

THE ROMANCE OF SALVAGE ENGINEERING.

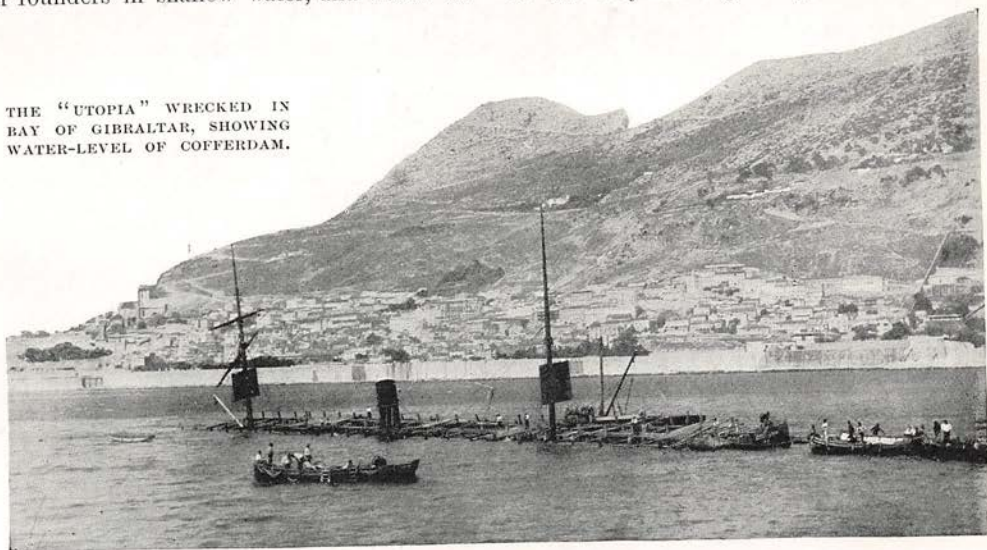
BY JOHN M. CARLISLE.

IT is a moot point whether there is any ramification of marine engineering so fascinating and yet so precarious as wreck-raising. The salvor is an indispensable acquisition to the shipping world. In these days of gigantic ocean greyhounds, when one single vessel may possibly represent half a million sterling, and carry a valuable and extensive cargo easily worth another similar sum, it will be recognised what heavy loss would continually be incurred if the wreck scavenger were an unknown being. Many a vessel runs ashore, or founders in shallow water, and would be

such as the *Neptun* or the *Svitzer* organisations. It is by no means pleasant reading to learn that we depend upon foreigners for assistance where we ought to lead the world. Yet the industry is a peculiarly lucrative one, as the prominent foreign companies have discovered; hence their present proportions, with their wrecking steamers distributed throughout the world.

The largest and most important salvage company is the London Salvage Association. Existing under the *ægis* of Lloyds, its agents are ubiquitous. But for practical purposes it has only an organising existence. It

THE "UTOPIA" WRECKED IN BAY OF GIBRALTAR, SHOWING WATER-LEVEL OF COFFERDAM.



totally lost were it not for the salvor and his innumerable ingenious appliances. So expert has he become in his particular profession that nowadays, unless a ship founders in an impenetrable depth of water, or is utterly smashed to pieces upon the rocks or by the waves, it is very seldom that she is totally lost.

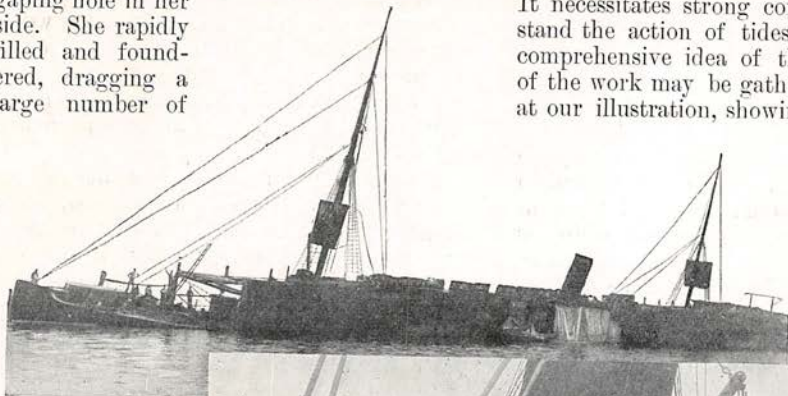
Notwithstanding the fact that this country controls the greatest part of the world's maritime traffic, it is a curious and noteworthy circumstance that there is not a British salvage company in possession of such elaborate and up-to-date equipments as those owned by several Continental companies,

