

## DREDGES ON THE MISSISSIPPI.

BY WALDON FAWCETT.

In no inland waterway in the world is there maintained a more elaborate system of perpetual improvement than on the Mississippi River, and it is no doubt partially due to this policy that the dredging operations on the great American river are more extensive and more systematically conducted than on any other stream on the globe. The character of the river is another factor in the case. Such is the rapidity with which deposits form at many points on the waterway that dredging at short intervals, if a navigable channel is to be kept open, is an absolute necessity.

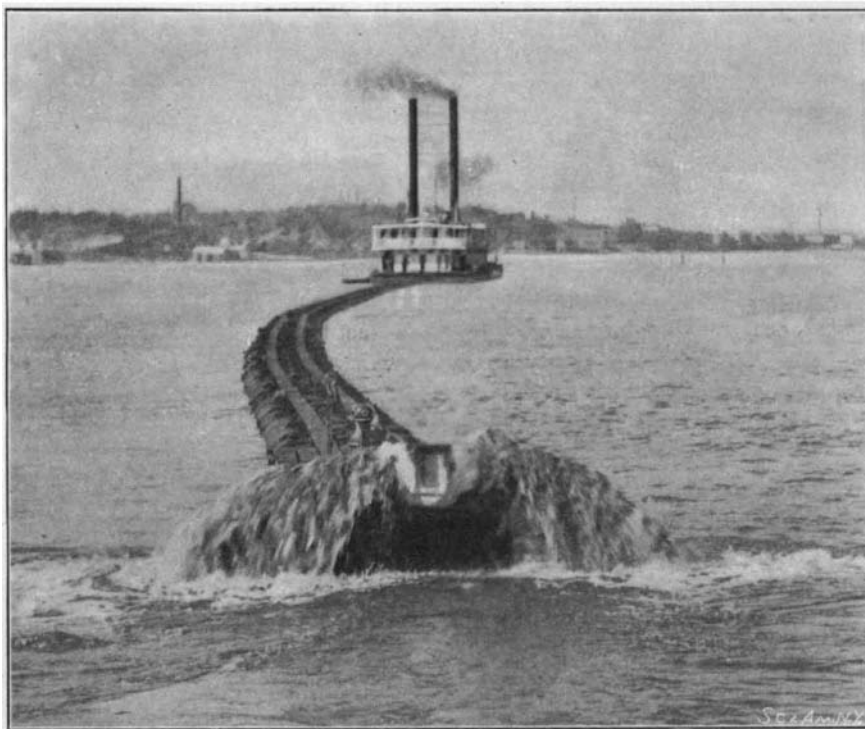
The improvement of the Mississippi, including of course all the dredging operations, is under the jurisdiction of the Mississippi River Commission, a branch of the engineering department of the War Department. There are in service during the greater portion of the year a fleet of more than half-a-dozen steel-hulled hydraulic or suction dredges. These dredges, most of which have cost over \$100,000 each, have all been built within about half a decade. In most instances the hull has been constructed at some point on the Mississippi or tributary rivers; but the major part of the machinery equipment has been supplied by firms in New York, Philadelphia, and other distant points.

The majority of the dredges are capable of dredging from seven hundred to one thousand feet of sand per hour from a depth of fifteen feet. This sand is discharged through at least one thousand feet of floating pipe trailing out behind the dredge; and as there is not infrequently a deflection amounting to as much as five hundred feet, it will readily be appreciated that it is quite possible to thus convey the dredged mass to the bank of the river or to a swampy section of the stream quite remote from the navigable channel. The one thousand feet of floating pipe, with which each dredge is equipped, is made in twenty sections, each fifty feet in length. These sections are floated upon steel pontoons, each about twenty-four feet in length.

The dredge "Beta," although constructed for the Mississippi Commission several years ago, remains today one of the most interesting machines on the river. The "Beta" has two independent dredging machines complete, and was built at a cost of \$172,000. The contract specifications stipulated that the dredge was to have a capacity of at least 1,600 cubic yards per hour, but on her official test an average capacity of 4,920 cubic yards per hour was shown and the contractor therefore earned a bonus of over \$86,000. The sand pumps are of the centrifugal pattern, with runners seven feet in diameter and with eight arms in each runner. The suction for each pump divides near the forward end of the hull into three suctions, and each of these suctions was provided originally with a vertical revolving cutter with twelve nickel-steel blades, which serve to loosen up the material, so that it will readily enter the suction. They are driven by engines which make about eight revolutions to one revolution of the cutters. The sand pumps are operated by engines which run at a speed of 130 revolutions per minute and develop 1,250 horse power. Near the bow of the boat are the winding engines, with six huge drums. Two are used for side warping, two for pulling the dredge ahead and two for raising and lowering the suction. About a year or two ago this dredge was reconstructed, and the cutter engines and cutters, above described, were replaced by a jet suction and pumps.

