

THE UNITED STATES LIFE SAVING SERVICE.

Upon the ocean and lake coasts of the United States there are now about two hundred and twenty-six government life saving stations. Of these, one hundred and sixty-five are on the Atlantic shores, eight on the Gulf of Mexico, eight on the Pacific, and forty-five on the great lakes; and one, a river station, at Louisville, Ky., on the falls of the Ohio River. The work of the Federal service is re-enforced to a certain extent by private association. Thus a portion of the New England coast is guarded by the Massachusetts Humane Society, a volunteer organization noted for its efficient work.

The distribution of stations is regulated by the nature of the coast and the amount of commerce passing by or approaching it. From the eastern extremity of the coast of Maine to Cape Cod there are but sixteen stations for 415 miles. The coast, for a great part rocky and precipitous, gives numerous harbors of refuge. Along Cape Cod a dangerous region appears, where there are ten stations, about eight miles distant from each other. The bight formed by the shores of Long Island and of New Jersey, with New York harbor at the apex, is renowned for its dangerous nature. Along 250 miles of the shores of this much frequented waterway there are 79 stations, giving an average distance of about three miles from station to station. Further south there is less commerce, and fewer stations are provided. For 175 miles from Cape Hatteras south to Cape Fear there are but six stations, the distance between stations averaging nearly 30 miles. The coast of Florida is of such formation that vessels are generally wrecked close to shore and the crew can save themselves. Refuge stations for the supply of food and water are provided along the uninhabited portions of this coast. Their average distance apart is 26 miles. At each mile along the coast a guide post is erected, giving the distance and direction to the nearest refuge station. Each has provisions enough for twenty-five persons for ten days.

The great lakes have a coast of 2,500 miles extent. Most of the harbors of refuge are artificial, defined by piers and maintained by dredging. These are the scenes of most of the wrecks, as vessels in storms make for the nearest of them, and are liable to strand upon shoals at their mouths. Forty-five stations protect this great extent of coast, being generally placed at or near harbors.

The whole system is under the Treasury Department. Its chief officer, the general superintendent, is appointed by the President; under him is an assistant superintendent, appointed by the Secretary of the Treasury. From the revenue cutter service inspectors are appointed who make monthly visits to the stations and conduct annual examinations of the station employes. They also make special investigations of wrecks with loss of life, and do other services as required. The stations are assigned to districts, for each of which there is a district superintendent, with, in one case, an assistant superintendent. Under these come the station keepers and station employes.

The station keeper is selected with the greatest care, as he is in direct control of the work of the station and is in absolute command of his crew. He and the district superintendents are *ex-officio* inspectors of customs. The keepers are also statutory guardians of all wrecked property until relieved by the owners or their agents. The selection of a crew is left in the hands of the keeper. The regular crew at an Atlantic coast station consists of six men with an additional man from the 1st of December. The active season extends on this coast from September 1 to May 1, taking in the fall, winter, and spring months. On the lakes the term is reversed, extending from April 15 to about December 15, including the summer months.

After a man has been selected by the station keeper for engagement on a life saving crew, he is subjected before appointment to a rigid examination as to his qualifications. After appointment he can only be discharged, with the exception of two cases, by the general superintendent's authority for good and sufficient reasons. In cases of neglect of patrol duty or insubordination at a wreck, the offender is subject to instant dismissal by the keeper. Where disability or death has been incurred by accident on duty, there is a system of pensioning that cannot be extended beyond two years.

The patrol system is regarded as one of the most important branches of the service. Under its provisions a constant watch is maintained all night long offshore. The hundreds of miles of coast are patrolled nightly by the surfmen charged with the duty of warning off vessels approaching dangerously near the coast. The service probably saves more lives by its patrol system than by its operations at wrecks. It acts to supplement the lighthouse department, notifying vessels of their proximity to shore. The work includes a carefully verified patrol of the shore, with constant watching for and warning of vessels. Where stations are near to each other, the surfman starts out when his hour arrives, and walking along the coast as near to the shore as practicable, proceeds on his beat until he meets the patrol from the next station. Each has a metallic check, which they exchange and then return.

