

THE SALT LAKE & MERCUR RAILROAD.

By W. P. Hardesty, C. E.

The Salt Lake & Mercur Railroad is a standard-gauge mountain road, for giving the Mercur mining camp connection with the railway system of Utah. This camp is situated in Camp Floyd Mining District, in the Oquirrh Mountains, and near the center of the State. This district has, within the past two or three years, attracted a great deal of attention, on account of the discovery and working of enormous bodies of gold-bearing ore, so that within the past few months it has been enjoying a veritable western mining boom. The gold found is not free-milling, not the usual "quartz" gold, but is in a form that requires the application of the cyanide process to secure it. The town of Mercur is the site of the first developments of the gold mines and is the commercial center of the district. It lies just over the divide, and on the west side of the Oquirrh range, which divides Tooele County on the west from Utah County on the east.

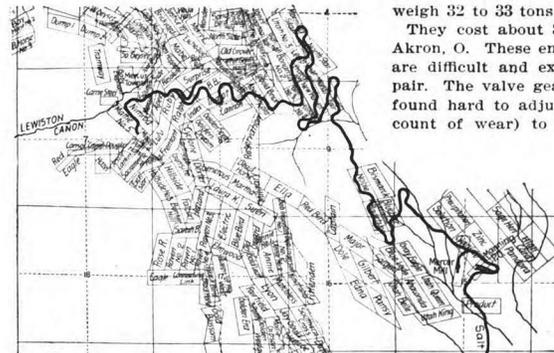
The Tintic branch of the Union Pacific Ry. traverses Cedar Valley on the east side of the range, and from the station of Fairfield, which is 49 miles from Salt Lake City, the Salt Lake & Mercur R. R. is built to the Mercur Camp.

The Oquirrh main range, though not high, is difficult to surmount on account of its slopes rising abruptly to its narrow summit, it having no considerable mountain streams with their canons, and it is entirely different in these respects from the Wasatch range of mountains.

From Fairfield to Mercur the distance in an air line is 6 miles. The Salt Lake & Mercur R. R. Co. was organized to build this road. Col. Chas. D. Moore, who has had an extensive experience on the location and construction of western railroads, was selected as chief engineer, and work commenced in July, 1894.

A large gulch comes down from Mercur divide on the east side of the range and opens out into Cedar Valley, directly opposite Fairfield station. Up the general line of this gulch the road is located. From Fairfield to the mouth of the gulch the distance is $4\frac{1}{4}$ miles by the line. The road is fairly straight and direct from this portion, and an average ascending grade of 3.75% is used, with

the summit (called Mercur divide) is 1,986 ft., the length of line 9.58 miles in a direct distance of less than $5\frac{1}{2}$ miles. The maximum grade used is 4.2%, and the maximum curvature 42° , the grade being equated for curves at the rate of .02% per degree. Six of these sharp curves (hav-



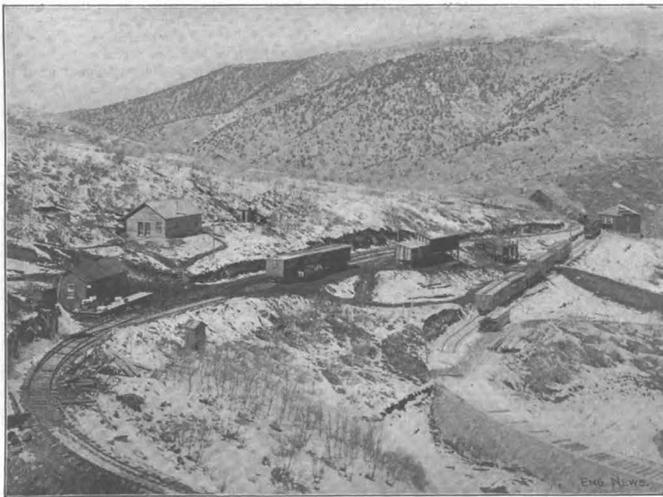
MAP OF THE CAMP FLOYD MINING DISTRICT AND THE SALT LAKE & MERCUR R. R.

ing a radius of 146.2 ft.) are used for loops, and many 40° and less are used.

The line is continuous, no switch-backs being used. Lighter curves would have been used but for considerations of economy. The map and views show the alignment and the nature of the country very well.

The excavation and embankment are comparatively light for such work. The work is mostly in earth, with a good percentage of loose and solid rock for part of the line. The largest cut, about 1,000 ft. long, contained 30,000 cu. yds. The total cost of grading was about \$30,000.

There are four 45-ft. culverts for crossing main gulches. But little trouble with either wash-outs or snow has been experienced in the operation of the line. Standard ties are used throughout.



A STATION ON THE SALT LAKE & MERCUR R. R.

a maximum of 4.2%. Then the development begins.

Here at the mouth of the gulch are located the shops of the Salt Lake & Mercur R. R., and also the Mercur mill, for reducing the ores of the famous Mercur mine. The station here is called Manning. From Fairfield to Manning the rise is 844 ft.; from Manning to the summit the rise is 1,142 ft. more, in a direct line of less than $2\frac{1}{2}$ miles, and by the railway of $5\frac{1}{2}$ miles.

The total elevation overcome from Fairfield to

35-lb. second-hand rails were put down. These are to be replaced on the east side of the summit during the summer of 1896 by new 52-lb. rails, the old ones being used for the extension and switches on the west side.

The rails were elevated on curves for a speed of 12 miles per hour. The gage was not widened on curves, Col. Moore deeming it a disadvantage to do so under the conditions here, and of little benefit in any case.

