Aubrey limestone. On emerging and climbing an eminence, we saw that this lava wall was the margin of a terrace, several of which were visible, being successive overflows from the volcano around whose base they had been formed. Our journey for the last twelve miles of it was over a road which, however fine it may be from May to November, was for us but an alternation of stony ridges and miry bogs, with occasionally a lingering snow drift. It was after dark when we rattled at full speed down the long limestone hill leading to the welcome cabin of honest John Hance. Under a sheltering hill, beside a living stream, nestled amid gigantic pines, some of which have been so felled as to fence in the spacious door yard, is the home of this mountaineer. He has probably done more actual exploring of the canyons of the Colorado than any other Arizonian; and it is his boast that, in the period of two years, with his own unaided hands, he made the famous Hance Trail, from the highest rim down to the river—certainly one of the greatest engineering feats ever accomplished by one man. William Mulvern, sheriff of Yavapai County, and John Francis, sheriff of Coconino County, assisted by John McGowan and R. A. Ferguson, recently surveyed the Grand Canyon from the head of the Hance Trail, and determined its depth to be 6,875 feet vertically from the rim to the river. The trail covers 4,000 feet of this in 7,050 feet, and the remainder at a much easier grade.

After our tired horses had been cared for, and our own hearty supper duly disposed of—matters demanding our first attention—I was determined to have a look at the canyon, although it was after nine o'clock. In solitude I climbed the hill. The distance from the cabin to the rim is less than 300 yards. But even when within a hundred feet of the mysterious rim, not a sign of the glorious vision awaiting me appeared. For a moment I paused with a natural shrinking from what I knew must lie beyond that calm, untrodden snow bank. The full moon was riding in a cloudless sky. The wind soured through the tall pines and fragrant junipers. Huge rocks cast their shadows across my way, and seemed to be watching like grim sentinels. At length, resolutely, I advanced through the snow, and stood alone on the dizzy verge. Bending over it in a kind of sacred horror, I beheld, at last, what for many years I had longed to see, the fathomless, boundless abyss, with its myriads of chasms and cliffs, fretted ruins, slender spires and massive towers, all under the beaming stars and flooded by the silvery moonlight. And this sublime chaos, such as cannot be found elsewhere in the whole world, and amid whose depths we were to venture on the morrow, was the Grand Canyon of the Colorado.

#### The Doctor and Good Roads.

The sentiment in favor of improving country roads is growing every year. It has reached our legislative assemblies, and bills are being introduced in order to secure State aid in the matter. Good roads are things which no class of persons would appreciate more than physicians, and to none would they bring more direct personal comfort, and even practical financial help. On a good road the country doctor can travel ten miles an hour, on a bad one barely five. The time required in doing his work is doubled, the physical weariness is increased, the amount of visiting rendered possible is curtailed. Besides this, the patient suffers, for the doctor's visits are delayed and less numerous. He cannot watch the patient so closely, and he brings to his work a wearied body.

Perhaps the horse would argue most eloquently of all, if he could speak in favor of good roads. His working life would be lengthened and his working days made easier.

With good roads the bicycle could be utilized, and through its invigorating influence, perhaps, the country doctor would cease, as years rolled on, to become obese from too much sitting in a wagon, his wits would be sharper, his professional work better.

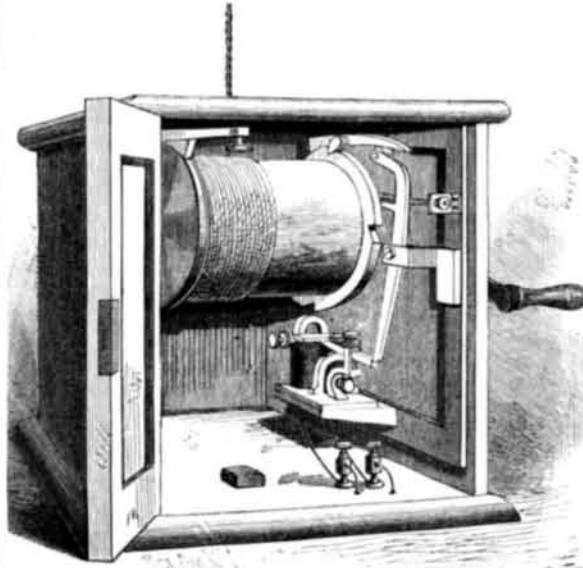
By all means, then, let the doctors take up the gospel of good roads and urge forward their construction. They make intercourse more easy, work less burdensome, life more enjoyable; and they are, in fine, an index of the progressiveness and civilization of a community.—*Med. Record.*

