

trolling this subject is absurd. The citizen of the United States who cultivates a farm on the Upper Alleghany, Wisconsin or Yellowstone, is as much interested as he who cultivates his rice, or sugar, or orange grove, in sight of the Balizo. The work is national, and the nation has assumed it and has delegated the work to Captain Eads. There are many mouths of the Mississippi—Pass a l'Outre, North east Pass, East Pass, South Pass, and Southwest Pass. The latter is now and has been the main sea channel, and Captain Eads most properly and naturally preferred to lay hold of it; but the wisdom of our representatives in Congress assembled has appropriated money alone for the South Pass, and at the South Pass must he try his hand. His plan, as I understand it, is to extend the present banks by artificial levees or dykes made of mattresses of willow fascines, loaded with stone. These, extended to deep water, will beyond doubt force the river current to cut out its own channel of thirty feet in depth across the present bar to deep sea water. But we all know, and have ocular proof on the table before us, that the Mississippi water carries in suspension a large amount of clay and dirt in proportion to the strength of current, which it must deposit, when the current ceases, in the still waters of the Gulf of Mexico. What is to be done with this mud? Where is Captain Eads to find a hole big enough to hold it all, to prevent its forming another bar outside his new Balizo? But he has undertaken it, and as he has in the past done mighty deeds we must repose with confidence in his ability to do this. It is not a question of cubic yards, but of cubic miles; and I doubt not Captain Eads will say, and say truly, that the Gulf of Mexico is large enough to hold it all, and I am further willing to admit that if the same operations must be repeated every thirty three years, the object aimed to be accomplished is worthy the effort.

The first public banquet ever given in this beautiful room which I attended was to some English gentlemen, on a visit to our country, to see about their investments of money; among them were Sir Morton Peto, Mr. Melleny, and Hon. T. Kinnear of London. On their return to England in 1866 the former, Sir Morton Peto, published a volume of his observations on the resources of America, which is full of interest and bears directly on the question that occupies us to-night.

He asserts that the annual consumption of wheat is six bushels to every individual. That the inhabitants of England and Ireland with thirty millions of people require one hundred and eighty millions of bushels, of which they import fifty six millions. One half of this comes from America and the balance from the Black Sea. Now I have seen the steppes of Southern Russia, which produce the wheat exported from Odessa and Taganrog, and am satisfied they are identical with the plains of Western Kansas and Nebraska, now lying idle, and fed over by herds of wild buffalo. Let Captain Eads remove the bar at the South Pass, even to the depth of twenty five feet, so that sea-going vessels may at all times reach New Orleans, and I am certain that England and Ireland alone will give you a certain market for thirty millions of dollars that now go to the Black Sea, for wheat alone. Then take Brazil the India Islands, and other countries that need our cheap grain; and you have, one single item of trade that approaches a hundred millions annually. In 1856 our country yielded 173,000,000 bushels of wheat, and \$34,000,000 bushels of corn.

The census tables for 1870 further show that the extent of our country is measured by four hundred millions of acres, only one fifth of which is occupied. Illinois now heads the column of agricultural extent with twenty five millions of acres occupied as farms; next Georgia, twenty three millions; then New York with twenty-two millions, and Missouri with twenty one million seven hundred and seven thousand two hundred and twenty acres. The aggregate value of farm products for 1870 was \$3,447,658,000. Yet our country is in its infancy, and the amount of human food that we can produce is only limited by the demand and the cost of carriage, and we all know that the Mississippi River itself affords the cheapest possible carriage, provided the necessary ships are ready at its mouth to receive this freight.

In 1870 our population was 38,553,381, applying the ratio of increase 33 1/3 per cent. every ten years, we have for 1880 51,411,116, for 1890 68,548,214, for 1900 91,397,199, so that many now here will probably live to see the day when the population of our country will be a hundred millions.

If as industrious as their fathers the surplus food for shipment abroad will be simply indefinite; plenty to give occupation for the Erie canal, and every railroad leading eastward, as well as the vast amount that must flow down the Mississippi and seek a market by the channel that Captain Eads now proposes to delve.

