THE RUDDER OF A GREAT STEAMSHIP.

The steamship Alaska, of the Guion line, noted as being the quickest vessel on the Atlantic, left Queenstown January 25, and when off the Irish coast met heavy weather; the storm increased in violence until February 2, when it began to abate. On the following day it was found that the rudder had been broken. Owing to the rough water, an effort to steer by means of a drag failed, and sail was put on to keep her head to the wind. On the 4th, the steamship Lake Winnipeg was sighted, and on the next day the vessels were connected by two chain cables, about ninety fathoms long, leading from the Alaska's quarters to the Lake Winnipeg's bow, the arrangement of the cables being as shown in the upper view of our frontispiece. Communication between the vessels was maintained by signals—flags being used in the daytime and lights at night. When the Alaska wanted to go to starboard, the Lake Winnipeg was signaled to throw her bow to port; this movement drew the stern of the Alaska in the same direction, causing her to go forward to starboard; the reverse of this operation permitted the Alaska to move to port. During stormy weather, which followed, the cables parted, when the Alaska was steered with the sails until it became again possible to bring the cables into use. The vessels reached New York, February 9.

As soon as practicable the rudder was removed, when it was found to have been fractured at the lower part of the post; an irregularly shaped piece of the blade, between the first and second lugs, was missing. The rudder was also cracked at the second lug, and at a point a little above, and cracks were found in the upper cross rib of the frame, and in the outer rim, a few inches above the cross rib. As there was no way of attaching chains to the blade of the rudder, the complete severance of the two parts rendered it absolutely useless.

The old rudder consists of an iron frame or skeleton, having a length of about 44 feet, and an extreme width of 7 feet 9½ inches, the width of the blade proper at its widest point being 6 feet 9½ inches. The rudder post is 13 feet 2½ inches long, and terminates in a head 11¼ inches in diameter, formed with two longitudinal grooves to receive keys by which it is held to the center of the circle or wheel used to operate the rudder. The back or stock part of the frame is 9½ inches wide by 6½ inches thick; the curved or outer portion is 5¼ inches wide by 3¼ inches thick, and joins the stock at each end. In the lower part of the stock is a semicircular recess, 2¼ feet in diameter, which enables it to clear the outer journal of the propeller shaft as the rudder is moved from side to side. This circular portion is 10 inches wide, of the same thickness as the stock, and is united to the rim by a cross piece 7½ inches wide; just below the second lug is a cross piece 7 inches wide. Upon the back of the stock are four lugs or eyes placed 6 feet 4¼ inches apart, and provided with tapering holes in which the upper ends of the pintles fit. Upon the lower end of the rudder is a pivot 6½ inches long by 5½ inches in diameter, that works in a socket formed in a side projection of the stern post. The latter is a heavy iron column having a square cross section, and carrying the journal for the end of the propeller shaft and four eyes to receive the lower ends of the pintles. The two sides of the frame are covered with iron plates, the rivets in the curved rim passing entirely through, while those in the inner part are tapped into the stock. To prevent the plates from being dented or approaching each other, the open spaces in the frame are filled with wood. The weight of a rudder of this description is about 12 tons.

The new rudder—the frame of which was forged at the foundry of John Roach, and which was finished at the works of McCurdy & Warden, this city—while not varying in general dimensions from the old one, is essentially different, the changes resulting in increased strength in those parts which experience proved to be weak, and in providing a means for operating the rudder in case the rudder post should be broken. The amount of metal at the upper part of the blade has been increased, there are three cross ribs instead of two, and an eye has been formed on the rim at A (shown in the engraving of skeleton of new rudder), to which chains may be attached, should the other methods of moving the rudder become disabled. (It may be stated in this connection that it is customary in building rudders for first-class vessels in this country to provide a series of eyes upon the outer edge of the rudder, so that it could be used even under the most unfavorable of conditions.) The covering plates are seven-sixteenths of an inch thick, the seam being about in the middle of the blade; they are secured by rivets, seven-eighths of an inch thick, spaced 6 inches apart, and extended clear through. The interior spaces are filled with wood.

