letter substantially confirming this was also written by Col. Merrill, U. S. A., and was read in the House by Mr. Bayne, of Pennsylvania, when the measure came up for discussion. The result was that it was defeated, but no appropriation to complete the works was carried in the river and harbor bill at that session, for the reason that Capt. Eads had previously reviewed before the committees the features of the government plans, and had convinced those committees that even if the works were completed, they had four radical defects in them, either one of which would defeat the object in view: 1st. The enormous width between the jetties. 2d. They were too low, and should be carried up several feet above high tide, to prevent storm waves from injuring the channel by carrying sand over the jetties into it when the channel was once secured. 3d. The openings left between the shore and the jetties, to facilitate the inflow of the tide into the bay, were wholly wrong in principle, and would prevent the deepening of the channel. 4th. The sea ends of the jetties terminated in water too shallow to secure any permanent depth greater than that at the jetty ends.

Besides these inherent defects, the jetties would not resist destruction by teredo in the clear water at Galveston. To protect the brush from them, the water must contain sediment or mud, as at the Mississippi jetties. He declared that the jetty reported by Colonel Mansfield as completed and substantial was almost wholly destroyed already, and that it required a ten foot pole to reach its remains in many places.

A new board of army engineers was convened during the recess of Congress, 1885, to report upon the Galveston works. The board consisted of Generals Duane, Abbot, and Comstock, and their report has just been published. [Executive Doc. 85, H. R.]

This board does not give Captain Eads the least credit for the unanswerable logic with which he pointed out the errors in hydraulic engineering which their brother officers have made at Galveston, but their report is as complete a vindication of him as his friends could possibly desire. First: The board admits that 61 per cent in the height of the *substantial* and completed jetty of Colonel Mansfield is wholly destroyed already, and that the works must be built of stone and concrete. Second: That the jetties should be 5 feet above mean low tide. Third: That they should extend from the land out to 30 feet of water (about 10¼ miles, or 54,000 feet), and should have no openings in them to let the tide flow into the bay. Fourth: They reduce the original width of the opening—12,000 feet—about one mile, or to 7,000 feet. Fifth: Instead of the guaranteed channel of 30 feet proposed by Captain Eads for $7,750,000, with no money to be paid until after the stipulated depths were secured, their works are estimated to cost $7,000,000, without any guarantee of success. On the contrary, the board says: "This estimate supposes that the money is freely supplied."

Already one million and a half has been almost wholly wasted at Galveston. Two plans have been tried by our army engineers, and now they propose a third. At Charleston we are building submerged jetties on plans of General Gillmore, U. S. A., with precisely such defects as Captain Eads pointed out in those at Galveston. The late board of his brother officers at Galveston says: "The greatest scouring effect will be obtained, and the greatest security against undermining, by making the jetties tight *and by raising them above high water*." Had we not better move slowly in these improvements, or expend the money only after *civil* engineers have approved their plans? The House, by a very decided vote, has recently taken away from the Mississippi River Commission the control of the appropriation for the improvement of the Mississippi, and has lodged it with the Secretary of War. General Gillmore is President of the Mississippi River Commission, and General Newton is the chief of the army engineers and the official adviser of the Secretary of War, and the commission is essentially a military one, which the House refuses to trust!

DEEP WATER CANAL TRANSPORTATION.

At the convention held at Utica last August, the friends of the Erie Canal favored the deepening of its waters to nine feet, and the lengthening of its locks sufficiently to permit quicker service and larger business. The cost of these improvements was calculated to be something over a million dollars. The question of asking aid from the National Government, though negatived by the convention, was afterward brought up at Albany. It was finally decided, however, that the State should retain exclusive control of the canal.

In view of this action, Mr. T. C. Ruggles, C.E., presents a number of statistics in support of the cheaper carriage which will result from the deeper water. His arguments have been reprinted by the Union for the Improvement of the Canals of the State of New York.

