

Marine Salvage*

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INTRODUCTION

It is on record that from the earliest time of the establishment of Mediterranean sea power some 3,000 years ago, man has been interested in the recovery of property from marine peril, so much so that the Rhodians found it expedient to devise rules or laws designed to encourage persons to embark on ventures at their own risk with the prospect of just reward in the event of success. These laws although crude at the time were fundamentally sound, for not only did they provide for reward in the event of success but also penalties against looting. As time went on and power progressed into Roman hands, so these laws were perpetuated, and in consequence it is fact that those same laws form the basis of our thinking today.

MILITARY AND CIVIL SALVAGE

In order to express clearly the purpose of this paper, it is necessary to explain, before proceeding further, that the Court of Admiralty, a part of the High Court of Justice in England, recognizes two kinds of salvage, military salvage and civil salvage, and in both of these the word salvage is used to indicate a salvor's service and the reward given him. The services associated with military salvage are those rendered property in time of war in the nature of rescue from the enemy. Civil salvage on the other hand is the preservation of life and/or property from the many dangers to which they may be subject both in peace or war. This paper will deal only with the circumstances of civil salvage, and in particular as it affects the shipowner and the salvor when brought together in the routine course of their respective business as a result of marine disaster.

To appreciate fully the underlying principles associated with the payment of salvage awards to the successful salvors of property at sea, it must be understood that two essentials are required—voluntariness and danger—for without these there can be no salvage award. It is the first of these two requirements which brings maritime law so much at variance with common law, for unlike the marine salvor, the person on shore successfully saving property from a burning building or from flood or whatever else, has no right to reward for his efforts. The marine salvor on the other hand has a maritime lien on the salvaged property including ship, cargo, and freight under certain circumstances. It is understood that the reasoning the Romans had for this difference in marine and common law and which is prevalent to the present day in all marine countries, is that property saved at sea is saved under great stress and peril, and also that it encourages maritime trade.

With regard to life salvage only in rare instances is a salvage award paid as such, but more often life salvage is paid in the form of an enhanced award for the saving of property to which life has been associated. The inference here is obvious inasmuch as there is rarely an instance where life is in greater jeopardy than the ship and/or her cargo, that is so far as salvors are in a position to assist, therefore it is accepted that

it is unnecessary to try and assess the peril to each separately, but proportionately. The influence exerted by the saving of life generally stresses the importance of the salvor's assistance to the vessel and/or cargo and has been said, generally enhances the magnitude of the award. In Great Britain life-salvage as such may only be claimed under the conditions laid down in the Merchant Shipping Acts of 1894.

It has been said that in order to claim a salvage award the salvor must prove to the Court of Admiralty, or if the case is taken to arbitration then to the arbitrator, that two essentials were prevalent—voluntariness and danger were present. It is as well to describe each in turn.

Voluntariness

This may simply be described as an entirely voluntary act on the part of a person, persons, or group of persons representing company interests, proffering intended constructive aid to a ship without thought first of contractual gain. Perhaps to clarify this a little more it might be said, that in order to claim salvage for services rendered, those services must have been given free of pre-salvage financial arrangement. From this it will become very apparent that a ship's crew, her owner, pilot, or others normally associated with her and under some obligation to work to the ship's advantage cannot obtain salvage in her preservation except under the most extenuating circumstances. This also applies to tugs under contract to tow.

An interesting feature in respect of persons directly associated with a ship in distress is that in relation to passengers. A passenger although not in any way obligated to the vessel, who labours in an effort to save the ship is considered to be labouring for self-preservation and this is incidental to the benefit of life and ship. He cannot therefore ordinarily claim salvage although, again, there are exceptional circumstances such as voluntarily remaining in the ship after having been offered the opportunity to escape, simply in order to assist her crew in saving her.

Danger

Danger and its degree are basically the essence of most salvage cases and claims. It is insufficient for a claimant to represent his case as existing only in fancy or perhaps vaguely possible. He must prove that although the danger may not have been immediate or absolute, it was such as to cause apprehension

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and of such a nature that no prudent person in charge of the venture such as the shipmaster would have refused help if offered upon the condition of his paying a salvor's reward. Doctor Lushington once ruled as follows:

"I am of the opinion that it is not necessary there should be absolute danger in order to constitute a salvage service; it is sufficient if there is a state of difficulty, and reasonable apprehension . . . I think the removing of a vessel from apprehended danger, and real danger, does partake of the character of salvage service."