The great civil war that recently upheaved us as by an earthquake is nearly forgotten. New issues and new troubles already disturb us. Let the past go, look to the future, and I say to Captain Eads, go in; work like a beaver on your great dams and dykes, and may God spare your life and health to see the *Great Eastern* steam up to New Orleans for her 25,000 tons of St. Louis superfine flour to carry back to Shermans for the hungry millions that want it, in that human hire—London—*U. S. Army and Navy Journal*

The Mouth of the Mississippi.

The honorable Mr. Stannard, of St. Louis stated recently (see page 8, Congressional Record, Saturday, February 20) that neither the United States Government nor private corporations had constructed jetties in this country, so far as he was aware.

Notwithstanding that Mr. Stannard is not aware of it, the U. S. Government has for nearly 50 years past constructed jetties at the mouth of the rivers emptying into the Great Lakes, and has, in fact, created some forty harbors on our Lakes by jetties aided by dredging, and is now annually applying that system.

Mr. Stannard read a list of some nine or ten rivers in Europe, the channels of entrance to which had been deepened by jetties, the gain in depth varying from 7 to 12 feet, and in one instance, from 13 to 14 feet, and in another, the Oder, 16 feet. This list included the Sulina mouth of the Danube, where the gain was stated to be 12 feet. Mr. Stannard added that his list comprised 19 European rivers where the mouths had been deepened by jetties.

Now the gain in depth at the mouths of the rivers of the Lakes by the construction of jetties aided by dredging varies from 7 to 12 feet, and the number of these largely exceeds the number in Mr. Stannard's list of European rivers.

As examples.

At Chicago, the depth at the entrance

was 3 feet; it is now 15 feet, and can be still further increased.

At Milwaukee, it was 7 feet, and is now 17.

At Racine, it was 2 feet, and is now 14 feet.

At Michigan City there was scarcely any water, about 1 foot; is now 12 feet.

At Erie, there was 3 feet; there is now 15 feet.

At Buffalo, the depth way was very small; there is now 15 feet.

And at many other harbors similar gains in depth have been secured.

It may be well to note that the rivers named by Mr. Stannard, with the exception of the Sulina mouth of the Danube, empty into the Baltic, a nearly fresh water inland sea. Two of them, the Niemen or Nemel, and the Oder, reach the sea through Sounds called Haffs, the first through the Kurische Haff, the second through the Grosse Haff.

Now at the mouths of these Lake rivers, the bars are formed by the drift, sand and other loose material, carried along the shore by the waves, and the bars at the mouths of the European rivers mentioned and referred to, including the Sulina mouth of the Danube, are formed chiefly, if not altogether, in the same way, that is, by the waves driving along the shore the loose material of the coast, and filling the openings, such as river mouths, with it. Cases of this kind are properly treated by the use of jetties and dredging, where needed.

The object of this brief statement is to show that the Government Engineers of this country are familiar with the use of jetties in deepening the mouths of rivers and with the cases where there is no question as to the economy of their application: that is where the bar is formed by the action of the waves in accumulating the loose drifting material of the shore at the mouth of a river. In the natural condition of this class of bars, the bar remains substantially in the same position, and the distance across the bar from deep water outside, is short, and the jetties are of corresponding shortness.

The case of a delta river is different, there the bar is formed by the earthy matter brought by the river to the sea, and dropped at its mouth, and the bar is constantly moving into the sea, the shore following it; the distance across the bar from deep water inside to deep water outside is long: as, for instance, the bar of the S. W. Pass of the Mississippi River is more than 7 miles long; that of the South Pass is 2 1/2 miles long. The jetties in such cases must be of corresponding great length.

In case of the drift bar when jetties are built the drift accumulates against the jetties on the outside and extends a long distance along the shore, this distance increasing as the drift accumulates against the jetty, and giving an increasing area for the deposit to form in. Hence, not only the original length of the jetties, but their extension from time to time, is moderate.

The bars of the Mississippi river, are but little affected by drift, as the shore at its mouths, as well as its bars, are formed of soft, cohering materials glued together, and not of the loose sandy material, which forms the shores and bars of drift bars.

The delta bar extends annually into the sea, rising as it grows, and the jetties must be extended to meet this constant growth and rise.

A very important question in the application of jetties to the mouth of the Mississippi river is, the rate at which the bar will advance into the sea when jetties are built.

Some Engineers are of opinion that, with jetties, the rate of annual extension of the