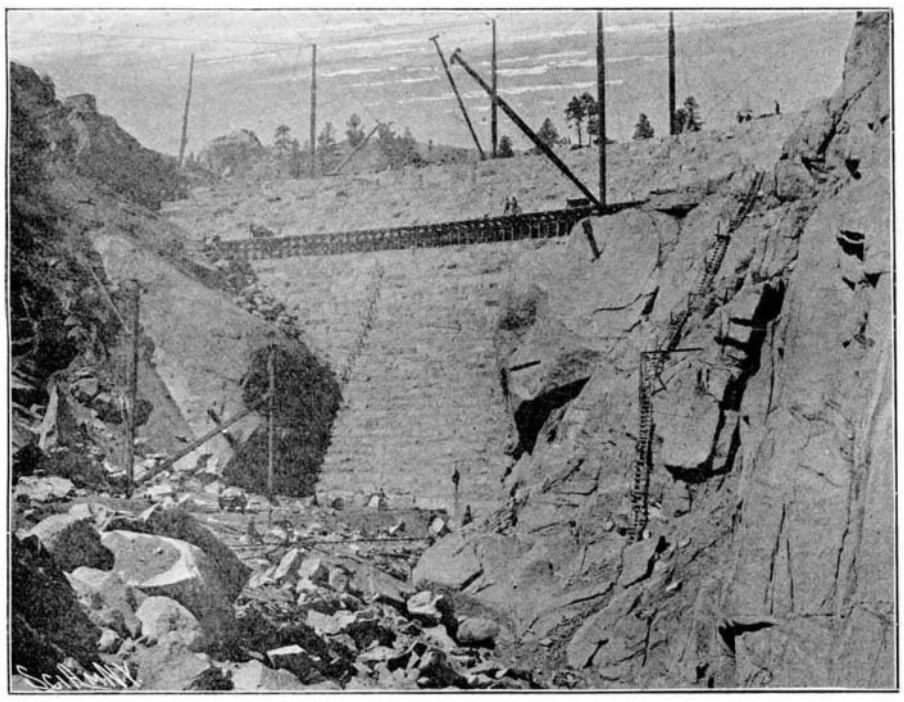
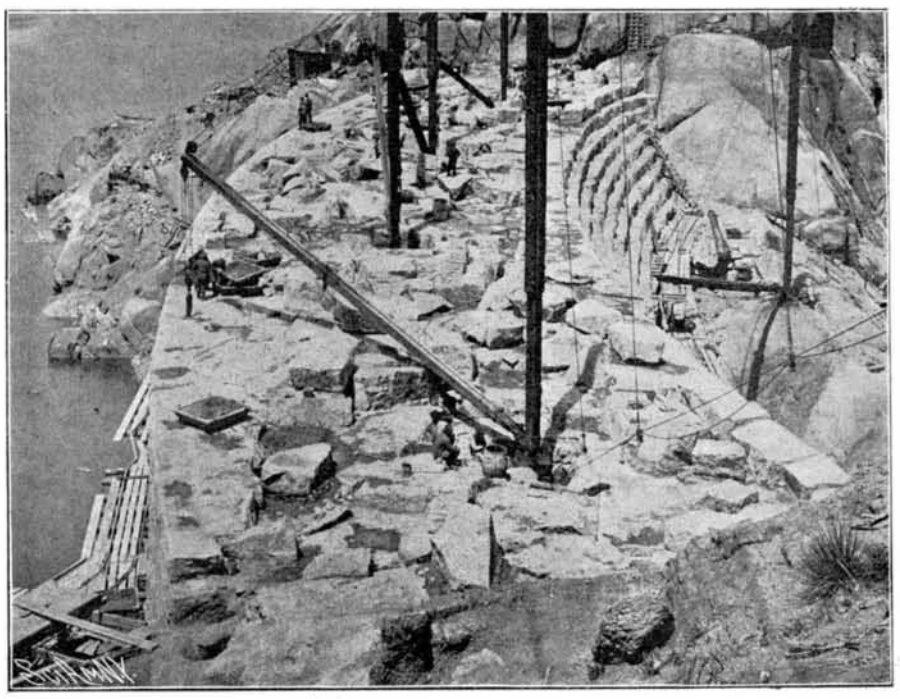
THE GREAT GOOSE CREEK DAM FOR THE DENVER WATER SUPPLY.

