

A New York house of long standing, whose views on the metals markets are usually well worth attention, has this to say upon the advance in wages in the States: "The movement to advance wages, a movement in its universality and magnitude such as, we think, has never before been seen in the history of this country, eliminates the prospects of strikes and social disturbances, but it serves to prove how serious the conditions are that make such action necessary. It means the additional cost to railroads and our manufacturing interests of hundreds of millions of dollars annually. How is it to be recouped? Partly by decreased net earnings, and, therefore, smaller dividends, partly by higher prices for manufactured goods and freights; but we think the greatest pressure will come on the prices of the raw materials, and, therefore, we anticipate lower prices as far as the metal trade is concerned in pig iron, scrap iron and the pig metals. It is unfortunate that these higher wages will be spent in making less oppressive the cost of articles that enter into the daily actual cost of living, and, while it will make these conditions more bearable, will do nothing to cure the basic conditions that have caused this increased cost of living."

LIGHT-DRAFT SAND-PUMP DREDGE "QUORRA" FOR IMPROVEMENT OF THE RIVER NIGER.

The improvement of the transportation facilities of Northern Nigeria has made it necessary to supplement the railway project now under way with the river navigation on the Niger.

We illustrate on this page, a light draft sand-pump dredge recently built to the order of the British Crown Agents for the Colonies for the improvement of the river Niger.

Before describing this interesting vessel it will aid in the understanding of the design if we state briefly the conditions to be fulfilled.

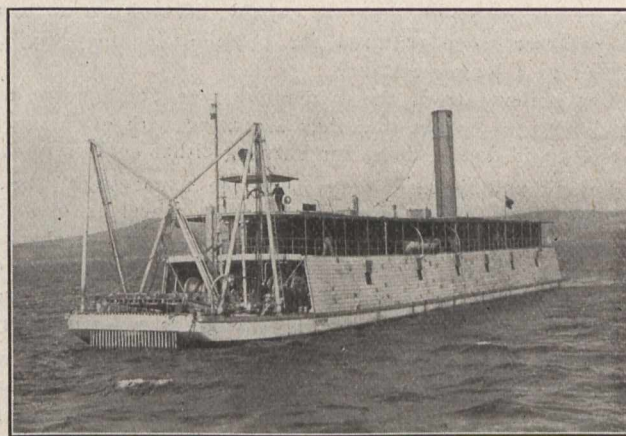
The river Niger is an alluvial stream subject to great range of level. In the reach of 300 miles between Abo and Baro where the principal work is to be done, there is a navigation depth of 14 ft. during the high water season, which diminishes to 1 to 2 ft. at low water. The obstructions formed by sand bars which are constantly shifting and occur in a manner similar to the Mississippi and other alluvial rivers. The condition of the river has given rise to a special class of light draft steamer to carry on the navigation during the low water season even down to the "steam canoe" which can carry 5 tons on a draft of 18 inches. That such light vessels with light loads can be commercially used is good evidence that far greater economy could be obtained with a deeper draft available and an outlet supplied by which the products of the interior country can be commercially carried to the sea.

The unstable nature of the river bottom renders difficult, if not impossible, any permanent works, and the successful results obtained by temporary dredging each season on the Mississippi attracted the attention of Sir Percy Girouard in 1908, then High Commissioner of Northern Nigeria, with the result that Mr. A. W. Robinson, M. Inst. C. E., of Montreal, Que., who had designed several of the great dredges on the Mississippi, was entrusted with the design of a special dredge to suit the river Niger. On the Mississippi, a depth of 9 feet is maintained throughout the low water season under conditions more difficult than on the Niger because the forces at work are on a vaster scale, and the Mississippi does not run within permanent banks or confine itself to a particular

channel, but is continually changing its map, often by several miles. The Niger, on the other hand, runs between comparatively permanent banks and the changes occur only in the sand bars and shallows in the bed of the river.

The problem therefore resolved itself into the design of a dredge which could rapidly and cheaply cut a channel across the sand bars along the line of the current and of sufficient width and depth to pass a steamer of say 5 or 6 ft. draft, and so that the cutting once opened in this way would tend to maintain itself by natural erosion with but little attention for the balance of the season as it is found to do on the Mississippi. The vessel should be light draft, of not over 3 feet in working trim, able to make its own flotation, able to set cut and pick up its own anchorages, and able to quickly go from place to place with its floating pipe-line, coal barge, etc., so as to maintain navigation at the critical points as the river level falls.

The type of vessel adopted is that of a light draft stern wheel steamer fitted with a suction pipe at the front end having a very broad fan-shaped inlet so as to make a cut as wide as possible with a straight forward feed. The width of the



The photograph shows the dredge at the yards of the builders enclosed with bulkheads for voyage out.

inlet is 16 ft. and it can be lowered to a depth of 12 feet. The actual width of cut therefore as made by the suction head is 16 ft. on the bottom, but the sides run in to such a slope that the channel made is quite sufficient to pass the vessel. The sand is deposited in the river far enough to one side of the channel to avoid running in again, and a self-deflecting floating pipe-line of special construction is employed for this purpose.

The forward feed is accomplished by means of two anchorage lines ahead. These anchorage lines are attached to steel piles which are sunk in the sand at the upper end of the channel to be dredged. The dredge is fitted with two pairs of light sheer legs on the front end overhanging the sides from which these piles can be placed in position. The anchor piles are constructed of steel tubes of great strength and are open at their lower end and closed at the upper end and fitted with a hose connection so that they can be sunk in the sand hydraulically, this being an operation occupying only a few minutes. As soon as the anchor piles are sunk with the head-lines attached to them the vessel drops downstream to the lower end of the cut and the suction pipe is lowered to the required depth. The dredge then advances by winding in the head-lines at such a rate as to feed the pump with sand up to its working capacity, this being indicated by means of a vacuum gauge in front of the operator.