possesses no plant, and conducts most of its operations by contract with the other salvage companies, mainly upon the principle of "No cure, no pay," a basis which, no matter how satisfactory it may be to the first party to the contract, is extremely hazardous to the actual salvors, because if the work be not accomplished, they receive absolutely no remuneration, despite the fact that they may have expended a vast sum of money upon their uncompleted scheme. The most glaring instance of the uncertainty of this work was the case of the steamship *Paris*, which ran ashore upon the Manacles. To the uninitiated it appeared but a simple operation to remove

a few tons of rock to free the vessel, yet one or two salvage companies essayed the task and failed.

The annals of salvage engineering contain many remarkable achievements. Take the case of the steamship *Utopia*. During a heavy gale in the Bay of Gibraltar this vessel, an Italian emigrant ship, drifted upon the bow of H.M.S. *Anson*, with the result that the ram of the battleship knocked a gaping hole in her side. She rapidly filled and foundered, dragging a large number of

but there were numerous swift currents which militated against the satisfactory performance of the task. Undeterred by these difficulties, a huge cofferdam was erected upon the steamer. This, by the way, is the principle invariably adopted by Mr. Armit for raising a vessel, and he has found it to be eminently successful. The *modus operandi* is practically to extend the vessel's hull upwards from the deck to the water level. It necessitates strong construction to withstand the action of tides and currents. A comprehensive idea of the heavy character of the work may be gathered from a glance at our illustration, showing the vessel when raised. In this instance the difficulties encountered by the engineer were abnormal, and the cofferdam erected was stated



"UTOPIA" RAISED AND BEING TOWED ASHORE.

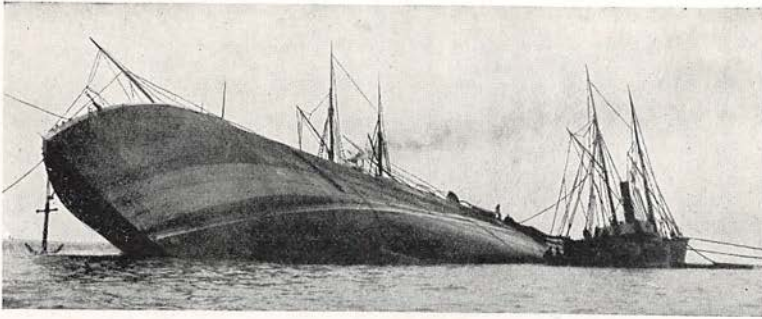
passengers with her to a watery grave. When day broke, the vessel was found to be within a short distance of land, and her masts and funnel were visible above high water. Her position offered a serious menace to the navigation in the bay, and the authorities ordered either her immediate salvage or destruction. A

survey was made, and the results of the divers' investigations prompted an attempt to raise her. She was lying in 57 ft. of water at the stern, and at a slight list. The East Coast Salvage Company, of Leith, one of the foremost salvage organisations in this country, undertook the contract, under the supervision of Mr. Armit, engineer to the company. It was a perilous business. Not only was the rent in her side extensive,



DECK OF "UTOPIA" AFTER RAISING, SHOWING HEAVY NATURE OF COFFERDAM.

by several authorities to be a triumph of engineering skill. When this part of the work had been performed, divers proceeded to patch the rent caused by the battleship's ram, upon the completion of which the vessel was ready for raising. This was accomplished by simply pumping out the water from the area enclosed within the cofferdam. Six 12-in. Invincible Centrifugal Pumping Engines, which in themselves