The water famine which threatened the city of Denver in the summer of 1902 served incidentally to confirm the wisdom which had prompted the construction of a great storage reservoir which is now approaching completion in the Platte cañon at a point where the South Platte River and Lost Fork Creek converge. Measured on an air line from Denver, the distance to the new dam is about 50 miles; but measured by the traveled route which lies up the Platte cañon by way of the Colorado and Southern Railroad to Buffalo Station, and from there by a stage ride of 20 miles, the distance to the dam is about 61 miles. From the dam the water will be carried down the South Platte to the mouth of the Platte cañon, where it will be filtered and then piped to the local storage reservoirs surrounding the city of Denver. There are several features which cause this dam to rank as one of the most notable in the world, chief among which is its great height from toe to crest of 231 feet; moreover, when it is completely filled it will impound about 30,000,000,000 gallons of water, which is about the same amount as will be impounded by the new Croton dam of the New York water supply. The natural configuration and geological character of the site of the dam are ideal for a structure of this nature, for at the bed of the river the solid gray granite walls of the cañon approach within 12 feet of each other, and they rise at an average angle of 45 degrees on both sides to a height of several hundreds of feet. In constructing a dam at this spot it was only necessary to raise it to a height of 66 feet to cause the water to back up for a distance of 3½ miles and provide a lake varying in width from half a mile to a mile; and by carrying it to its full height of 231 feet, the water will be backed up to a distance of about 7 miles, and will provide a supply of water sufficient to last the city of Denver for three years, even if the reservoir should not be replenished by rainfall or by melting snow.

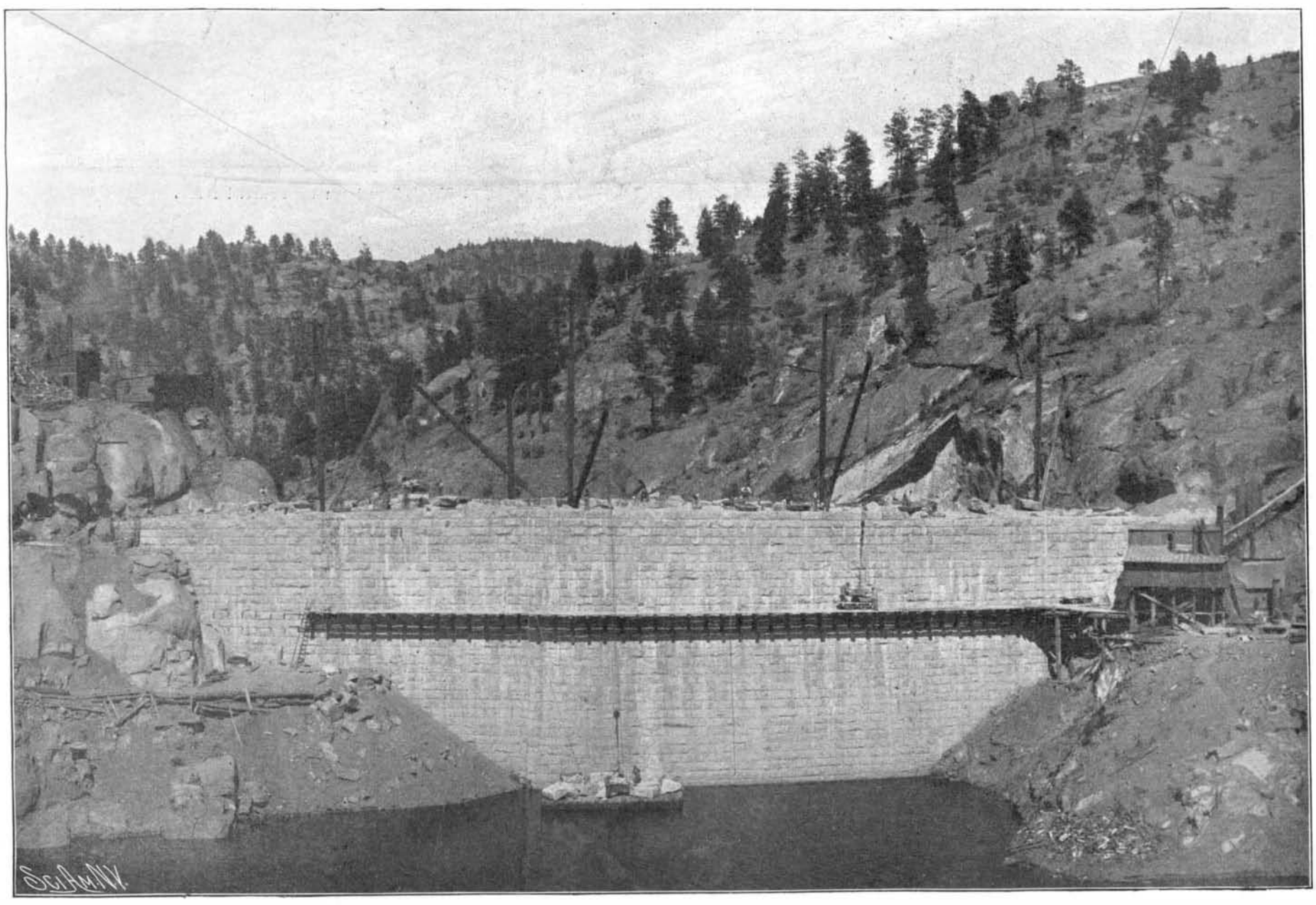
The upstream side of the dam will be approximately perpendicular. At its greatest depth, measured through the bottom of the foundation, the masonry is 178 feet in thickness, and it will taper on the downstream side from 178 feet to a width of 18 feet at the crest of the dam. The enormous pressure of the water due to its great head will be resisted both by the mass of the masonry and by its arched form, the upstream face of the dam being built with a curve of 400 feet radius. The curved dam system of construction is frequently used in western works of this character, where the narrowness of the cañon admits of an arch of moderate span being thrown across it, and where the splendid character of the rock on the hillsides affords a perfectly secure abutment, amply able to take the heavy thrust which is set up when the dam is filled to its full height. In a structure of this character the stresses are somewhat complicated and not absolutely determinate. The bulk of the stress takes the form of a thrust against the abutments, the inertia of the mass against overturning on the toe acting as a reserve of stability, which would come into play should there be any give of the lateral abutments. Theoretically, with absolutely unyielding abutments, this great arch would require no such thickness as 178 feet at the base; but the provision of such a mass of masonry indicates