Also, in a similar case: "It is not necessary, I conceive, that the distress should be actual or immediate or that the danger should be imminent and absolute; it will be sufficient if, at the time the assistance is rendered, the ship has encountered any damage or misfortune which might possibly expose her to destruction if the service were not rendered".

Doctor Lushington, by the way, was a Court of Admiralty judge who figured prominently in many marine salvage cases principally during the first half of the nineteenth century in England.

We now reach the stage of enquiry as to when and how an award is claimed and paid.

Success

The first essential necessary for the claiming of salvage is that part of the property or life must have been saved, and in the case of property this is to be construed as meaning ship, cargo, or freight. Freight being a sum of money paid or to be paid for the carriage of goods. It has previously been said that only in exceptional circumstances is it possible to submit a claim for the payment of salvage for the saving of life alone, since life is seldom in greater danger than the ship herself or her cargo. There is however the exception to the rule as shown by the following:

Some years ago a vessel carrying pilgrims in the Red Sea bound for Jeddah, was wrecked and as a result the pilgrims numbering several hundred were forced to abandon the ship and found themselves isolated on rocks from which there was no escape. A ship came on the scene but lay off, the master refusing to pick up the survivors until the master of the wreck had agreed to pay him several thousand pounds to take them on to Jeddah. The wreck's master had no option but to agree and the pilgrims in consequence reached their destination.

It so happened that the cash demanded by the rescuing master represented the original total passage money paid for the conveyance of the pilgrims from A to B and therefore constituted freight. Since the passengers had reached their destination it was held the wrecked ship's owners had covered their obligation, whilst at the same time the rescuing ship's master was considered to have saved freight from the wreck. This case resolved itself into a normal salvage service operation, the rescuing owners being ordered to return the initial cash to its original owners and themselves to receive an award for their services.

For the purpose of this paper it is not intended to dwell too much on Admiralty Court procedure with regard to the bearing of salvage cases simply because over a long period of time resort to this means of settling cases has tended to lessen in favour of Lloyd's Open Form. There are two specific reasons for this. Lloyd's underwriters themselves, to safeguard their own interests, evolved the Form which provides for arbitration and, by reason of the long-standing prestige of Lloyd's and the integrity of the procedure, all countries throughout the world now favour this method of settling disputes. The system has one very serious defect inasmuch as it limits the great wealth of this section of marine law to a mere handful of very highly qualified men, to the detriment of the Court where experience in this particular field is waning. As opposed to this fault it has great advantage in the use of arbitrators of highest quality experience, the method obviates long and costly litigation and, furthermore, as opposed to Court procedure, arbitrations are held in private as between parties and no statement as to facts or reasoning is made public. A word, with reference to the

implications associated with the signing of a Lloyd's Form of Salvage Agreement, is appropriate at this stage.

This type of Agreement was first devised in 1890 for the use of one individual contractor, but it was not until the following year that it was approved by Lloyd's for general use. Since that time it has undergone many revisions, the last in 1953 which produced the Form in its present text.

In essence the Form binds nobody to anything. Its value lies in the fact that insofar as the salvor is concerned, the signing is an admission that the service to be rendered is a salvage service, and that the owner agrees to go to arbitration for the fair payment of an award for the services rendered. Generally no specific sum of money is mentioned in the Agreement, thus ensuring the salvor is not left open to liability for financial loss resulting from under-estimation prior to commencing an operation. The salvor undertakes to use his best endeavours to bring the casualty to safety. The advantage to the owner, broadly speaking, is that the Form does not bind him to contract since the work to be performed will be undertaken on the principle of "no cure—no pay". He agrees, as has been said, that the services about to be undertaken are in the nature of salvage services, that he will place security on successful conclusion of the service, and will go to arbitration for the payment of a just award to the salvors. A further advantage to the owner and/or underwriters is the fact that the signing of the Agreement does not bind them to the exclusive services of one salvor, but leaves them free to engage as many as they wish. Finally, it obviates recourse to costly litigation.

The very fact that arbitrations are held in private makes it extremely difficult to compare the awards of arbitrators with those of the courts, but it may be accepted that they are in the main guided by them. The disadvantage with Court procedure apart from the question of expense is that the details of the service rendered, the judges' comments, the award and so forth are broadcast to the world and these, with all the implications associated with them, are clear with the weight they carry. Insofar as law is concerned in respect of arbitrations, the arbitrator must conform.