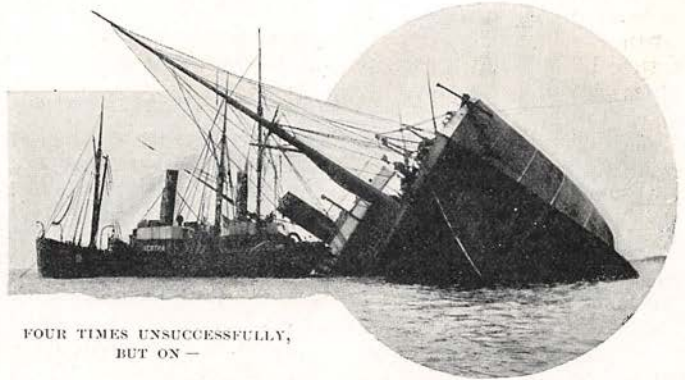
THE SS. "HYPATIA" WAS RAISED—

are remarkable and ingenious appliances of tremendous capacity, were set to work, and a combined stream of water equal to 70 tons was delivered per minute. Within one hour after the pumps were set to work, and after some 4,000 tons of water had been removed, the vessel was lifted off the ground and rose steadily to the surface. As she rose she was towed towards shore, ultimately beached, temporarily overhauled, and then towed to Glasgow. The whole of the work was performed within the short space of two or three months, a highly creditable achievement.

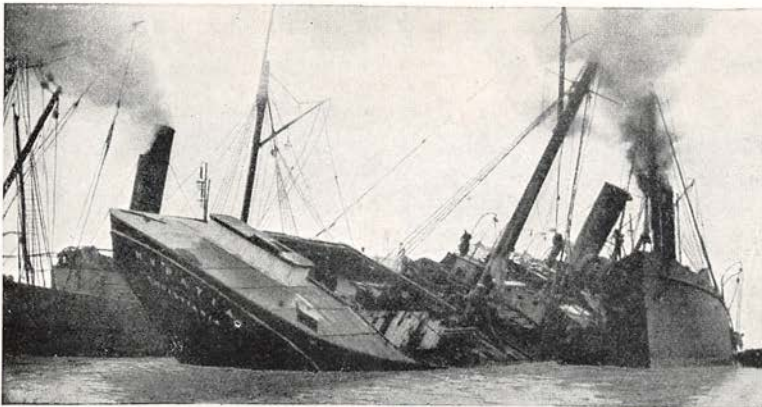
But it is not always that the work proceeds so smoothly and no hitches or misadventures are encountered. The SS. *Hypatia* proved a veritable thorn in the sides of the salvage engineers who

attempted her recovery. Four times she was brought to the surface, and as many times, through the failure of some portion of the raising apparatus, she sank again. On the fifth occasion, however, the salvors made sure of their quarry, and the refractory steamer was recovered.

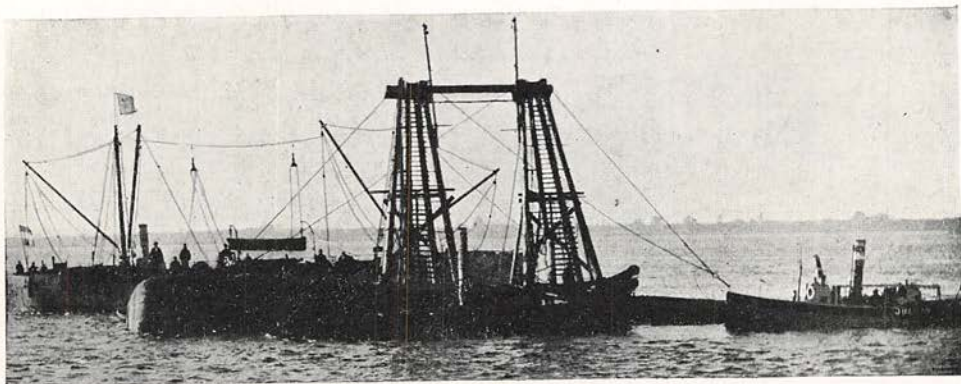
The process of recovering wrecks depends upon the local conditions and the position of the craft. When the *Puffin* lightship, off Queenstown, foundered during a gale, she

