

WARBURTON ROAD BRIDGE—MANCHESTER SHIP CANAL.

We present herewith an illustration of the Warburton Road bridge over the Manchester Ship Canal. The canal was constructed to enable sea-going vessels to reach Manchester, and thus avoid expensive railway transfers of freight at Liverpool.

The Manchester Ship Canal is 35½ miles long, 26 feet deep, and 120 feet wide at the bottom. Docks are built at intervals to accommodate the largest vessels which traverse the canal. The docks at Runcorn, Salford, and Manchester are very extensive. The total capital stock of the company is £9,812,000.

Engineering works, as locks and bridges, were necessitated by the country which the canal traverses and the exigences of travel, and these works required the skill of the best civil engineers. The most important problem connected with the scheme, next to the cutting of the canal itself, was the providing for the traffic which exists between the two sides of the river Mersey and the Irwell. Four roads cross the canal, one at Barton, one at Warburton, and two at Warrington. In addition to the road bridges, the Bridgewater Canal and five railroad bridges, as well as the famous Runcorn Viaduct, cross the canal. In the final plans, swing bridges were abandoned and high level bridges were substituted. The Warburton Road bridge was designed by Mr. E. Leader Williams, M. Inst. C. E., and is a fine example of a cantilever bridge. For the illustration we are indebted to the *Engineer*. The Manchester Ship Canal

should expect, for there is no presumption that the meat of which they were made was bad. Indeed, the contamination must have taken place after they left the baker's oven. The ptomaines of decomposed meat may pass through the baking process without change; but it is hardly possible to suppose that living bacteria could survive such an ordeal.

This, then, is a matter entirely different from the ordinary ptomaine poisoning due to the use of bad meat, and it raises a question of considerable interest. The pork pie, be it ever so good and fresh, forms a most admirable culture medium for microbes, and when we think of the late revelations concerning the disgraceful sanitary condition of our bake houses, we cannot but wonder that outbreaks like that at Camberwell do not occur more frequently. Short of actual poisoning, however, we suspect that the question is one of no little practical importance to the public, that cooked meats are pretty often contaminated with bacteria, and that a large proportion of sick-headaches, summer diarrhoea, and the like are to be accounted for in this way.—*Chem. and Drug.*

Prehistoric Irrigation in Arizona.

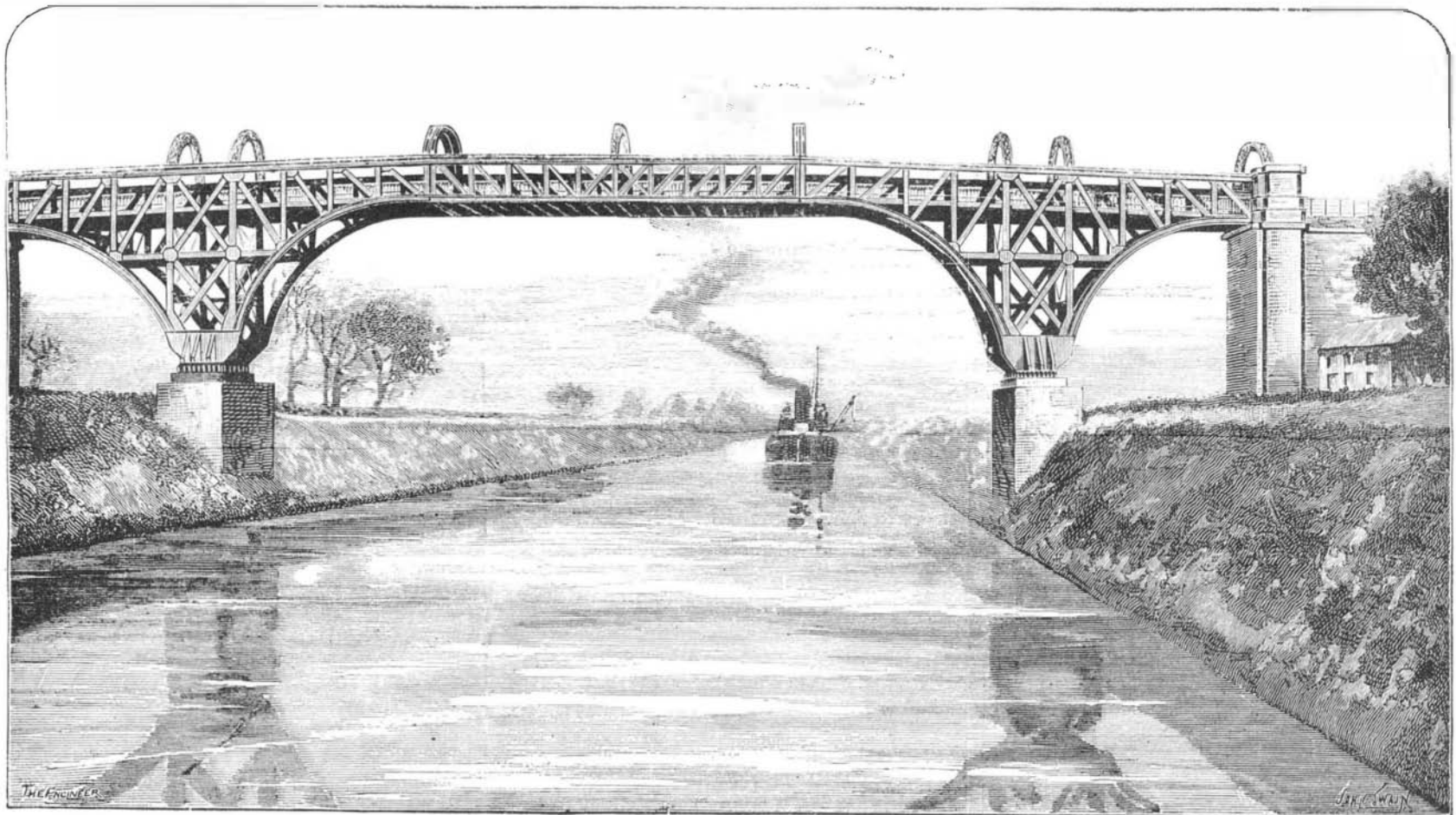
In the July *Anthropologist*, Mr. F. W. Hodge gives some interesting notes on this subject, from which we take the following:

In none of the extensive archæologic remains of Southern Arizona are the industry, perseverance, and degree of advancement of a large pueblo population

broadening until they reached the brinks, which were about thirty feet wide. Thus a main ditch consisted, so to speak, of one watercourse within another; so that if at any time a small current of water only could be supplied at the head-gate, owing, perhaps, to drouth, the lower and narrower ditch was doubtless always filled sufficiently to supply the towns beyond, while during the rainy season the upper and much broader portion of the great canal would readily accommodate all surplus waters.

Several years ago, when the Mormons first settled at Mesa City and began the irrigation and cultivation of the fertile plain about them, they utilized this ancient canal bed for a considerable distance, including that portion encircling the knoll of volcanic tuff mentioned. The writer has been informed by one of the founders of this settlement and builders of the Mesa canal, which is nine miles in length, that the saving to them by using the ancient canal was from \$20,000 to \$25,000.

In tracing the routes once pursued by many of the canals, great depressions—the sites of ancient reservoirs—are observable. The remains of one of these reservoirs, nearly a mile long by about half a mile wide, occur on the open plain at the terminus of one of the main canals that formed the source of water supply of Los Muertos, and about three miles southwest therefrom. It is possible that this great depression was, in part at least, a natural sink, deepened by artificial means to serve more fully the purposes of a storage basin of surplus waters from the Los Muertos irrigat-

**MANCHESTER SHIP CANAL—WARBURTON ROAD BRIDGE.**

is described and illustrated in the *SCIENTIFIC AMERICAN SUPPLEMENT*, Nos. 383, 515, 555, 685, 715, 763.

Pork Pie Poisoning.

The recent extensive outbreak of poisoning in Camberwell has revealed a little-suspected danger that may lurk in the pork pie *et hoc genus omne*. The outbreak was peculiar in two respects. The symptoms did not come on till after a lapse of from twenty-four to thirty-six hours, and those who scarcely tasted the pies suffered almost as severely as those who indulged freely. One woman, indeed, who had taken none, was attacked; but it was found that she had used a knife with which a pie had been divided.

In ordinary ptomaine poisoning the symptoms come on almost immediately, and their severity is, of course, directly proportionate to the amount of food taken. Here neither of those conditions was fulfilled, and the facts permit of but one interpretation. The pies were, so to speak, only potentially poisonous. They did not contain an actual chemical poison, but they did contain living bacteria, capable of growing in the body, and of producing deadly toxins therein. The period that elapsed before the onset of the symptoms was, no doubt, the incubation period of the bacteria, and with the enormous power of reproduction possessed by these organisms it mattered little whether many or few were introduced.

The pies, it is said, were made in Leicester on a Thursday, and sold either on the following day or on Saturday, and no complaint was made by any of those who partook of them that they were otherwise than perfectly fresh and good. This is exactly what we

more faithfully illustrated than in the many works of irrigation that abound in the valleys and on the mountain slopes of this section.

Judging from the remains of extensive ancient works of irrigation, many of which may still be seen passing through tracts cultivated to-day as well as across densely wooded stretches considerably beyond the present non-irrigated area, it is safe to say that the principal canals constructed and used by the ancient inhabitants of the Salado Valley controlled the irrigation of at least 250,000 acres, even without considering the economical methods employed by a primitive people in all its undertakings.

The mode of canal construction employed by these pueblo builders was another indication of their patience and industry. Their canals are models for the modern farmer to imitate; yet they could have been dug in no conceivable manner save by the laborious process of hand excavation with stone or wooden implements, the earth being borne away by means of blankets, baskets, or rude litters. Notwithstanding this, the outlines of at least a hundred and fifty miles of ancient main irrigating ditches may be readily traced, some of which meander southward from the river a distance of fourteen miles.

Unlike ordinary irrigation ditches, these were constructed in such a manner as to control to some extent the depth of the current as well as to prevent waste through seepage. The bed of the canal was about four feet wide, but the sides broadened in their ascent to within about four feet of the bank, where a "bench," three feet in width, on each side of the canal had been made. From these benches the banks continued,

ing system. Every cluster of communal structures in Los Muertos was supplied with a reservoir on a smaller scale than the one just mentioned, a single canal forming both its inlet and outlet. Sometimes a lesser communal dwelling shared with a neighboring structure in the water supply from a single storage basin.

The Iron Industry.

President Richards, in his closing remarks before the British Iron and Steel Institute, said: "So successful have we all been in economically increasing production that we have inundated and swamped the markets for the time being; at present, and for some time past, there is not enough work for half the steel-producing power of the country. Thus we go on, and we look about in vain for new markets. We compare America with 60 millions of people, having 175,000 miles of railway, with India, having 250 millions of people and only 17,000 miles of railway, and wonder why, under our sway, it develops at such a wretchedly slow rate. Where is the trade to come from to keep our workmen employed and our establishments in operation? No one seems to be able to answer this question; but we know that we have had many serious depressions before, though none seem so deep, so prolonged as this. The iron and steel trades may be likened to Pandora's box, from which, once filled with all good things and all bad, everything escaped—the good things back to heaven and the evils to infest and plague the earth; but there is still left to us that which never deserts us, the inestimable blessing—hope."