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.

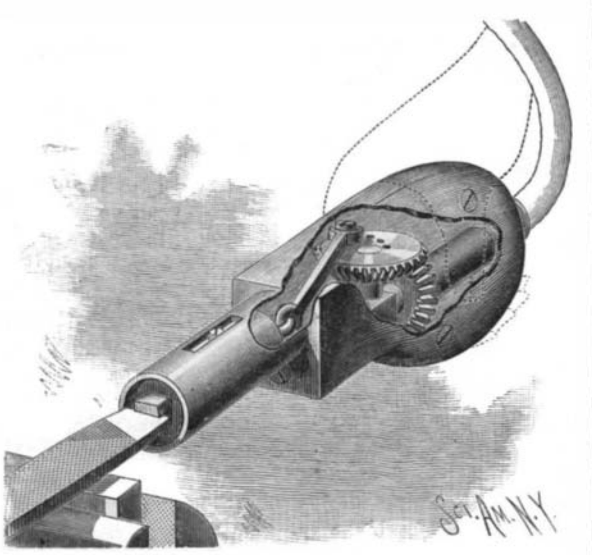
Another method is to use a stopper extractor. This can easily be made out of a block of wood three inches square and two inches thick, by cutting a hole through its center large enough to receive the head of a stopper of a forty ounce wide-mouthed shop round. The use of the above is preferable to pulling 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.

Ozokerite Railroad Ties.

A new and very important application of ozokerite has been recently discovered in Russia; it is now used for making ties in the Transcaspian railroad, which has already passed Oschabat and nearly reached Merv. The process of manufacture is very simple and inexpensive. Kyra, the local name for ozokerite, is found there in thin layers of 7 in. thickness. In its primitive state it contains a certain percentage of decayed matter. To remove this the ozokerite is melted in large caldrons, the refuse sinks to the bottom, and the pure ozokerite collects at the top. This purified ozokerite, melted and mixed with 75 per cent of limestone and 25 per cent of fine gravel, gives a very good asphalt, which is pressed in boxes shaped like railroad ties. Notwithstanding the high temperature, which reaches 48° R. (140° F.), the ties retain their shape and hardness. These asphalt ties are used all along the road, except at the ends and center of every rail, where as yet wooden ties are employed. In this way about $800 per mile are economized.—*From the Russian Monthly Journal of the Ministry of Roads.*

AN IMPROVED RECIPROCATING HAND TOOL.

The file, saw, or other reciprocating tool held by this device is guided by the hand to and over any part of the work, such as in file-finishing castings, in fret-sawing, or similar work. Held in the hollow stock by screws is a bearing, to which two beveled gears are so journaled as to mesh into each other. To the horizontal gear is fixed a wrist pin, to which is connected one end of a pitman, the other end of which is connected to a plunger fitted into a tube screwed into the forward end of the stock. The plunger is prevented from turning by a pin projecting into a slot in the tube. One end of a shaft is screwed to a collar on the vertically placed gear, while the other end passes through the rear end of the handle, in which it has a bearing, and is connected with a flexible rotating shaft, which allows the stock to be held in any required position for guiding the operating tool, which can be held to the plunger in any approved way. It is evident that when the shaft is turned, the tool held in the plunger will be reciprocated. The wrist pin may be set in any one of a series of holes in the upper gear, so as to lengthen or shorten the stroke. The plunger can be easily removed, to allow the tools to be more conveniently fixed to it.



KRAYER'S IMPROVED RECIPROCATING HAND TOOL.

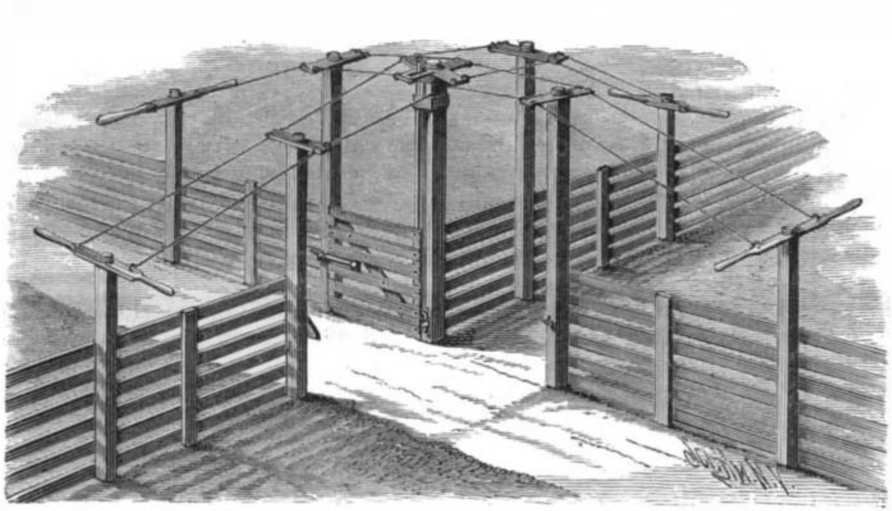
This invention has been patented by Mr. J. F. Krayer, of 1542 North 11th Street, Philadelphia, Pa.