Dam From Downstream Side, Built to 130-foot Level.



Top of Dam During Construction, Showing Arched Form.



View of Dam From the Upstream Side.

THE GREAT GOOSE CREEK DAM FOR THE DENVER WATER SUPPLY.

conservative judgment and a commendable determination on the part of the engineers to insert in the structure every element of strength that can be given to it.

The facing stones on both the upstream and downstream sides of the dam weigh from 6 to 8 tons each, and are quarried just to the south of the dam. The downstream face is built in steps of cut stone, as shown in our illustrations, while the body of the dam is filled in with granite blocks varying in weight up to a maximum of about 8 tons, the whole mass of masonry being laid in the best cement. The length of the dam from one side of the cañon to the other measured along the curved face is about 12 feet at the base and 675 feet at the crest. At elevations of 10, 60, and 110 feet above the riverbed, tunnels have been cut into the granite mountain, a little to the south of the dam, which pass entirely around the structure, the two upper tunnels converging to meet the lower one and emerging in the cañon on the lower side of the dam. These tunnels, which are controlled by 42-inch hydraulic valves, will enable the water to be drawn off from either of the three levels as may be desired. They will also be used as auxiliaries to the spillway in times of heavy flood. The spillway, which lies a few hundred yards to the south of the dam, is formed by making use of a natural depression in the rock, which has been blasted down for a length of 250 feet to the desired level. It is estimated that with five feet of water passing over this spillway, and with one 42-inch valve opened under a head of 100 feet, it will be possible to get rid of surplus water at the rate of 17,000 cubic feet per second.

Word from the Mount McKinley Expedition.

Word has been received from Dr. Cook's expedition that the ascent of Mount McKinley is about to be begun.

The men have fifteen pack horses with them and 1,250 pounds of supplies, which are calculated to last them all summer.

The party will study the region traversed and will try to measure the exact height of Mount McKinley. They have other commissions, one from the Arctic Club of this city to discover whether the mountain is of volcanic origin.