The Erie Canal was originally four feet deep. Prior to 1866 it was increased to seven feet. It is now proposed to make an increase of from two to three feet, by raising the banks for half that distance and lowering the bottom in the same proportion. Over culverts and aqueducts, the depth will remain as at present. The advantages of a greater depth of water would be in the lessening of the cost of transportation, resulting from a higher rate of speed and the less motive power required. The great difference in cost is due to the less resistance of a deeper body of water and the increased tonnage it makes possible. In 1880, the total tonnage on the canal is placed at 4,774,648 tons and the cost of transportation at $1.001 per ton. This was with a depth of seven feet. It is estimated that with a depth of nine feet the cost would be reduced to 72 cents per ton, effecting an annual saving of $1,333,246, or almost the cost of the improvements. Could the depth be increased to ten feet, the saving would be even greater.

Speaking of the value of deeper water, Mr. Sweet, the present State Engineer, said: "The same boats and same crews, without extra cost, could have carried 650,000 additional tons to tide water." As the result of an actual trip between Buffalo and Rochester, where the canal averages eight feet, Mr. Horatio Seymour, Jr., states that one-third better time was made with one-half the cost than over a like distance where the depth was but seven feet. If such marked differences in cost and speed result from the addition of only one foot of water, there is a strong inducement to make the increase in depth as large as possible, when the improvement is once undertaken. On the Erie Canal, a steamer and consort weigh 130 tons and carry 580 tons, giving 4·4 tons of freight to one of dead weight. On the journey from Buffalo to New York, they require six men to handle them, which equals 97 tons to the man. On the ocean, the average is about 60 tons to the man, but the freight, of course, is a better paying class. It is believed that the deepening of the canal, by permitting a better speed, will attract a more profitable class of freight. The yearly capacity of the canal, with the depth of nine or ten feet, could be made nearly equal to that of the railroads in 1884—22,123,895 tons. Those who have studied the question of canal transportation state that there should be at least two feet of water under horse boats, and that the propellers require even more. On almost any canal at the present time, the track of a propeller can be seen in a long trail of muddy water which has been churned up from the bottom at the cost of large waste of power. On the present seven foot canal, one ton of fuel effects a carriage of 49 miles, while on the Hudson this is increased to 81 miles. A depth of nine or ten feet would produce a marked lessening of this discrepancy, as there would be three feet of water under the bottom of the boat, instead of, as at present, only from four to nine inches. This would greatly reduce the friction, and, therefore, both the fuel and time required by the journey.

THE OREGON DISASTER.

Just how the mishap to the Oregon came about is not yet known with anything like certainty, though the subject has been looked into by the Wreck Commissioners' Court, London, and attracted no little attention among sailors, landsmen, and marines the world over.

When the various stories of the passengers and crew were compared one with the other, and again with the informal statement of the master of the ship and his first officer, there seemed little to sustain the theory advanced by the latter that the injury to the ship came from contact with the bows of a schooner, and inferentially that it was one of those casualties of the sea which no proper precaution, at least on the part of the officers of the steamer, could have served to prevent. There is evidence to prove that the weather was hazy at the time of the accident, and under such circumstances it is not at all surprising that the officer in command of the deck, unable to see with anything like distinctness, should formulate a theory of the collision leaving the responsibility for the mishap with the stranger. It was pointed out in these columns that, under the prevailing conditions of tide and wind, a coaster would scarcely have occupied the position attributed to the stranger. Bound down the Long Island coast, a sailing vessel with a west by north wind behind her would make a course parallel with that pursued by the Oregon, but in a contrary direction; and if bound into New York, with head wind and tide, or lying at anchor, she would have been tailing the direction from which the Oregon was advancing. This being the case, it was suggested in these columns that nothing ran into the Oregon, but, on the contrary, that *the Oregon ran into the stern* of another vessel, which vessel was either quietly lying at anchor waiting for a slant into New York, or beating to windward, bound for that port.

This view of the disaster seems to be shared by a British contemporary, the *Scottish News*, which is said to echo the opinion held upon the Clyde after a consideration of the evidence as presented to the recent court of inquiry.