Street Cleaning and Garbage Removal in Boston.

For the article under this heading which appeared in our paper of April 3, page 216, we were indebted to *Engineering News*, for which due credit should have been given, but inadvertently was omitted.

IMPROVED FARM GATE.

Test by actual use has shown that the gate herewith illustrated is not liable to get out of order from any cause, and can be easily operated from a point at any desired distance away. This latter feature makes it especially useful for a pasture gate in a stock raising country, as the herder can drive the cattle before him to the gate, and open it while herding them, without allowing the cattle to scatter off while going round them to open it; and as the gate latches open as well as closed, there is no danger of the stock being frightened, while passing through, by any movement of the gate caused by the wind. In locations where loaded wagons are to pass under the wires leading to the operating levers—by means of which the gate can be swung in either direction—the gate post is made high, as shown in the engraving. The distance of the operating levers from the post does not in any way affect the ease with which the gate can be operated. The lever of a gate now in use is about one hundred feet from the post, and yet the gate can be easily opened and closed by a child. The construction is so simple that it can be understood at a glance. The number of levers depends upon the situation of the gate.



WILSON'S IMPROVED FARM GATE.

This invention, which has been patented by Mr. John G. Wilson, of Cameron, Texas, can be applied to a swinging gate already in use.

For Locomotive Engineers.

How to run a headlight casing without glass. A. If the glass is half broken or there is a hole in it, knock the glass entirely out, turn burner one-third higher, and rain, wind, or snow will not put it out.

When side-tracked, turn down the light, or it will smoke.

How to block a driving or engine truck box when spring is broken. A. Run forward or back wheel on a wedge, block box, and go.

Quickest way to set an eccentric. A. Let fireman catch hold of lugs on eccentric and knock key out of front end of eccentric rod where it connects to link, drop rod, turn eccentric, hold eccentric rod, and let it follow eccentric until rod will go in eye neat, put key in, tighten eccentric, and go, and it will be as true as any machinist can set it.

To explain why pipe from steam gauge to boiler is bent. A. Steam condenses in the bent part and presses against the springs in gauge and keeps steam from cutting springs; the gauge being air or steam tight will not rust. Only, backing up or standing, the gauge pipe will freeze.

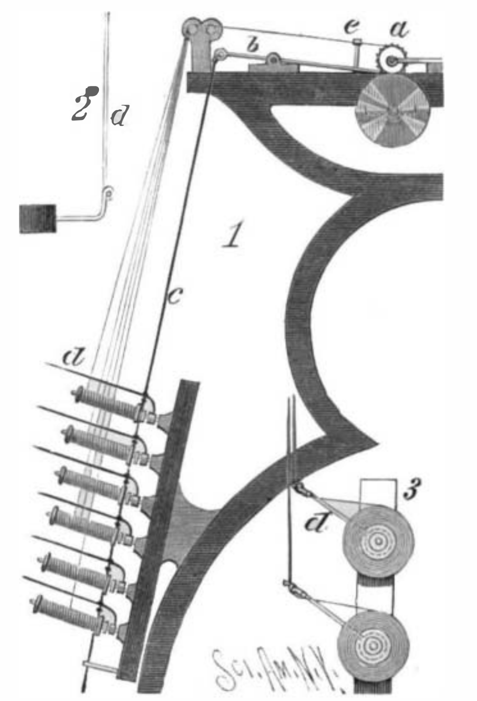
Why is it that water in a boiler running for 20 years don't rust boiler or flues? If you put boiler in water, it will rust boiler out in one year. A. Boiler being air tight, it won't rust on the inside.

Removal of Warts.

