PIPE

IN the present era of large-scale developments accompanied by intensive application of engineering principles in many of the basic industries, it has become increasingly important to give more study to the characteristics and properties of the materials entering into the structure and maintenance of their various contributing units. This is particularly true of pipe lines which often bear an important relation to efficient and economical operation.

STEEL PIPE

During the past twenty years in particular there has been a remarkable development in the wrought tubular industry, including the tonnage used, the capacity of mills, diversity of pipe service, and improvements in the material itself.

The factors which control the characteristics and properties, and thus produce the wonderful improvement in various tubular materials, are the facilities of the manufacturer; the special processes supplementing the fundamental ones; the availability and quality of raw materials; the ideals and skill of the men in the organization—their capacity for genuine accomplishment. Among the many evidences of this trend are: the improvements effected in the quality of the material, production of certain sizes of pipe up to 40 ft. lengths, diameters up to 96 in., a complete line of tubular products, full standard weight pipe, and marking with the name, are representative of the progressive attitude taken in the manufacture of wrought pipe. The increasing demands of the oil industry, which consumes nearly one-half of the pipe made, has been a stimulating factor in respect to improved quality.

Among the improvements none have received greater attention than the efforts to produce a uniform quality of steel. To secure and maintain uniformity, necessitates complete control of all materials and manufacturing operations—from ore to finished product. This practice of producing uniform pipe and steel and its fabrication into finished tubular products is supplemented by a mechanical process of roll-knobbling, to make the metal more uniformly dense when there is any tendency to physical irregularity in this respect.

Another condition which gives rise to electrolytic centers and pitting is the presence of irregular areas of heavy welding-scale on the surface of the finished product, caused by oxidation at the high temperature of welding. This scale is strongly electro-negative to iron, like copper, and should therefore be removed. For a number of years efforts have been directed to accomplish this object and a scale removing process has finally

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been worked out, which is in effect a further application of the process of laterally working the steel above mentioned, but in this process the work is applied to the hot pipe in the finishing operations at a temperature below the welding heat. When the skelp has reached the proper temperature for welding, it is drawn through the customary type of welding bell forming an unfinished pipe of larger size than is usual. The pipe is then held on a cooling table until the temperature is reduced to about 1800 deg. fahr. It then passes through a series of rolls where it is reduced in size and elongated. These rolls reduce the pipe to its correct finished size. The reduction in the size of the pipe which it receives in passing through the series of rolls cracks the hardened welding-scale from both the interior and exterior surfaces of the pipe, leaving them clean and smooth.

After a pass through a set of cross rolls, to take care of any straightening that may remain to be done and to give the exterior a smooth, clean finish, the pipe is taken to a tank of water where it is dipped, lifted to a slanting position and the water allowed to rush out, carrying with it the loose scale from the pipe. Certain sizes have the loose scale blown out by a blast of compressed air instead of being dipped in the water.

The advantages of scale-free pipe are, its clean, smooth surfaces present an ideal base for the adherence of a galvanizing coating—full working capacity is assured, the interior being free from any obstructions tending to reduce the flow. This is important in heating and other piping work. Troubles caused by the deposit of scale in valves and strainers, and other apparatus, are practically eliminated, while pitting by corrosion is materially reduced.

These improvements naturally give rise to the thought that a longer life might reasonably be expected from the pipe under certain conditions, and while this has been the object of most of the research, experiments and perfection of processes, considerable improvement has been attained in this respect, the fact still remains that the life of pipe is governed largely by installation conditions, and no matter how well made or uniform the pipe may be, the life of pipe, particularly under severe corrosion conditions; such as, hot water supply lines, boiler feed and return lines, is limited, and some protective measures are necessary to secure a longer life.

For some years past considerable research and experimental work has been carried on to determine the causes of failure in pipe lines, and to ameliorate the effects of corrosion; to investigate unusual conditions of service, and to determine a practical means of corrosion prevention.

The electrolytic theory of corrosion as formulated in 1903 by Dr. Whitney has led to the development of certain protective systems which are based on the removal of dissolved oxygen from water. Careful experiments in various research laboratories have demonstrated that the amount of corrosion found is almost directly proportional to the amount of oxygen in solution, and varies directly as the temperature. The predominating influence of free oxygen in water was suspected before this, as a result of the early study of pipe corrosion, for the most striking