The Award

After having heard the evidence of both sides it is the duty of either judge or arbitrator to determine a fair valuation of the service rendered and, although the laws concerning salvage are clearly defined in legal text-books and there is experience of past cases to be used as guidance, nevertheless the fixing of the award is in the hands of the judge or arbitrator concerned and it is for him in his discretion to determine a sum which he considers fair and reasonable to both parties.

It must be understood that in the literal sense the term "discretion" means the making of one's decision with nothing more than one's own judgement, and so it is in this respect. Since there is no mathematical relationship to the practical operation it follows that the power of discretion must remain, but it is very much controlled by the factors "fair and reasonable" which in themselves are the result of many earlier decisions.

Obviously if judges and arbitrators are to be left in the state of using discretionary power in arriving at a just award, in order that somewhat similar cases may be resolved in like manner in consistency, it is necessary to break down into relative importance the factors of influence. The following is roughly the factors to which this reference is made:

- A) As regards the things salvaged:
 - 1) The degree of danger to human life.
 - 2) The degree of danger to property.
 - 3) The value of the property as salvaged.
- B) As regards the salvors:
 - 1) The degree of danger to human life.
 - 2) Their conduct and skill.
 - 3) The value of the property used and employed in the salvage service.
 - 4) The danger to which that property is exposed.

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- 5) The time and labour expended in the performance of the salvage service.
- 6) Responsibilities incurred in the performance of the salvage service, e.g., as risk to insurance, and liability to passengers or freighters through deviation or delay.
- 7) Loss or expense incurred in the performance of the salvage service, e.g. as detention, loss of profitable trade, or repair of damage caused to ship, boats, or gear.

There is a further influence upon awards not always understood in shipping circles, particularly amongst those most affected, the shipowners themselves and their representatives, for whose protection reputable salvage companies exist. This influence emanates from A.3,—“The value of the thing salvaged”, and this is as inferred—immediately on being calved and placed on the market not at an earlier or later time, nor as insured value. It follows therefore that at times when values are low regardless of effort which has been made, a salvage award will tend to be low although still remunerative. Such conditions are accepted by salvors because it is generally appreciated that inadequate awards are the result of low values on the one hand, whereas when values are high, adequate reward may be expected for the risk and danger accepted, in other words one may say the salvor and indeed his marine staff as a unit appreciate that “what is lost on the roundabouts is gained on the swings”.

Let us now assume that a salvor has completed the successful task of rescuing a stranded vessel from some perilous position and that the work was conducted under the terms and conditions of Lloyd's Form of Salvage Agreement. What then?

Salvage Arbitration

Upon completion of salvage services, the amount of security required must be promptly advised to Lloyd's and the salvor's solicitors. The security figure should always be an optimistic assessment of the probable award and then increased by a further sum as a safeguard against the assessment being too modest. The security figure should not be excessive, but it is better to have too much than too little. If the security is excessive in any large degree then the salvor will pay one per cent of the excess amount found by the arbitrator, but the security figure can always be reduced after initial lodging when the facts and values are better known and perhaps the lawyer's advice sought.

Until security is deposited, the vessel and her cargo are not permitted to move without the consent of the salvors who should arrest if the safety of their lien is threatened by the vessel sailing or cargo being discharged without security first being lodged.

Normally security is lodged with Lloyd's in London, either by owners or parties having interest in the venture, either direct or through their representatives or brokers. This is essentially the case applicable to interest of doubtful nationality, or where parties might be of limited means. It does not however, necessarily apply to interests of high standing. In such cases it is normal practice for the salvor to accept either a Bond or written guarantee to the effect that owners/underwriters will meet their salvage obligation as determined through arbitration.

Thereafter, the provisions of Clause 6 of the Salvage Agreement operate and these speak for themselves.

Assuring notice of objection and application for arbitration (as in 99 per cent of all cases) and the appointment of a sole arbitrator, the owners of the salvaged property then appoint solicitors to represent them. Frequently the same solicitors represent both ship and her cargo interests, but there is a growing tendency for the separate salvaged interests to have separate representation.

The next step so far as salvors are concerned is to prepare their salvage report, list of expenses and supporting vouchers, and disclosable documents. The latter to include the salvage master's report, log abstract and deck log.