Extreme accuracy is required in the pivoting of these great rudders, as a simple bolt extending loosely through each pair of eyes, or a single rod passing through all, would not allow the rudder to so quickly and reliably perform all the movements expected of it; and would, besides, increase the wear of the joints without facilitating the work of repair. The rudder eyes rest upon those formed on the stern post, a pintle, 26 inches long, serving to hinge each pair. The pintle may be divided, for convenience in describing it, into two parts; the lower portion—that which enters the stern post eye—is 5¾ inches in diameter, 12 inches long, and is covered with a brass sleeve. The upper portion tapers toward the top, which is threaded to receive a nut; the base of the taper is 5 inches and the top 3¾ inches in diameter. The holes in the eyes on the rudder are accurately tapered to fit the pintles.

Placing the rudder in position is a comparatively easy task: the pintles are put in the rudder eyes, and the nuts screwed down tightly; the head is then carried through the rudder hole in the deck, and the rudder raised until the lower ends of the pintles are free to swing above the stern post eyes. The rudder is guided until the pintles hang suspended directly over the eyes, which they enter as the rudder is lowered.

There are six methods of steering, all of which depend upon the rudder remaining in a perfect condition. The hand and steam steering gear is shown in the engraving. The rudder head is keyed to the center of an iron beam, which extends across a wheel placed a few inches above the deck. This wheel, about 12 feet in diameter, is made of heavy iron plate, and upon its outer surface is a rectangular groove formed by angle irons; just above this groove is an angular one. Immediately forward of the wheel is a double engine, still forward of which is the hand steering gear.

On the engine shaft is a small pinion gearing with a cogwheel on a shaft directly below; this shaft carries a pinion gearing with a large wheel mounted on a shaft extending across (longitudinally of the ship) the frame below the engines. The rear end of the shaft has a beveled pinion meshing with two beveled wheels, one at either side, and the shafts of which make an angle a little greater than 90 degrees. Upon each of these shafts is a drum formed with a spiral groove, in which run the chains that work in the upper or angular groove on the rim of the wheel. The other ends of the chains are attached to powerful springs secured to the opposite side of the wheel. The journals of each of the large beveled gears are made in one casting, bolted to the deck. The springs serve to take up all shock, which would otherwise be transmitted to the gearing, during the sudden striking of the rudder by a wave. This apparatus can be instantly thrown out of gear, without stopping the engines, by moving a lever located in front of the engines.

On the hand wheel shaft are two hand wheels, between which is a pinion meshing with a wheel on a shaft below; the second shaft has a pinion in gear with a wheel on a shaft carrying a chain wheel. A chain running in the rectangular groove leads from one side of the wheel to a pulley, from which it passes to a pulley revolving in a vertical plane, and located in front of the chain wheel over which the chain passes and returns to the large wheel along a similar route. On the shaft of the chain wheel is a sliding clutch by which the hand steering mechanism may be thrown in or out of gear by the simple movement of a lever.

In the steam chest between the engine cylinders is a valve, the shifting of which changes the direction of motion of the engines. Beneath the piston rods is a small shaft, on one end of which is a beveled pinion. A slight movement of this shaft serves, through the intermedium of a lever, to shift the valve. Meshing with this pinion is a second one mounted upon the end of a vertical rod, which is conducted to the wheel house, located in the forward part of the ship. It will be seen that the steam steering gear can be operated from the wheel house. Meshing on one side of the pinion on the shaft moving the lever is a third pinion, the shaft of which leads to a standard where it terminates in a beveled pinion meshing with a similar one on a shaft placed at right angles to the first. The other end of this shaft is held in a standard, on top of which is a dial, the index finger of which shows the distance to either side which the shaft has revolved, and consequently the exact position of the rudder. On the dial are the words "port" and "starboard." The end of the shaft projecting beyond the side of the dial box is squared to receive a hand wheel, which may be used to shift the valve in case the rod leading to the wheel house should fail to work.