The "Gamma," another of the dredges, has a hull of steel 138 feet in length, 38 feet wide and 8 feet deep. In the bow there is a well for the suctions which is 32

feet long and 22 feet wide. Bulkheads divide the hull into two compartments, one for the boilers and coal, and the other for the engines. There is a cabin 97 feet long and 29 feet in width, and the crew's quarters, with bath room and mess galley, are located below the boiler deck. Between the boiler and engine rooms on the main deck is a fully equipped repair shop. The engines of this dredge are capable of developing about seven hundred horse power. They are supplied with



The discharge at end of floating pipes.

## UNITED STATES DREDGE "GAMMA," UNDERGOING EFFICIENCY TESTS.

steam from a battery of six boilers of the type in universal use on the inland rivers of America. These steam generators are only 48 inches in diameter, but 28 feet long, and are built to withstand a pressure of 140 pounds per square inch. The coal bunkers on the dredge will hold forty tons.

The "Gamma" is supplied with a powerful pump which supplies the water to stir up the sand at the suction head, and among her other equipments is an electric lighting plant which supplies the current for a four thousand candle power searchlight, four arc and seventy-five incandescent lamps. Exceptional interest attaches to the Mississippi River dredges in engineering circles by reason of the heavy work required of them, and also from the fact that the character of material to be removed in various portions of the river differs so widely as to make the problem of treatment especially complex. In order to give the reader some idea of the strenuous exactions imposed, there may be cited a brief outline of the general efficiency test which the "Gamma" was obliged to meet ere she could be accepted by the United States officials. The stipulations required that the dredge should be operated sixty

is stated that the "Delta," another dredge of the same general type as those described, but 175 feet in length, has a weight of upward of seven hundred tons although she draws but a little over four feet of water. Then the floating pipe has a weight of fully 110 tons. The steel plate of which the hulls of these dredges is formed varies in thickness from  $\frac{3}{8}$  to  $\frac{1}{2}$  of an inch. In 1898, there was designed for the Mississippi River Commission a self-propelling dredge. Save in this feature, however, the plans differed little from those of the dredges of which mention has already been made. The dredges of most recent construction, such as the "Beta" and "Epsilon," are even more elaborate in equipment than their predecessors. In addition to a complete electric light plant they have cold storage facilities, tanks holding over half a thousand gallons of water and several powerful fire pumps. The dredging capacity however remains practically unchanged. Each dredge is designed to make a channel about 20 feet wide at the bottom at each cut. It should, perhaps, be mentioned also that whereas each machine is capable of delivering the sand through 1,000 feet of floating pipe, the line of discharge is frequently of not more than half that length.

Nor is there any reason to suppose that a climax has been reached in the development of Mississippi River dredges. Indeed, Major James B. Quinn, the United States engineer in charge of the government work at the mouth of the Mississippi River, has only recently designed two powerful suction dredges to be used in maintaining the channel at South Pass. They will cost in the neighborhood of \$150,000 each and will be about 157 feet in length, 37 feet beam and 16 feet depth of hold, with two propellers and a hopper capacity of 650 yards. Two powerful pumps with 15 and 18 inch suction pipes about 60 feet in length will be suspended alongside the hull. It is estimated that each dredge will have a capacity in excess of 12 cubic yards per minute. These new dredges instead of having the floating pipes will be fitted with shore discharge pipes so that material may be deposited over the levees.