The salvage report should describe all details with regard to standing of the salvage company, their experience, craft, etc., identification of the ship and if any, her cargo, everything

to do with the location where the casualty occurred and the nature of the services rendered, a chronological recital of all facts and developments from start to finish.

These details should include everything which will enable the parties and the arbitrator to appreciate the condition of the casualty, the degree of danger to which she was exposed, the skill and merits and any difficulties of the services and risks run by the salvor's equipment and personnel.

It is desirable to include even facts which *prima facie* appear to have little value, as these may develop in importance when the facts spoken to by the other side are known and may help to anticipate and defeat arguments to be made against the merits and skill of the services by the other side seeking mitigation of the award. Pure comments and opinions in the report, as to risks or merits, should be avoided, although it is often possible to present these in a factual manner in the form of explanation of steps taken. It is always extremely useful to include sketches and diagrams, etc., showing internal and outer soundings, arrangements of ground tackle, disposition of craft around the vessel, refloating attempts, etc.

When the salvage report is complete with documents, etc., steps can be taken to press the other side to proceed either to a hearing or commence negotiations for an amicable settlement.

Whilst the salvors are drawing up their salvage report the ship and cargo solicitors are:

- i) Ascertaining:
 - a) the sound market value of the vessel,
 - b) the deductions to be made therefrom in respect of repairs and incidental expenses in order to arrive at the hull salvaged and contributing value and
 - c) the cargo and freight values.
- ii) Obtaining evidence from the shipmaster and other ship witnesses and surveyors as to the facts of the services.
- iii) Collecting all disclosable documents such as log books, telegrams and letters, survey reports, etc.

The values must of course be submitted to the salvors for their approval and, once they are agreed and the other side's solicitors have completed the steps under ii) and iii), they are ready to proceed. Delays on their part may be caused by:

- 1) Difficulty in obtaining documents from foreign clients who may not be too co-operative.
- 2) Difficulty in obtaining figures for values, in particular details of the cost of repairs where these are extensive and lengthy and the repair accounts or survey reports are not drawn up.
- 3) Non-availability of ship's witnesses to give their evidence due to ship trading in a remote part of the world.

If the salvors are all ready to proceed and the other side have no good reason for delay, application can always be made to the arbitrator for an Order to compel the other side to do whatever is holding things up. The arbitrators are always ready to assist in expediting matters and anxious to avoid delays which may give Lloyd's Open Form a bad name.

When both solicitors have collected the documents and evidence, they meet and give mutual inspection of these and then copies are exchanged.

It is extremely rare for pleadings to be exchanged or witnesses to be called to give oral evidence.

The case is then ready for arbitration or discussion between the solicitors with a view to arriving at an amicable settlement after consideration of both sides' documents.

If no settlement proves to be possible, a date is fixed by the arbitrator and both solicitors prepare one or more bundles of the documents they wish to put before the arbitrator. All the documents are then sent to Counsel by the solicitors together with a Brief giving Counsel all the information he requires, in connexion with the case (e.g. values), not included in the documents and suggestions as to the manner in which the case should be presented to the arbitrator and as to the arguments, contentions and submissions to be made on behalf of the party represented by Counsel, seeking either to minimize the value of

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the services or establish the equity of a large award. Prior to the hearing a conference is held with Counsel to discuss the matter generally and particularly upon points arising from comments in the Brief and upon points occurring to Counsel relating to the arguments to be made.

At the hearing of the arbitration all the documents are read by Counsel aloud (the arbitrator having a copy before him) by way of formally adducing evidence and thereafter both Counsel address the arbitrator with their submission as to the merits, etc., involved and as to the points he should bear in mind when assessing his award. However, no suggestions are made to him as to the actual figure in which he should make his award, beyond generalizing that the case merits a "large" sum or a "modest" sum.

After Counsel have made their speeches (the salvors' Counsel having two speeches—one in answer to the points made by the other side's Counsel) the hearing is adjourned and the award is usually issued by the Committee of Lloyd's within two or three weeks. The arbitrators make a practice of re-reading the documents and their notes of the speeches, in private, before arriving at the figure of the award and also consult the Confidential Reports issued by Lloyd's to them, covering all other arbitration cases, to endeavour to check the figure and obtain a level of consistency in scale of awards.