If they do not meet, the one man continues his patrol to the next station, exchanges checks, returns, and reports accordingly. One of the checks is shown in the illustration, Fig. 14. A record is kept by their means of the patrolling. At isolated stations a post marks the end of the beat. A watchman's time detector is carried by the patrol, who finds the registering key attached to the post. With this he marks the dial, thus registering his time of reaching the end of his beat.

The patrolman carries with him a beach lantern and some red Coston light signals, Figs. 7 and 8. These light by percussion. If the patrol discovers a wreck or vessel in distress or danger, he ignites the signal, Fig. 1. This warns the ship offshore if there is time, and at the worst assures the crew of assistance.

The work at a wreck, such as shown in Fig. 3, is executed by boat or by hawser tackle and breeches buoy. When possible the boat is used in preference. The entire responsibility of choice of methods rests with the station keeper, and he is held to rigid accounting for any error resulting in loss of life.

The favorite type of boat is a development of the surfboat used by fishermen along the New Jersey and Long Island coasts.

They are built of cedar planks on a white oak frame, vary from 25 to 27 feet long, 6½ to 7 feet beam, and 2 feet 3 inches to 2 feet 6 inches deep, with 1 foot 7 inches to 2 feet 1 inch sheer of gunwale. The bottoms are flat. They draw only 7 or 8 inches of water and weigh 700 to 1,100 lb. They are propelled by six oars, and can land fifteen persons, though this is more than they are calculated for. They are in great contrast to the 4,000 lb. self-righting lifeboats of the English service. So far the record is all in the favor of the lighter boat, which has no air tanks and hitherto has not been self-baling, as a rule. It is hoped that the last named feature, used in some of the boats, may be successfully introduced in all.

The boats are taken to the shore on a wagon, as shown in Fig. 2. As they reach the water's edge, one end is lifted, a pin is pulled out of the reach of the wagon, and a single pair of wheels are pulled from under. The same is done for the other end, and the boat is launched. A favorable moment is taken for the launching through the surf. In one minute the boat and crew can be afloat.

The keeper steers with a long oar over the stern, held in a closed swivel rowlock or rope grummet. He and his crew work in perfect touch with each other. By the steering oar he works the boat so as to take the breakers head on, and the crew by their training are responsive to his slightest word or look. The crew wear life preservers, shown in Fig. 4, of which a supply is carried in the boat. The boats also carry a canvas drag or sea anchor with tripping line. This when thrown over with a good length of line holds their head to windward in emergencies or acts as a drag upon them in breakers, enabling them to be maneuvered under difficult conditions of rapid surface drift and current.

The life saving boat represents only one phase of operations.

Much of the work is done by life line and breeches buoy. A gun, shown in Fig. 3, or a rocket, Fig. 9, is used to throw a light line over the wrecked ship. The gun practically is the universal method. The crew of the wrecked vessel haul this in, and to its end is attached a rope, and to the shore end of this is fastened a continuous endless rope reeved through a block and called the whip line. Sometimes, where a large gun is used, the intermediate line is dispensed with. The crew of the wrecked vessel haul in the line until the whip line block reaches them. This has attached to it a board, Fig. 11, with directions in English and French.

The block of the whip line, according to these directions, is to be secured to the lower mast or as high as possible to the hull of the wreck. By means of the whip line the end of a hawser is brought on board and secured near the whip block. Upon the hawser a block carrying a buoy provided with a canvas receptacle resembling a species of breeches, called a breeches buoy, Fig. 6, is reeved so as to travel back forth, being attached to the whip line and worked by it. The wrecked crew have to attend to the installation on their ship of these means of rescue, and experience shows the sailor to be exceedingly stupid in contributing to his own succor. On shore the tackle is sustained by a crotch or shear legs, guyed or braced to a sand anchor in its rear, as shown in the cut. When all is ready the wrecked people are brought ashore one by one in the breeches buoy. The same tackle may be used for the Francis lifecar, shown in Fig. 5. This is a closed metallic boat that can hold six or seven people. Its use on our coasts is limited, the breeches buoy and surfboats doing most of the life saving.

What is called by the surfmen a sausage light, shown in Fig. 13, in use in the wreck scene, is suspended from a tripod on shore to illuminate the beach in wrecking operations.

It has been found practicable to dispense with the hawser on occasions, the traveling block working on one lay of the whip line. The complete system con-

templates the use of the independent hawser for the traveling block.