FOUR TIMES UNSUCCESSFULLY,
BUT ON —

was brought to the surface again by a curious method. At low tide two barges took up their positions on either side of the submerged vessel. Thick, strong cables were then passed from one barge under the sunken wreck, and up on to the deck of the other barge. The cables were then drawn taut. When the tide rose again, the wreck was necessarily lifted off the ground, and towed in shore until she once more rested upon the shelving bottom. At the next low tide the cables were once more drawn taut, and at high water



THE FIFTH ATTEMPT WAS RECOVERED.

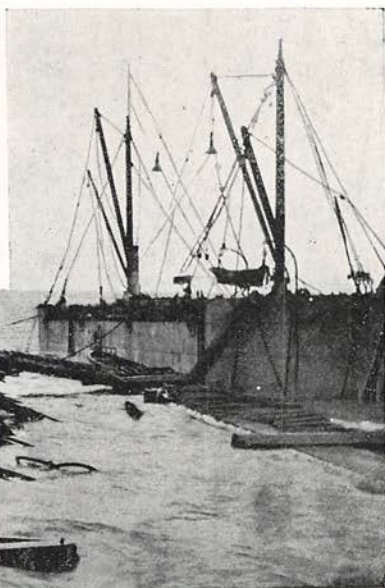


A GOVERNMENT DREDGER, SUNK IN THE RIVER ELBE, WAS BEING RAISED BY PONTOONS, BUT—

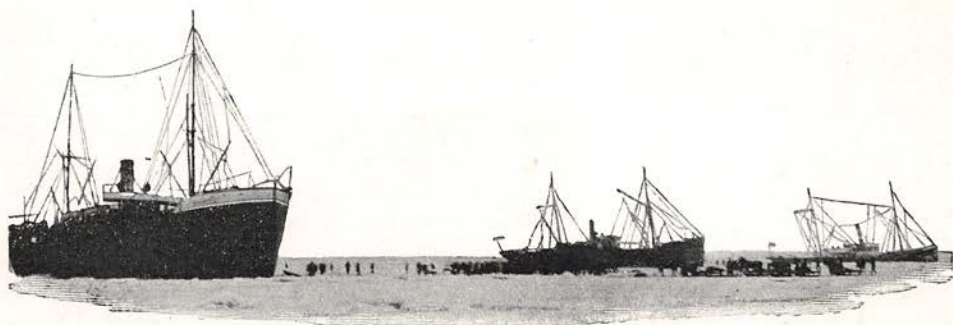
the vessel was once more lifted, the process being repeated until the lightship was beached, a battered and broken hulk. This was also the method employed in the raising of the *Eurydice*, which foundered off the Isle of Wight several years ago.

In shallow waters, when the proportions of the submerged wreck are adaptable, and the local conditions are propitious, the wreck is sometimes raised by means of pontoons. These are huge rectangular caissons, which are filled with water and sunk near the wreck, to which they are attached by means of cables. The water in the pontoons is then displaced with air, and the lifting that is thus exerted is tremendous. As the pontoons gradually rise to the surface, the wreck to which they are secured is also lifted. This work, however, is fraught with many difficulties, since should a cable break, or the pontoons not rise evenly, all the preparatory work may be suddenly undone. Notably was this the case in the raising of a dredger which sank in the River Elbe. Pontoons were sunk into position, and huge trestles were erected to act as levers to right the vessel when lifted. Suddenly, however, without the slightest warning, and while the strain was at the maximum, they collapsed, and the wreck sank back into its river bed, destroying the work of several weeks.

During heavy gales it is no uncommon circumstance for a vessel to be caught up by a wave and stranded upon the coast. When the sea calms down, the ship is left high and dry, far away from her native element. Invariably the vessel only sustains a trifling damage, and the salvor consequently sets to work to devise a means of restoring the ship to the sea. Sometimes a wooden slipway will be erected, and the vessel hauled along this improvised roadway, which is thoroughly greased with some unguent to facilitate the operation. A much more general method, however, is to construct a temporary



THE TRESTLES COLLAPSED UNDER THE STRAIN.