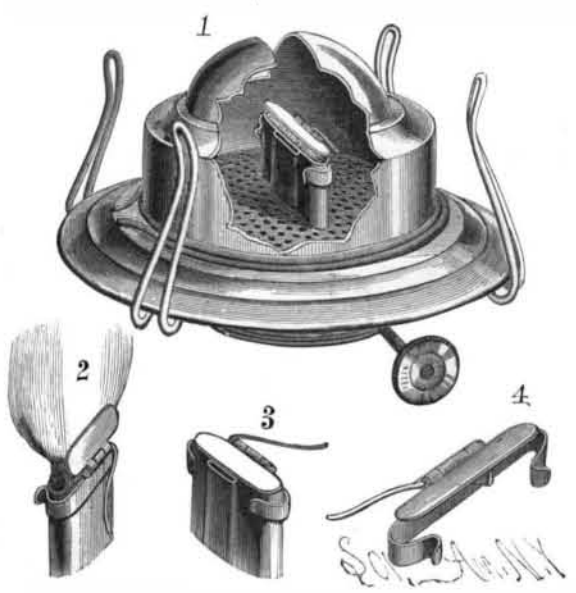
The signals from the wheel house would then be communicated through means of a dial placed in a conspicuous position, on the wall of the compartment, so as to be clearly seen by the man at the small hand wheel. In the center of the dial is a pointer moved by wires extending to the wheel house. In the center of the top of the dial is the word "course," and to the right are the words "steady," "starboard," and "hard;" on the left are the words "steady," "port," and "hard." There are also dials in the wheel house to show the position of the rudder. Should all the devices we have described become disabled, the ship could still be steered by chains attached to the wheel, led through openings in the side walls of the room and guided to a winch.

On February 26 the Alaska was placed in dry dock, and a most minute examination of the hull failed to detect any signs of damage resulting from the severe treatment she experienced while being buffeted by the waves.

EXTINGUISHER FOR LAMPS.

The extinguishing plate is hinged to a narrow strip of spring metal, the ends of which are so formed that the strip can be slipped over the end of the wick tube, as shown in Fig. 1. When in a raised position, the plate is prevented from falling backward by an arm projecting from the hinge and moving with the plate, coming against the wick tube. Upon the under side of the plate is secured a little piece of metal, the weight of which causes the plate to fall forward as the wick is drawn down.

When the wick is raised, it presses against the plate and holds it in a vertical position. The plate makes the flame spread and burn more evenly than it otherwise would, thus producing a much better light. When the wick is turned down, the plate falls forward upon it, instantly extinguishing the flame, and the coal that may remain upon the wick is smothered out, so that the smoke and disagreeable smell produced by ordinary lamp burners when the light is blown out are avoided; the danger of explosion, which sometimes is a direct result of blowing down the chimney, is also done away with.



MILLEN'S EXTINGUISHER FOR LAMPS.

Additional particulars may be obtained from the inventor, Mr. William Millen, of 431 East 83d Street, New York city.

Cutose.

Cutose, the substance which covers and protects the aerial organs of plants, approaches the fatty bodies in its properties and composition, though distinct from them in certain other respects. Cutose resists the action of energetic acids; it is insoluble in dilute alkalies; neutral solvents have no action upon it, but it is modified by oxidizing agents and boiling alkaline liquids. With nitric acid it yields at first resinous bodies, and afterward suberic acid. Alkalies, and even alkaline carbonates, at a boiling heat dissolve cutose, split it up, and convert it into a kind of soap, soluble in water and insoluble both in excess of alkali and saline solutions. Baryta, strontia, and lime effect the same decomposition. Under the influence of bases, cutose gives rise to two new fatty acids, the stereocutic and the oleocutic. The former acid differs from all known solid fatty acids. It is white, fusible at 76°, almost insoluble in cold alcohol and ethers, scarcely soluble in boiling alcohol. Its true solvents are benzol and glacial acetic acid. On boiling this acid with dilute alkalies, we obtain gelatinous salts insoluble in water. These two acids, when once modified, acquire new properties, which approximate them much to the primitive cutose. They form a neutral substance, which on treatment with caustic alkalies experiences a kind of saponification.—*MM. E. Fremy and Urbain.*

How to Fill a Boiler.

"I filled this boiler when we first started without a pump, and from a well, or reservoir, below the level of this floor." This from an engineer of a stationary, who is a very capable man. "Well, I suppose you used buckets," was the reply. "No, the boiler filled herself." The boiler was new and had just been located, the connections made, and all was ready for a start except the filling of the boiler with water. The force pump had not been connected, and, in fact, had not been placed, when the engineer thought it well to fill his boiler. He built a fire of light stuff in the furnace, after putting in a few pails of water, connected hose with the water reservoir, and after the fire had burned down he opened the connection, and the water came in with a rush, the creation of a vacuum impelling the inrush of the water.