#### Microscopic Drawing.

Place the body of the microscope horizontal; remove the mirror; put the slide on the stage; condense the light upon it by means of the bull's eye, taking care to center the light; attach the concave mirror to the front of the eyepiece by means of a spring or a piece of thin wood. Have its surface at an angle of 45° with the plane of the anterior glass of the ocular. This will project an image of the object on the paper beneath. If the outer ring of light is circular, there will be no distortion. With a black cloth exclude all outer light, covering both your head and the instrument. Mr. Hopewell Smith draws any section easily in this manner, including magnifications of 600 diameters.

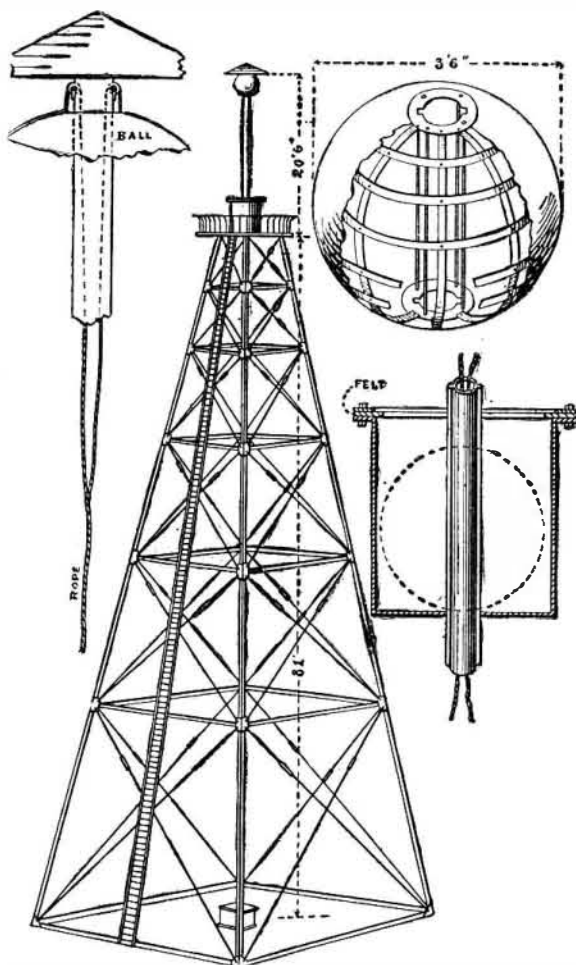
#### THE WESTERN UNION TIME BALL SERVICE.

Since the fire which destroyed the upper stories of the Western Union Telegraph building, the time ball service has been suspended. The old staff and ball were mounted on the tower in the front of the building. As the new building has been completed another tower has been built for special service of the time ball system. This tower is built of open iron work, and through its center a ladder runs up to the top. From the top a staff of hollow iron piping with two feathers running down opposite sides of it rises, and is surmounted by a cap. As regards dimensions, the tower rests on the roof of the main building, 163 feet above



WINDLASS AND ELECTRIC TRIPPING MECHANISM.

the surface of the street. The base of the tower is 24 feet, 6 3/4 inches by 25 feet, 4 inches; the top of the tower is 4 feet, 3 inches by 5 feet, 5/8 inches; and the height of the tower is 81 feet. A platform 7 feet, 5 inches square surmounts it, and from the center of this the flagstaff rises 20 feet and 6 inches, giving as the total height from the street 264 feet, 6 inches. The time ball is of very light construction; notched rings that fit the staff loosely form the top and bottom elements and are connected by four 1/2 inch iron rods. The contour is secured by hoop iron running in directions corresponding to the latitude and longitude of a globe, and over the whole canvas is fastened. The ball is 3 feet, 6 inches in diameter, and weighs only 35 pounds. The staff passes through its center. To raise it a double lead of rope runs up through the center of the staff; the two ends of the rope pass over two pulleys on opposite sides of the staff near the top and, descending thence, are attached to the ball at the top.