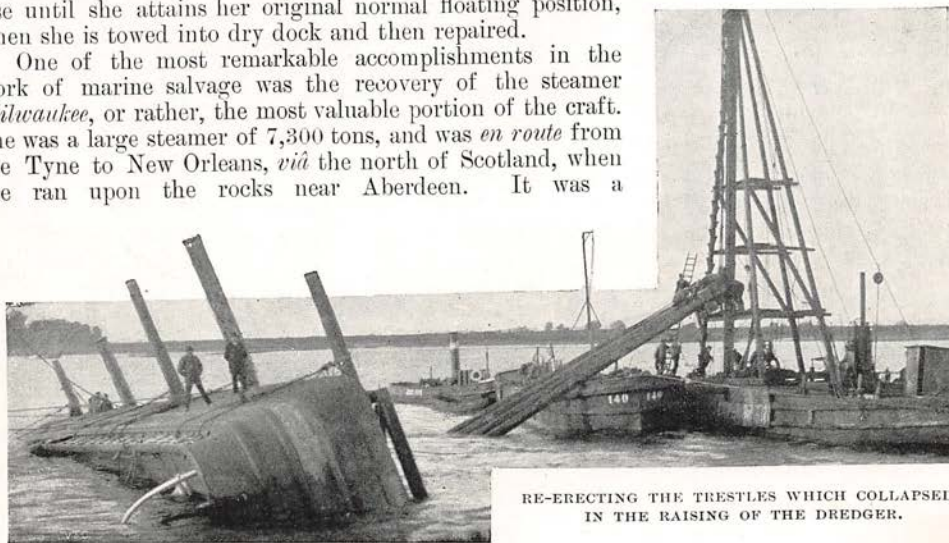
SS. "CORVYN MATYASS" IMPRISONED IN THE ICE IN THE BALTIC SEA.

canal from the point where the ship is stranded to the open sea, wide enough to allow the vessel to pass through it, and then at high tide to tow the vessel seawards. In the case of a sandy coast this operation is both laborious and difficult, since the salvage engineer has to devise a means of preventing the work he has accomplished at low water from being destroyed when the sea rises at high tide. The banks of the improvised waterway are lined with sacks filled with sand, and this prevents the channel from being filled with silt by the action of the tide.

A unique salvage feat was the recovery of the SS. *Corvyn Matyass*. This vessel was caught in the ice off Otchakoff, in the Baltic Sea, and the jamming ice-floes threatened to crush her. The ice-breaking steamer *Ermack* was unknown in those days, otherwise her rescue would have been an easy matter to the salvors; but the engineers had to resort to their own ingenuity and resources to accomplish the object. They cut a channel through the solid ice sufficiently wide to admit of the passage of the vessel. Quite an unusual scene of activity and bustle was imparted to the scene by the operations. No less than fifty teams of horses and sledges and 200 labourers were requisitioned to remove the ice, while another ship was utilised to dredge the channel to keep it open until the vessel was able to proceed on her way.

Occasionally, when a vessel founders in shallow water, and the damage caused is not very extensive, divers descend, patch up the hole, and then tightly and securely batten down all the hatches, rendering them perfectly watertight. Pumps are then requisitioned to remove the water from the interior of the vessel. As the water is thus withdrawn, and no water can re-enter the holds, the wreck is bound to rise until she attains her original normal floating position, when she is towed into dry dock and then repaired.