RECENTLY, at Louisville, Ky., after several hours of dark fog, a drenching shower took place, during which small fishes—minnows—fell to the ground.

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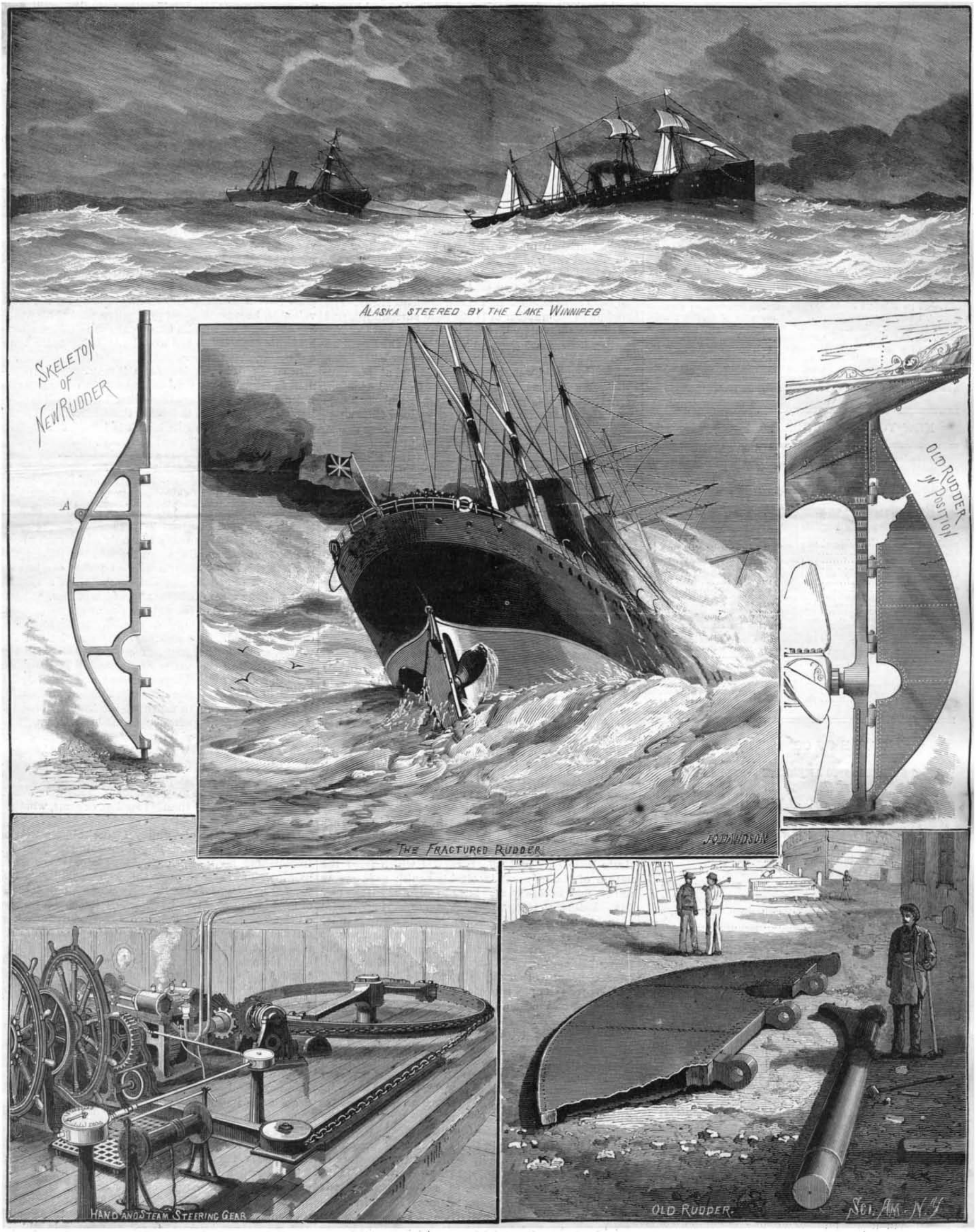

THE STEERING GEAR AND BROKEN RUDDER OF THE STEAMSHIP ALASKA.—[See page 148.]