The editor says: "The first officer tells us that if the jibboom had been there it would have struck him. Where was it, then? Obviously, at the other end of the schooner; and the fact that Seaman Rogers, looking out on the promenade deck, saw a red light as the schooner passed after the collision, not only destroys the popular theory, but supplies a key to her position. Assuming that the Oregon was struck by the schooner at right angles, she would pivot on her stem, and the Oregon, going at a speed of eighteen knots, would pass her on the starboard side; but Rogers says that he saw a red light as she passed, and therefore she pivoted on her stern. This is an incontrovertible position in itself, but the injury to the Oregon proves it to a demonstration.

"The breaches in her side could not have been made by the stem and anchor, but they are exactly what would result from a counter and rudder. The divers report the first hole 25 feet before the bridge, 18¾ feet at the top and 12 feet halfway down. This hole was apparently above the water line originally, and was made by the first contact, as the counter of the schooner crushed into the Oregon by the impetus of the steamer. The rudder of a sailing vessel would naturally—before this impetus was spent—attack the side of the steamer below the water mark and further aft. Thus we have what the divers describe as a breach 12 feet below the main deck, extending down about 6 feet and 3½ feet wide.

"The Oregon, still steaming ahead, would draw the stern of the schooner with her, and ultimately leave her exactly in a position to show Rogers the red light. This was seen also by Lucey, a seaman who was carrying the mails, and by Wittle, the boatswain. This is the only light that was directly and unequivocally testified to—except the flash light just before the collision; and the chief officer stated that if the Oregon had been overtaking the schooner, the white light only would have been seen. Mr. Rothery's answer to the Board of Trade's thirteenth question, therefore, needs revision. It is fair to admit, in this connection, that the officers say nothing about the anchor or the second blow; these are merely popular rumors; for what would the anchor be doing below the water line?"

The editorial, which throughout deals with the sworn evidence as a judge would, thus emphatically concludes: "We regret that we cannot congratulate the public upon the perspicacity of a court on which it relies for ascertaining the causes of misfortunes at sea. If the efficiency of the mercantile marine depended upon the Wreck Commissioners' Court, the ocean traveling public would be indeed unfortunate."

Removing Fixed Stoppers.

The *Chemist and Druggist* has gathered from various sources a list of well known methods for getting fixed stoppers from bottles, which are well worth preserving in this collated form by every housekeeper.

When a stopper is found to be immovable, it may often be loosened by gripping the neck of the bottle firmly in the left hand, applying the thumb at the same time with a firm upward pressure against one side of the head of the stopper, and smartly tapping the opposite side with the handle of a spatula or other suitable piece of wood. The force should be applied in the direction of the longer axis. The operation may often be expedited by placing a drop of oil or other liquid—according to the nature of the contents of the bottle—on the line at the junction of the stopper and the neck of the bottle; when the stopper is tapped a minute space is momentarily formed, into which the liquid slips, and so gradually gets between the stopper and the neck of the bottle, and allows of the former being easily withdrawn.

Another method is to use a stopper extractor. This can easily be made out of a block of wood three inches square and two inches thick, by cutting a hole through its center large enough to receive the head of a stopper of a forty ounce wide-mouthed shop round. The use of the above is preferable to pulling out two drawers, sticking the head of the stopper between them, and twisting the bottle round, as this latter method has a tendency to mark the shop fittings, which does not improve their appearance. To apply the extractor, it is placed over the stopper and grasped firmly in one hand while the neck of the bottle is held by the other. A gentle, but firm and steady, twisting motion is then used, care being taken to keep both hands moving in the same plane, but in opposite directions. If the pressure be applied too vigorously or spasmodically, or if the lines of the direction of the opposite forces be not quite parallel, there is a danger of wrenching off the head of the stopper or breaking the neck of the bottle. If either or both of these methods fail, the application of heat may be tried. This may either be induced by friction, by means of a string passed once round the neck of the bottle and drawn rapidly backward and forward, the bottle being held fast meanwhile, or it may be applied by dipping the corner of a towel in hot water, squeezing, and wrapping it round the neck of the bottle, and repeating this at short intervals. When the glass has sufficiently expanded, the stopper should be immediately removed, and not be inserted till the bottle has cooled. By one or other of these methods, or a combination of them, together with patience and perseverance, the most intractable stopper may be drawn.