One of the most remarkable accomplishments in the work of marine salvage was the recovery of the steamer *Milwaukee*, or rather, the most valuable portion of the craft. She was a large steamer of 7,300 tons, and was *en route* from the Tyne to New Orleans, *viâ* the north of Scotland, when she ran upon the rocks near Aberdeen. It was a

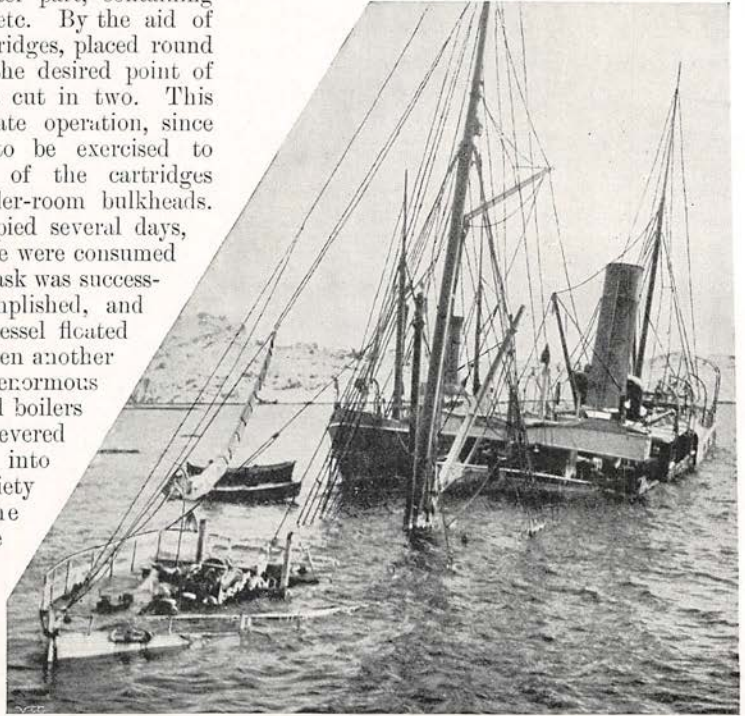


RE-ERECTING THE TRESTLES WHICH COLLAPSED IN THE RAISING OF THE DREDGER.

lamentable disaster, because the vessel was practically new. The underwriters determined on the difficult work of salvage, and entrusted the Liverpool Salvage Association with the task. The vessel was firmly jammed upon the rocks, and her fore part was extensively damaged owing to the action of the waves incessantly bumping her on the rocks. Recognising that the salvage of the vessel in its entirety was absolutely impossible, Captain Bachelor, an experienced engineer, who was superintending the work, decided to save her most valuable section—that is, the after part, containing the machinery, boilers, etc. By the aid of a belt of dynamite cartridges, placed round the hull of the ship at the desired point of severance, the vessel was cut in two. This was an extremely delicate operation, since unremitting care had to be exercised to prevent the explosions of the cartridges from damaging the boiler-room bulkheads. The actual cutting occupied several days, and 500 lbs. of dynamite were consumed in the operation. The task was successfully and cleanly accomplished, and the after part of the vessel floated away off the rocks. Then another danger arose. The enormous weight of the engines and boilers caused that end of the severed portion to sink deeply into the water, and great anxiety was evinced by the engineer as to the stability of the engine-room bulkheads being sufficient to withstand the tremendous pressure. The *Milwaukee* was constructed so strongly, however, that not the slightest sign of the bulkheads collapsing under the unusual pressure was observed, and in this curious plight the saved portion of the *Milwaukee* was towed back to the Tyne, a distance of 150 miles, and the steamer actually assisted the tugs as far as possible with her own engines. When she arrived at the shipyard of Messrs. Swan and Hunter, who had originally built her, a new fore part was constructed and spliced to the saved section. This was no easy task, but so skilfully and carefully was the work fulfilled,

that the second *Milwaukee* only differed from her prototype by six tons in her gross tonnage.

The work of the salvage engineer has been considerably facilitated by the invention of ingenious appliances, without which it would be almost impossible for him to accomplish the work entrusted to him. The centrifugal pump, an apparently insignificant contrivance, has done much to revolutionise salvage engineering. Then, again, how would the salvor fare without the valuable



SS. "VOLA" WRECKED IN THE SCAW.

assistance of the diver? Probably the diver is his most essential acquisition, since the major part of the work has to be performed under water. The majority of the divers for this branch are supplied by Messrs. Siebe, Gorman and Co., the well-known manufacturers of submarine equipment, and are always thoroughly experienced and reliable men. It is through the courtesy of this firm that we are enabled to publish many of the illustrations accompanying this article.