the use of British troops in washing clothes. Further along a supply was tapped for an Indian dhobying place, and finally, there was a long trough for watering horses. The Indian dhobying place consisted of a row of stone and cement tubs made by building up four walls of stone and cement mortar on a flat sloping slab of rock, each tub being supplied with a very large table-like rock on which to beat the clothes. The tubs could be drained and filled very quickly. The Indian regimental dhoby had each day a very large washing, and he preferred to soak the clothes as long as possible. He then stood in the water, took up a suitably sized flail of clothes, and beat them upon the stone until all the dirt and buttons had disappeared.

The main pipe line followed the bottom of Wadi Reiya to the pump at Ain Zerka, situated at the junction of Wadi Reiya and Wadi Zerka. In the pump-house the arrangement of valves permitted of pumping from Wadi Reiya only, from Ain Zerka only or from Reiya and Zerka combined, or of a gravity supply from Wadi Reiya. At Ain Zerka was the large stone pump house, a fanati water filling point and a considerable length of horse troughs for watering camels, horses and donkeys. There were also shower baths, and clothes-washing tables and in addition we erected a vertical boiler in which to produce steam for a delousing station, in order that clothes could be deloused while the men were bathing.

Supply for Light Railway

The 4-in. pipe line from the pump-house followed Wadi Zerka to its junction with the Wadi Deir Ballut, where was situated an Arab water point, which was arranged for both fanati filling and animal watering. There was here storage for 18,000 gallons, the storage being filled from the pipe line only when emptied; as this was the lowest point in the pipe line, the tanks could be filled very quickly.

From the junction of Wadi Ballut and Wadi Zerka the line climbed a hill and over the crest back to the two main water points in the Lubban area; each water point was provided with 18,000 gallons storage, troughs for animal watering and fanati filling arrangements. From the storage at Lubban water point No. 2, a 2-in. pipe line about ⅓ mile in length ran to a steel water tank erected at the end of the narrow-gauge railway used for bringing up supplies. From this tank the railway secured its supply. It was found necessary to cover the pipe line in order to prevent inconvenient delays and difficult repairs, as before this was done the line was occasionally struck and burst by enemy shells.

A telephone system for control purposes was used to connect up the pump-house and various water points. It was found necessary to wire in the springs to prevent contamination. The pump-house was built of stone laid in mud mortar, pointed with cement mortar. Window frames were provided by the engineer corps. The roof consisted of panels covered with the metal from petrol tins, the whole being covered with felt roofing. The pipe line was kept in successful operation until after the final attack in September, 1918, when it was dismantled.

Operating Native Pumping Outfits

Just prior to the final operations in September, 1918, the field companies spent some time in outfitting and overhauling all water equipment, consisting of pumps, troughs, tanks, etc. The division, after having been moved to the edge of the plain and having spent a short time in training for plain warfare, was moved up to a position in the rear of the portion of the front line from which it was to attack, and was concealed in the orange and eucalyptus groves there for two days prior to the attack, so that the divisional engineers had the task of endeavoring to run the various and assorted pumping plants which had been operated by the Jews in this section for watering their orange groves. These people, by force of circumstances due to the war, had had to adopt all manner of repairs to keep their engines running, so we found that each engine had some peculiarity different to any other, and it was often a long puzzle to any one other than the owner. The groves were supplied with large concrete storage tanks from which they were irrigated. We filled these tanks and were able to supply abundant drinking water, and in addition, were able to set aside certain tanks as swimming pools.

In the advance after the rout of the Turks, many different types of watering-places were developed. Of course, we took over all the Turkish pumping plants, which were all equipped with a standard make of German engine and pump. We were forced to run these plants continuously, so that in cases we had breakdowns, owing to wearing out of the parts. However, so many engines of the same make were used, that we were able to interchange parts. Large engines in towns and orange groves were also used. Previous experience with the Turk taught us to be on the watch for "booby traps" in the engine houses, but this time the attack and advance were so swift and unexpected, that he had evidently no time to prepare anything of that nature.

Use of the Chursa

Where the depth of the well was not too great, we used lift and force pumps, but for deeper wells as a very temporary measure we employed a chursa. The chursa consists of a large conical-shaped leather bag about 2 ft. in diameter at the large end and about 8 ins. in diameter at the small end. It holds, when full, about 30 gallons of water. The small end is hooked up level with the iron ring which gives rigidity to the large end of the chursa bag. The bag is then ready to be lowered into the well by attaching it to the end of a long length of 2-in. cordage, which passes over a pulley suspended from a sheer-legs directly over the opening of the well, the pulley being at such height that the bag, when hoisted, will clear the opening. From this pulley the rope passes to another pulley on the ground, so that a horizontal pull is obtained. The chursa is operated usually by attaching a swingle tree and using two horses to pull it. When up clear of the well, the small end of the bag is released and the water spilled into a trough, usually leading directly into a drinking trough or storage tank. This chursa equipment, with trained men, can be set up very quickly, but of course, is not a good permanent arrangement.

The Chaine-Helice

The chaine-helice seemed to be the arrangement best suited for the work in Syria, where one had usually deep wells and wanted a continuous supply and wanted it generally in a great hurry after arrival at the well. The chaine-helice consisted simply of a continuous link chain surrounded by a helix of heavy wire. This continuous chain passed over a cupped wheel housed in a tin hood, which caught the water as it was thrown clear of the chain, and which led to a spout where the water was caught and led to the storage tanks or wherever desired. This hood and wheel were set over the well opening, and the chain lowered into the well. A heavy, deep-flanged wheel was set in the loop of the chain. This kept the chain taut and prevented it from twisting and tangling. The power was supplied by a petrol engine connected by a belt to a pulley on the shaft of the cupped wheel over which the chain passed. This outfit gave about 1,200 gallons per hour with wells 70 or 80 ft. deep. The length of the chain could be altered, split links being provided for this purpose.

In the fall of 1918 we were engaged mostly on road work and bridge building, but in spare time we made reconnaissance of the country for springs, which were measured and the map location given. For this class of work a small metal V-notch, which could be carried on the saddle, was useful; this, with a small rod about 18 ins. long, marked in inches and tenths of inches, comprised a simple device whereby one man could measure a small spring, it being necessary merely to make a small bend into which the V-notch was built, the inch scale firmly set up-stream and the reading noted at the time of first spill and again when the flow through the V-notch had become steady. For various heads of water on the notch, the yield in gallons per hour could be obtained from tables in a hand-book.