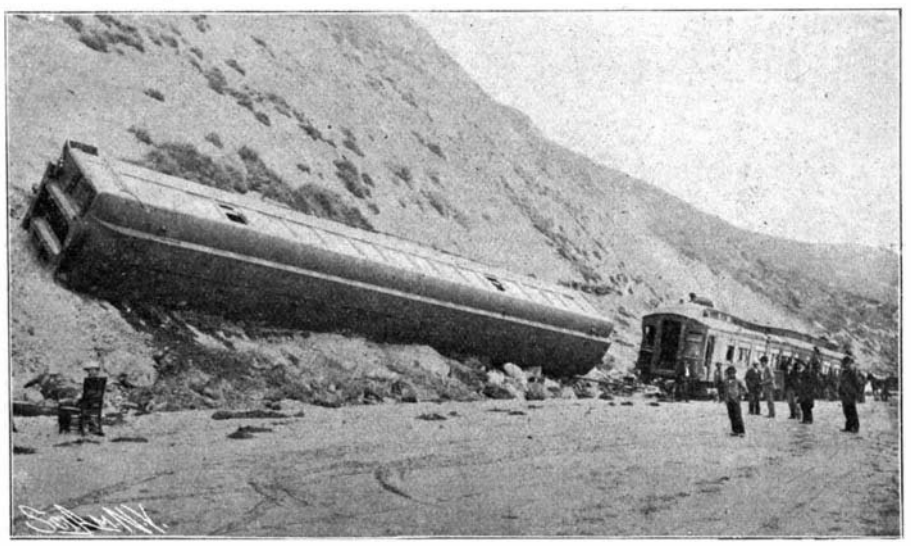
The plans for the tunnel by which trains will enter the Union Station to be built in Washington provide for a branch tunnel to connect the main subway with the basement of the proposed office building for the use of members of the House of Representatives.

PULLMAN CARS IN A RAILROAD WRECK.

The remarkable strength of the Pullman car, when it is subjected to the twisting and crushing effects of a derailment or a collision, is so well known as to need no further demonstration after its many decades of hard and useful service; but the truly remarkable manner in which the three cars shown in the accompanying wreck went through the ordeal of being rolled down a 35-foot embankment calls surely for special mention—particularly when it is borne in mind that of the occupants of these cars, not one was killed, and only one or two were seriously injured.

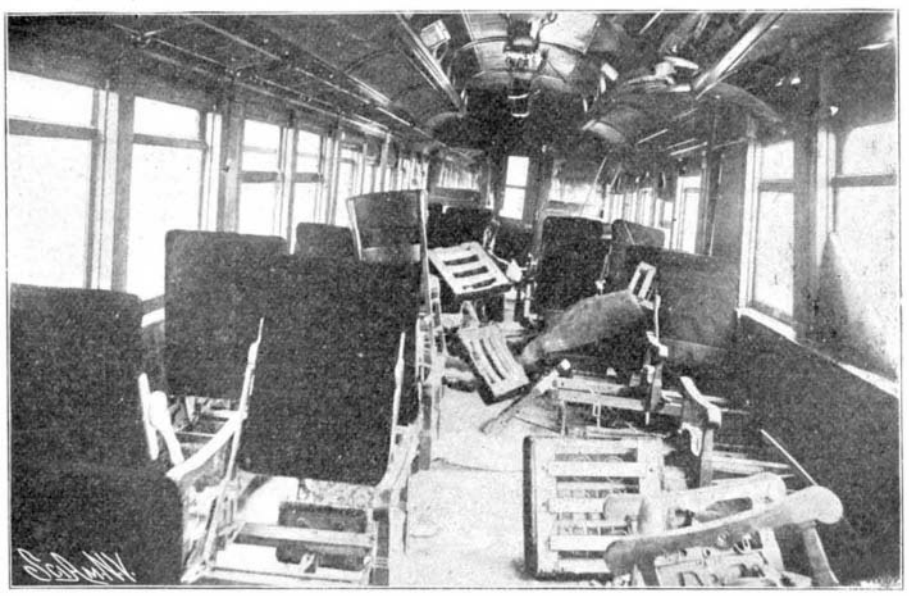
The wreck occurred at Punta Gorda, not far from Santa Barbara, Cal., on the line of the Southern Pacific Railway. At the place where the derailment occurred, the track, which is level and on a three-degree curve, runs around the base of the cliffs on an embankment which is 35 feet above the sandy beach of the Pacific Ocean. The train, which was made up of seven cars, was running at a speed of about 35 miles an hour, when the driving wheels of the engine left the rails, and the rear cars after running along for some 130 feet, were wrecked in the manner shown in our illustrations. Strange to say, the pony truck of the engine, the tender, and the three leading cars of the train, kept the rails; the four rear cars, however, consisting of a chair car, a dining car, and a parlor car, followed by a chair car, jumped the track. The chair car and the dining car rolled down the embankment and finally landed, right side up, on the beach, but minus their trucks. The parlor car turned almost completely over, and came to rest in the position shown in our engraving, lying upon its side on the slope of the embankment. The last car of the train came to rest diagonally across the track, the forward end obstructing the traffic, and the after end being slewed around until it overhung the embankment. The accompanying illustrations speak for themselves and require no detailed explanation; but attention is drawn to the fact that although the cars were moving at the rate of between 30 and 40 miles an hour, and that in rolling over down the bank, the roofs had to endure the tremendous wrench and impact of the 50-ton mass of the car, they proved equal to the task. The interior and exterior views of the chair car show that the roof, as a whole, remained intact, being crushed in only at one point, and there probably by some projecting bowlder. The injuries to the passengers were such as would naturally result from their being pitched from floor to ceiling, and from ceiling to floor, as the cars rolled over; and to the wonderful strength of the framing and roof is to be attributed the escape of the passengers with nothing worse than some bad cuts and bruises. The cars were brought back to the track by building several hundred yards of temporary track from the beach to the level of the main line.