A correspondent of the *Therapeutic Gazette* announces through its columns the virtues of castor oil in the removal of warts. Constantly applied for from two to four or six weeks each day—that is, once a day—it has not failed in my hands, says the writer, in any case of any size or long standing. The time it takes may try the patience of the user, but if faithfully used they will get their reward in the removal of the wart without leaving any scar. I have used it with some success in other growths, and had benefit enough to merit further trial. It might, he adds, be a success in the removal of certain kinds of cancer, especially scirrhus forms.

STOP MOTION FOR DOUBLING MACHINES.

The gravity take-up, shown detached in Fig. 2 and in place in Fig. 1, which represents part of a silk doubling machine, is composed of a collar to which is secured a bent wire or rod. The collar fits loosely upon the creel spindles below the spool, and the wire is bent at right angles, so that its long arm stands parallel with and a little distance from the spool. The wire is formed with an eye to receive a cord, *c*, attached to the stop lever or pawl, *b*, for stopping the revolution of the bobbin, *a*, and spindle on which it is placed in case a thread should break. The eyes in the wires prevent the cords from sliding on the take-up arms, thus rendering tangling impossible. The spindles, of any desired number, are held at an angle upon an inclined plate attached to the main frame of the machine. The spools are placed upon the creel spindles so that the threads unwind from the top, and the thread is passed first under the wires, *d*, thence over bars and through the traversing eye, *e*, to the bobbin. In unwinding the thread from the spools, the friction of the spools upon the spindles will cause each thread to lift its take-up about to a level with the thread on the spool, as shown in Fig. 3, so that the whole weight of the take-up comes upon the thread and always holds it taut. In this way a regular tension is kept upon the threads, causing them to be wound with uniform tightness upon the bobbin. Each take-up is connected to the end of the pawl by a cord. When the weight of the take-up is upon the thread, this cord is slack; but in case a thread breaks, the weight of the take-up will come upon the cord, when the pawl will be made to engage with the ratchet wheel and instantly stop the spindle. A single cord may be passed through and knotted below each eye; or in place of a cord, a slight rod may be used.

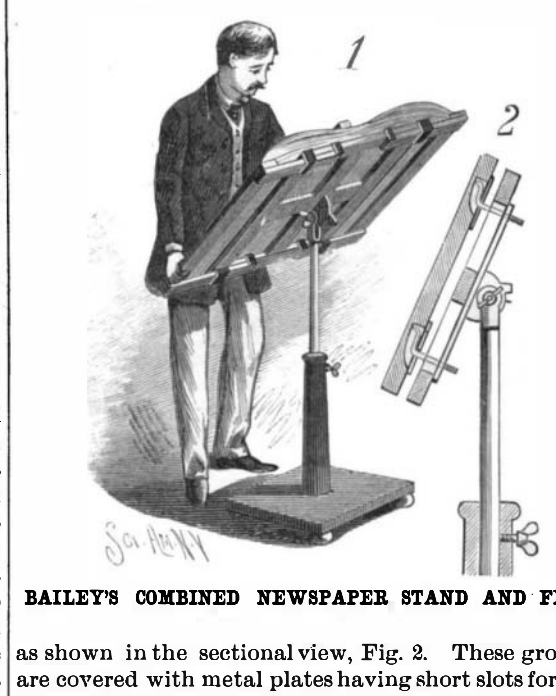


NIGHTINGALE'S STOP MOTION FOR DOUBLING MACHINES.

This invention has been patented by Messrs. Nightingale Brothers, of Paterson, N. J.

COMBINED NEWSPAPER STAND AND FILE.

Within the tubular post of the pedestal slides a rod which can be held at any desired height by a set screw. The upper end of the rod is slotted to receive a lug formed upon a plate secured to the center bar of the frame. This lug is formed with a projection which permits the frame holding the papers only to come to a level. Passing through the slotted end of the rod and the lug is a clamping screw, by which the frame can be held at any required inclination. The main frame, at each side, is provided with a sliding extension frame, by means of which the file can be adjusted to the size of the newspaper to be filed. The cranks of crank screws, held in the upper and lower parts of the central longitudinal bar of the frame, are made with sharp ends to penetrate the papers easily, and with rounded angles, so that the papers can be readily slipped off and on. The papers are held in place by a bar having grooves formed in it to receive the cranks,



BAILEY'S COMBINED NEWSPAPER STAND AND FILE.

as shown in the sectional view, Fig. 2. These grooves are covered with metal plates having short slots formed through their lower parts for the passage of the cranks. The frame and its attached paper can be raised or lowered, and adjusted at any desired inclination to suit the convenience of the reader.

This invention has been patented by Mr. William E. Bailey, of Manchester, Md.