THE WESTERN UNION TIME BALL TOWER.

The two leads join each other a little distance down, and a single rope runs thence to a windlass, which is contained in a box at the base of the tower.

By tripping mechanism the ball is released at noon-time and falls down the staff. To receive it an air box is provided at the bottom which cushions its fall. This is a circular box 4 feet high and 3 feet, 6 inches in

diameter, and therefore of just such size as to receive the ball. A sort of flange or washer of felt is carried around the mouth of the box, so that the ball cannot by any possibility strike any hard material in its descent. As it falls, the air in the box can only escape slowly, so that it forms a true cushioning device.

The tripping mechanism is contained in the box with the windlass. On a flange projecting from one end of the windlass four notches are cut with which a pawl engages as the windlass is wound up, preventing it from unwinding or turning the wrong way. The pawl is carried by an arm pivoted at one end. If the arm were raised, it is evident that the pawl would be withdrawn from the notch and the windlass would be free to unwind. The tripping mechanism effects the raising of this arm. A lever nearly vertical is pivoted at its center, and a roller at its upper end touches the rear end of the pawl lever, which at this point is bent downward. A spring tends to draw the upper end of this lever backward. If it were so drawn, the end of the latter would be raised and the pawl released, owing to the downwardly curved shape of the pawl lever. To prevent the spring from doing this, the lower end of the lever is caught by a projecting bar attached to the armature of an electro-magnet. The whole is so arranged that by connecting the magnet with an active circuit its armature is attracted, which draws the bar out of engagement with the vertical lever. The spring on the latter then draws its upper end back, thereby raising the pawl lever and releasing the pawl. The windlass and tripping devices occupy but little space, the whole being contained in a cubical box only 18 inches each way.

A special clock at Washington is connected to the circuit of the electro-magnet, the whole being on open circuit. When the clock in its motion closes the circuit, which it does precisely at noon, the electro-magnet is excited, its armature is attracted, releasing the vertical lever whose upper end is drawn back and trips or releases the drum of the windlass, and the ball at once begins its descent. From the above it will be seen that it is the beginning of the fall of the ball which marks the time of noon. The system formerly in use was different in several respects from the present one. The one we illustrate is based largely on the results attained at Washington, and its operations will undoubtedly be very perfect. By the time this paper reaches our readers the new service will have been inaugurated.

#### Hints for Boys.

A gentleman advertised for a boy to assist him in his office, and nearly fifty applicants presented themselves before him. Out of the whole number he selected one, and dismissed the rest. "I should like to know," said a friend, "on what ground you selected that boy without a single recommendation?" "You are mistaken," said the gentleman, "he has a great many. He wiped his feet when he came in, and closed the door after him, showing that he was careful; gave up his seat to that lame old man, showing that he was kind and thoughtful; he took off his cap when he came in, answered my questions promptly and respectfully, showing that he was polite and gentlemanly; he picked up a book, which I had purposely laid upon the floor, and replaced it on the table, while all the rest stepped over it or shoved it aside; and he waited quietly for his turn, instead of pushing or crowding, showing that he was honest and orderly. When I talked with him I noticed that his clothes were carefully brushed, his hair in nice order, and his teeth as white as milk; and when he wrote his name I noticed that his finger nails were clean, instead of being tipped with jet like that handsome little fellow's in the blue jacket. Don't you call these things letters of recommendation? I do, and I would give more for what I can tell about a boy by using my eyes ten minutes than all the letters of recommendation he can give me."

#### The Telephone in New York.

We are indebted to the *Western Electrician* for the interesting report under the above heading we recently gave, describing a visit of the members of the New York Electrical Society to the premises of the Metropolitan Telegraph and Telephone Company. Due credit should have been given at the time. The *Western Electrician* is one of the most enterprising and successful electrical publications in the world.

A PROSPEROUS German residing in America writes of a recent visit to his native country, thus: "One day I saw a review of cavalry in Berlin. There were thousands of men cantering gayly along for the entertainment of the young Emperor—the War Lord as he calls himself. The next day I went into the country, and not very far from the capital I saw a sight that was pitiful enough. One woman was holding a plow, and this was being dragged through the earth by two other women and a dog harnessed together. Here, then, were two pictures—the idle horses and the idle men capering about Berlin, the women and dogs doing the work of men and horses in the country!"