The great strength of Pullman cars, as here demonstrated, is due to the excellence of the material of which they are built and the thoroughly scientific manner in which this material is disposed. To all intents and purposes a Pullman car is a trussed bridge, the two trucks being the piers or abutments on which it rests. Below the window sills within the outside sheathing is a stout steel and timber truss which extends for the full length of the car. The floor is also admirably adapted to withstand the shock of a collision, being framed of heavy longitudinal sills with steel plating sandwiched in between them. The latest cars have also steel framing at the corner posts and in the sides and roof. We are indebted for our illustrations and particulars to Mr. E. W. Hadley, of Santa Barbara.

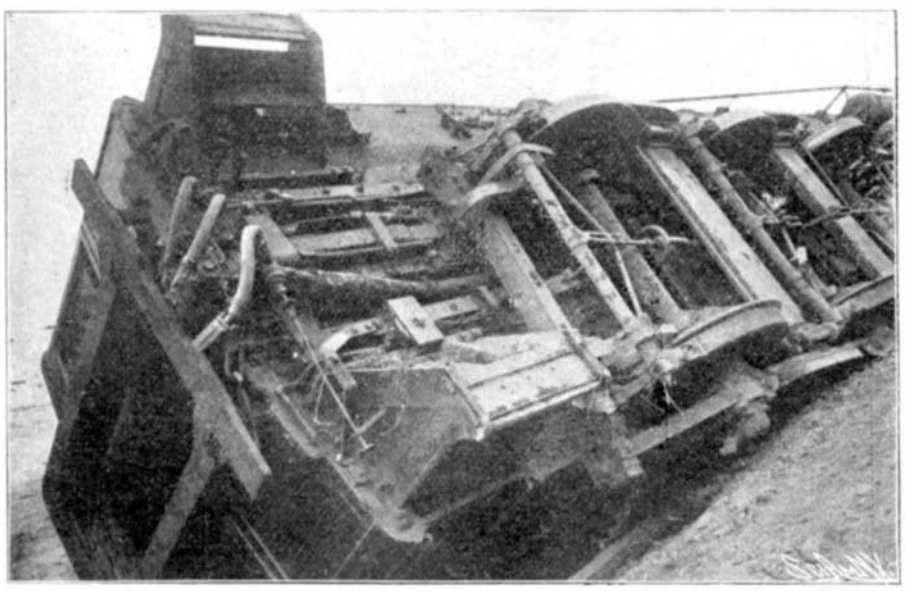


View of the Wreck Taken From the Beach.

The Wreck Seen From the Railroad Track.



Interior of Chair Car After the Wreck.



The Parlor Car, Bottom Side Up.

PULLMAN CARS IN A RAILROAD WRECK.

The Death of Dr. Common.

The death has occurred in England of Dr. Common, the inventor of telescopic gunsights and the constructor of large telescopes. His telescopic sight is now being fitted to all guns in both the British military and naval services, and was utilized with conspicuous success in the South African war. In this sighting apparatus a small telescope is fitted to the barrel of the rifle or gun, and the marksman brings the object at which he is aiming, exactly behind a tiny point made by the bisecting of two capilliform straight lines, crossing at right angles upon the lens. When this position is obtained perfect marksmanship is assured. Dr. Common's greatest work, however, has been the manufacture of huge telescopes; and prior to the construction of the Lick and Paris reflecting telescopes, he had built the largest instrument of this character in the world. He devoted a great amount of his time to the discovery and perfection of a method for grinding reflecting glasses from three to five feet in diameter, and succeeded in making a five-foot reflector, with which he secured a photograph of the nebula of Orion. For this work he was awarded the gold medal of the British Astronomical Society.

Pelican Island in Indian River, of the coast of Florida, has been acquired by the Department of Agriculture as a government reservation. The step was taken to prevent the entire extinction of the brown pelicans which breed there.