The railway cost, fully equipped, about \$75,-

000. Shay geared locomotives are used, it of course being impracticable to use ordinary mountain engines on such a road. There are one 18-ton and two 28-ton Shay locomotives in the service, the former being geared 3 to 1 and the latter 2 to 1. Each locomotive has three cylinders or engines and eight driving wheels. The large ones weigh 32 to 33 tons when coaled and watered.

They cost about \$6,000 each at the works, at Akron, O. These engines do their work well, but are difficult and expensive to keep in good repair. The valve gears of the three cylinders are found hard to adjust for proper cut-off (on account of wear) to avoid working against each

other. The wheel base of the small engines is 47 ins., of the large ones 52 ins.

The ore cars used by the road are 30 ft. long, weigh 20,000 to 21,000 lbs., and have a rated capacity of 15 tons, though 18 to 20 tons are often carried. The 34-ft. box cars of the Union Pacific Ry. are hauled over the line with no trouble at all. At one time a 46-ft. furniture car was also taken up to Mercur. It is found that any wheel base of over about 6 ft. 8 ins. gives trouble. The sharp curves, unless reversed, do not seem to affect train motion to any appreciable extent. The ability of the cars to stick to the track seems to depend mostly on their ease of swiveling on their trucks.

At one time a car got loose and ran for three miles, presumably at 40 or more miles per hour, before being ditched by a broken rail. At another time one got loose and was derailed by the workmen hurrying down the hill-side and placing a tie across the track, catching the car in its return down a loop.

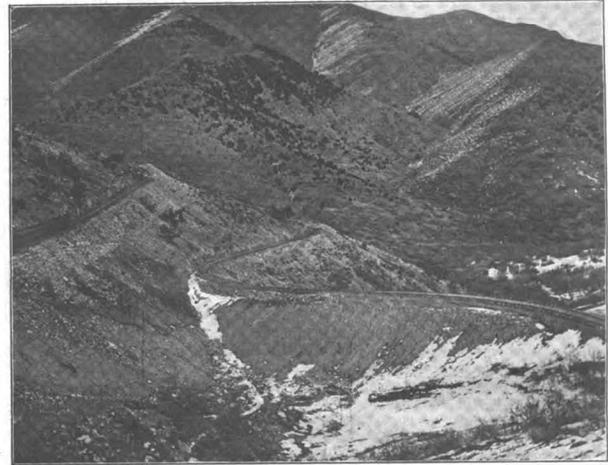
For down trips an air pressure of 20 lbs. is kept on the drivers of the engine, and is applied to the cars only for stops. All cars are equipped with Westinghouse air brakes and with hand brakes. The water brake is not used with the Shay engines, as it is thought that there would be a possible danger of their cogs stripping if it were. Chilled steel brake-shoes are used and are worn out very fast.

On up trips two passenger coaches or three box cars is counted a fair load, while seven empty ore cars are taken up at one trip. Mercur station is located nearly one mile further and 132 ft. lower than the summit, being $10\frac{1}{2}$ miles from Fairfield. The depot is 253 ft. higher than the center of the town, which lies in the bottom of Lewiston Canyon. An extension of the road is now being built that will get down into the town on a comparatively easy grade, with a distance of about two miles. This requires extensive development, and two switch-backs are also used. The grade on the west side of the summit is all 2.4% descending, except one level portion of 500 ft.

The operation of this road has proved very profitable, and has fully justified the enterprise

of the projectors. An average of 200 tons of ore per day are carried from the Mercur mine to the Mercur mill at Manning, at a contract rate of 35 cents per ton. With a number of other mines that have about begun shipping, the revenues from these sources may greatly increase. A considerable business is also done carrying miscellaneous freight and passengers, high rates being charged. The road has been in operation since January 20, 1895.

The only other road of any importance in Utah that exceeds the Mercur road in heaviness of grades is the Utah Central, running from Salt Lake City to Park City, distant 31.6 miles. This road has 6% and 6½% grades for considerable of



VIEWS ON THE SALT LAKE & MERCUR R. R. IN UTAH. MAXIMUM GRADE, 4.2%; SHARPEST CURVE, 42°. ELEVATION OF 1,986 FT. ATTAINED IN A DISTANCE OF 9.58 MILES.

its length, and one very short strip of 7¼%; while 4% and 5% grades are very common.

It has three switch-backs, however, and moreover is exceedingly difficult and expensive to operate, both on account of the heavy grades and because of snow, being located on the wrong side of the valley it traverses. It is a narrow-gauge road, with maximum curvature of about 20°. It runs over the Wasatch Mountains, following up the valleys of Parley's Creek and its forks.

By a proper location, using more distance, the grade could have been kept down to 4%, giving a line with better ground for construction as well as much more freedom from snow.

The summit of the divide crossed by this road (19 miles from Salt Lake City) is 7,046 ft. above sea-level, that of the Mercur divide being nearly as high. The Utah Central road, with an engine weighing 40 tons without tender and something like 60 tons with tender full, can haul up ten empty flat cars at one trip, these weighing 6½ to 7 tons apiece.

The great expense of operating this direct connection between Salt Lake City and Park City, is compensated for by the fact that its only competing line, the Union Pacific, runs by way of Ogden and requires about three times the distance for the same connection.

The Alta branch of the Rio Grande Western Ry., running from Bingham Junction to Wasatch, Utah, has about one mile of 5% grade.

This road is about 8 miles long, and is operated only during the summer season, though it is not troubled with snow.