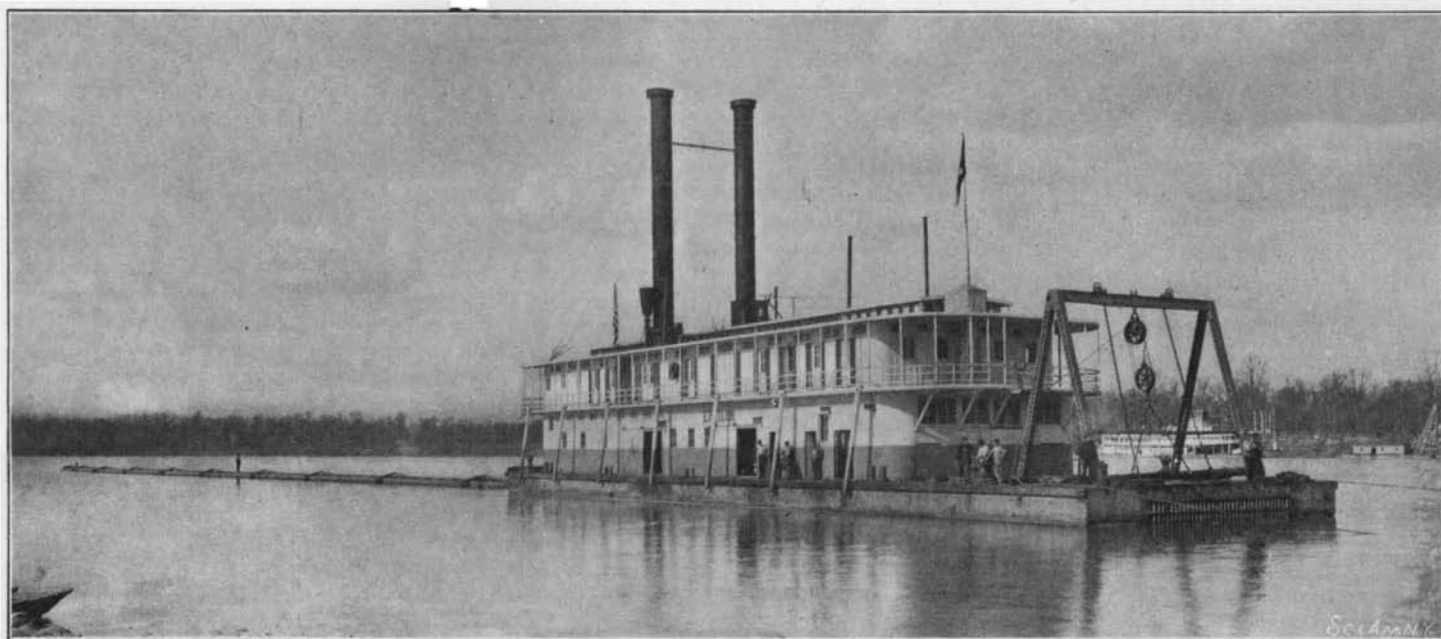
## Loss of Life by Lightning.

The loss of human life by lightning in the United States during the year 1899 was greater than any preceding year for which statistics have been collected. The number of persons killed outright or suffered injuries which resulted in their death was 562; the number of those who received injuries varying in severity from slight physical shocks to painful burns and temporary paralysis was 820. The subject has been treated exhaustively by A. J. Henry, in *The Monthly Weather Review*, published by the Weather Bureau. The greatest number of fatalities, about 45 per cent, were in the open. The next greatest number occurred in houses, 34 per cent; 11 per cent occurred under trees

and 9 per cent in barns. Fully a dozen persons were killed in the act of stripping clothes from a wire clothes line or coming near to one.

## The Raddatz Submarine Boat.

The Raddatz submarine boat has been having some additional tests. On June 16, a trip was made under the surface of Milwaukee Bay; there were five in the party. A steam launch accompanied the boat and



Capacity, 1,000 cubic feet of sand per hour from depth of 15 feet.

## UNITED STATES DREDGE "EPSILON."

working days of twelve hours each in water from 5 to 15 feet deep, and with sand at such different degrees of coarseness as would be found on the low-water bars. After this had been done and the machinery found satisfactory, twenty capacity tests had to be made with the suction at different depths.

Something of the staunchness of construction which characterizes these dredges may be imagined when it

kept as close as possible to the course of the submarine craft, so as to render any assistance required. The boat was run 18 inches below the surface. It is provided with a diving bottom, from which a diver can be sent to the bottom of the lake, and have air supplied from the tanks aboard the boat. It is thought that the boat will be specially valuable in wrecking operations.