A FLOODED TRACK.

The picture presented herewith tells its own story of the trials of the railroad engineer in the middle West. The illustration shows a train hauled by two locomotives across the Loosahatchie River bottom, south of Woodstock, Tenn., last March. The system of levees along the Mississippi is a source of endless trouble during the spring freshets. Time was when breaks would occur in the lowland and a comparatively small area would be flooded; but with the present system of embankments the river rises higher and higher. The result is that considerably more damage is done than was formerly the case. Even when the levees hold, the small tributary rivers become so flooded that the backwater does much damage. Our picture shows a condition of affairs which was thus caused. In order to retain the tracks in place, the plan is adopted of spreading over the ground to be occupied by the embankments, brush, old timbers, and slabs of logs. These form a kind of mattress which clings together and thus holds the embankment in place until the timber has decomposed and the bank has found a permanent bed.

TRAIN CROSSING THE LOOSAHATCHIE RIVER BOTTOM SOUTH OF WOODSTOCK, TENN.

CONSTRUCTION OF THE RAILROAD ACROSS SALT LAKE.

The Southern Pacific Railway Company is constructing a new line through a portion of Utah which involves some engineering work of unusually difficult character owing to the obstacles which must be overcome. The improvement is known as the "Lucin cutoff" and is being built to avoid the present circuitous route around Great Salt Lake. For several years past the company has been considering a new line which would shorten the distance between the Mississippi River and the Pacific coast and at the same time avoid some of the heavy grades which are encountered in this section of the West. The present line extends from Ogden to Lucin by way of Belfour, Kolmar, and Promontory, a distance of about 150 miles. On the route is what is known as Promontory Hill, which is one of the steepest ascents of the entire system and which trains have been unable to ascend at the speed of over 12 miles an hour.

The surveys made by the railroad engineers provided for a line about 105 miles in length with a maximum grade of not over 21 feet in a mile, but they found it was necessary to cross the lake and the plans included one of the longest trestling systems in the world, if not the longest, for the total distance across the lake is about 28 miles. The lake is somewhat curious in shape at the point where the railroad is intended to cross it. The northeastern portion is formed into a bay by a promontory which projects southward. In making surveys the engineers took advantage of this promontory and included it on the route so that the lake crossing really consists of two sections. From the eastern end of the cutoff at Ogden to the shore of the lake the distance is 13 miles. In building this portion little difficulty was experienced, as the country is comparatively level, with the exception of what is termed Little Mountain, through which a cut was made. As is well known, Great Salt Lake is one of the shallowest bodies of water in the world considering its dimensions, and in some portions a man may wade nearly a mile from shore without being completely submerged. The contractors decided to take advantage of this condition by making a solid roadbed as far as possible out in the water and material from the cut at Little Mountain was hauled out on a temporary track and used for filling. It was discovered that in some places the bottom was composed of crusted salt and sand extending to a considerable depth. In other places the formation was so loose that the longest piles driven into it would not become firmly imbedded. These were supposed to be depressions in the formation which could be readily filled. To form a permanent roadbed near shore a somewhat novel railway was laid, consisting of planks upon which were placed sandbags to hold them in position. On these, ties were placed to which the rails were spiked. As fast as this temporary track was laid, the cars would be run out and dumped over the side. In spite of the large quantity of material used on the section of the road constructed in the shallow water it was noticed that here and there depressions were continually occurring, showing that the foundation was still sinking. Only construction trains were used on the completed portion drawn by light locomotives but at frequent intervals it has been necessary to build up the roadbed where the sinking has been extensive and relay the track. Although the work upon the shore ends of the lake crossing began over a year ago some portions are still settling.

By far the most serious difficulty, however, has been encountered in the deeper part of the lake near the promontory referred to. Here the water ranges in depth from 20 to 30 feet, and it was determined to lay the track upon trestle work. For this purpose piles of the largest size were secured to be driven in for posts to support the framework, some of the piles being over 40 feet in length. Pile drivers built on rafts were towed to several points along the line and the work of driving the foundation began. In some places the bottom was so hard that but a few inches could be driven at a time. This led the engineers to believe that they had a substantial foundation for the structure. After being driven a few feet, however, it was discovered that most of the piles had apparently pierced what seemed to be a mere crust and in some cases a few blows of the driver forced them out of sight. An examination was made at several points, which disclosed the fact that a bed of soft material underlay the bottom, being covered by the crust referred to which seemed to be composed principally of salt and sand. Where the piles held and the trestle was completed several mishaps occurred which showed that it would not be practicable to operate trains over the structure unless it rested upon something more substantial than the natural base. In one instance an engine and two gravel cars, which were moved over the trestle, so weakened the work that the train crew had just time to detach the locomotive before the piling collapsed and fell into the water, carrying the cars with it.

Framework of Trestles Which Collapsed.

Construction in Shallow Water, Showing Sandbags and Planking Used to Sustain the Temporary Track. Sections of the Permanent Track Have Been Depressed by the Settling of the Roadbed.

Acting on the theory that this section of the line could be filled in with rock it was decided to form what might be called an enormous jetty connecting the rock work at each end and terminating at the promontory; but in spite of the fact that several thousand trainloads of material have been dumped along the right of way, most of it seems to be swallowed up in the mysterious depression. The engineers have finally determined upon another plan which they think will be more successful. Cradles of heavy timber are being constructed which are towed to deep water, then filled with stone and sunk, thus forming cribwork which is believed will support the superstructure without difficulty. This plan, however, has been but recently carried into execution and its success as yet is a problem. The magnitude of the task can be appreciated when it is stated that the deep-water sections, where the principal trouble is being encountered, comprise nearly 10 miles in all. In this distance two very large depressions have been encountered which the engineers term quagmires. In one of these over 2,500 tons of rock were emptied daily for over a month, but the soundings indicated that the material sank about as fast as it was thrown in.

A number of explanations have been advanced for the remarkable condition which prevails. One of the mysteries of the Great Salt Lake is that it apparently has no outlet. Several large streams empty into it, however, and scientists have had an idea that the surplus water not evaporated was carried out by underground channels. Several of the railroad engineers who have examined the deposits brought to the surface from the so-called quagmires, are inclined to believe that at this point a very large depression or gorge originally existed which has been by degrees filling up with silt and other loose material carried down by the currents of rivers entering the lake. There is no doubt, however, that quicksand exists in very large quantities. The original idea was to construct the roadbed through the shallow parts of the lake to a height of 15 feet above the water with a breadth of 24 feet at the top, but the settling has caused the alignment to be lowered considerably, and, as already stated, here and there it is still necessary to fill in portions which have sunk so far as to endanger train service.

When the work of constructing the line across the lake was begun, operations were commenced on the west side as well as the east, but on this end similar conditions were encountered, the west section of the road being constructed to a point about four miles from shore. The rest of the cutoff between Lucin and Ogden is completed and ready for operation, the only gap being the 10 miles referred to. The construction work in the lake itself is estimated to have cost already nearly $5,000,000, and it is not expected to complete the unfinished section before another year at least, for the crib system which is now being tried is as yet an experiment.

A truck built by the French Northern Railway has the capacity of 50 metric tons. and is the first ever built in France with such dimensions. Fifty similar trucks have been ordered by the Carmaux Coal Mines from the Douai Foundries. It is all hammered steel plate, and is of the type invented by Mr. Fox, improved and simplified by M. P. Arbel, who is proprietor of all rights in France and Russia.