It is obvious that to successfully conduct operations with the life lines and breeches buoy, considerable experience is necessary. Accordingly a constant system of practice is maintained at the stations. A pole is set up on the shore, preferably in the shallow water near shore. This is at 75 yards distance from the place of practice, and represents the mast of a vessel. The crew are first called upon in the boathouse by number, and are examined orally. They have to recite in proper sequence the details of the exercise as set down in the service manual. At the words of command they then fall into place at the drag rope and draw the apparatus to the drilling ground. A man has been placed upon the mast. At the word "action," the crew proceed to rig the apparatus and bring their comrade down from the pole in the breeches buoy. The time required is noted and recorded. If in one month after the active season commences the work cannot be done in five minutes, the men are cautioned. Further action is rarely necessary. An active rivalry exists between many of the stations. The mimic rescue has been effected in two minutes and thirty seconds. This was in daytime; at a night drill the same has been done in three minutes. In addition to the wrecking drill, in every week are included the following: Boat practice, including launching and landing through the surf with at least half an hour's rowing; practice in signaling with miniature flags and with oral examination as to the general features of the international code; and the recitation of four methods of rescuing the apparently drowned, with practice of manipulations upon the person of one of the men. When this ceaseless round of practice work is superimposed upon the patrol and other duties, it will be seen that the time of surfmen is very fully occupied.

On their monthly visit the inspectors mark in their drill books the proficiency of each member of the station force. A scale of ten maximum is adopted. The notes are reported to the general superintendent, where the record of the rating of every man in the force is kept.

The operations of the entire life saving service are under the charge of General Superintendent Sumner I. Kimball. Our thanks are due to Capt. Charles A. Abbey, inspector for this district, for courtesies received.

The Flower Clock.

The hour at which each flower opens is itself so uniform that, by watching them, floral clocks of sufficient accuracy can be arranged. Father Kircher had dreamed of it, but vaguely and without pointing out anything; it is to Linnæus that we must ascribe the ingenious idea of indicating all the hours by the time at which plants open or shut their corollas. The Swedish botanist had created a flower clock for the climate which he inhabited, but as, in our latitudes, a more brilliant and radiant dawn makes the flowers earlier, Lamarek was obliged to construct for France another clock, which is a little in advance of the Swedish one. We quote from Pouchet:

Hours at which the flowers open.	Plants on which the observations were made.
Morning.	
3 to 5 o'clock,	Tragopogon pratense (yellow goats-beard or saisiy).
4 to 5 "	Cichorium intybus (chicory).
5 "	Sonchus oleraceus (sow thistle).
5 to 6 "	Leontodon taraxacum (dandelion).
6 "	Hieracium umbellatum (umbellate hawkweed).
6 to 7 "	Hieracium murorum (wall hawkweed).
7 "	Lactuca sativa (lettuce).
7 "	Nymphaea alba (white water lily).
7 to 8 "	Mesembryanthemum barbatum.
8 "	Anagallis arvensis (field pimpernel or poor man's weather glass).
9 "	Calendula arvensis (field marigold).
9 to 10 "	Mesembryanthemum crystallinum (ice plant).
10 to 11 "	Mesembryanthemum nodiflorum.
Evening.	
5 o'clock,	Nyctago hortensis.
6 "	Geranium triste.
6 "	Silene noctiflora.
9 to 10 o'clock,	Cactus grandiflorus.

—Nature's Realm.

Low Prices for Steel Rails.

In consequence of differences between the manufacturers, steel rails have lately been selling at pretty low figures, one company having actually sold rails at \$26 per ton. It is now said that an agreement has been effected between the producers, and the price has been advanced to \$29 to \$30 per ton. The manufacture of steel rails is now controlled by the Illinois Steel Company, the Carnegies, the Lackawanna, Cambria, Pennsylvania, and Bethlehem companies.

ACCORDING to Herr Japing, the hourly rate of water falling over Niagara Falls is 100,000,000 tons, representing 16,000,000 horse power; and the total daily production of coal in the world would just about suffice to pump the water back again.

SCIENTIFIC AMERICAN

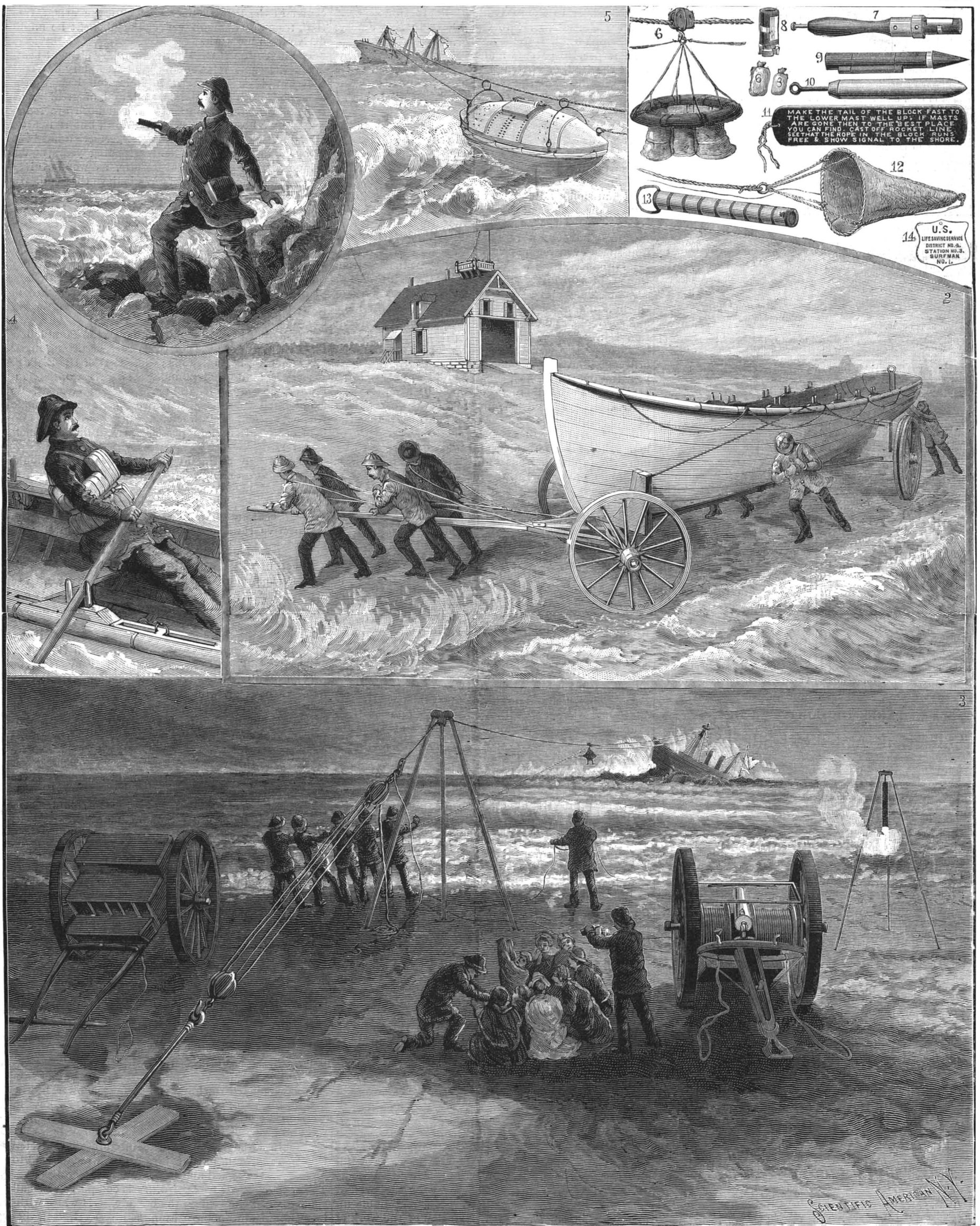
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1. Firing a Coston light to warn a ship offshore. 2. Taking the surfboat to the shore. 3. Scene at a wreck—working the breeches buoy. 4. A surfman with life preserver. 5. The Francis life-car. 6. The breeches buoy. 7. Coston light with handle. 8. Coston light detached from handle. 9. Rocket head. 10. Shot for gun, with 6 and 8 oz. powder cartridges. 11. Direction board as attached to whip-line block. 12. Canvas drag. 13. Light for use at wrecks. 14. Patrol check.

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