If either party is dissatisfied with the award and there is an appeal the matter proceeds to the Appeal arbitrator usually within two to three months.

The Appeal hearing follows much the same pattern, except that the notes and reasons of the original arbitrator, published to the parties, are also read and the reasons commented upon by Counsel for the parties.

The Appeal arbitrator's award is final and binding and ends the matter.

Arbitrators

The present composition of Lloyd's Panel of Arbitrators is as follows:

Appeal Arbitrator: K. S. Carpmeal, Q.C.

Original Arbitrators, in order of seniority:

J. V. Naisby, Q.C.

J. Roland Adams, Q.C.

Waldo Porges, Q.C.

H. V. Brandon, Q.C.

Peter Bucknell, Q.C.

All Original Arbitrators also act as Leading Counsel in arbitrations so that in different arbitrations they will appear

either as Arbitrator or Counsel for either the salvors or the salvaged property.

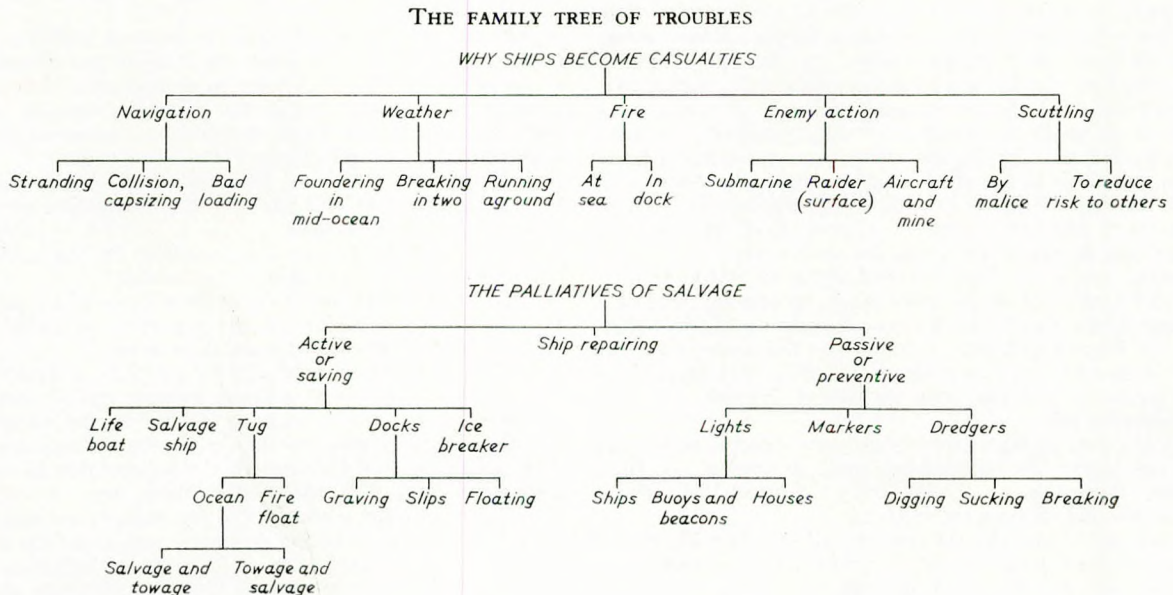
SALVAGE ASSOCIATION, LONDON

It is appropriate at this stage to mention a very important organization frequently called upon as the Third Party interested in wreck, casualty, and/or cargo. This body, known as The London Salvage Association, was formed in 1856 for the purpose of watching underwriters' interests in almost all sections of the marine industry. It was felt at that time that something more than haphazard insuring was required, beyond the mere coverage of ships and cargo. The result was that on the formation of the Salvage Association, offices were opened in various parts of the world and staffed by highly competent surveyors. These officers today carry the heavy burden of representing underwriters against expense—casualties, salvage, repairs—they recommend methods of dealing with unusual commodities, investigate and scrutinize cases of doubtful loss, suspected fraud and so forth. Fees are charged for the services of these officers, but the Association in itself is a non-profit making organization. These officers perform a further invaluable service not always appreciated by shipowners and salvage companies alike; that of referee between the two parties. It frequently happens, especially where foreign vessels are concerned, that owners or even shipmasters, the men most able to evaluate the degree of danger in which their vessels may be at a particular time, are hesitant to accept help from salvors no matter how reputable. The result is that valuable time is lost whilst discussion is carried on, lost time and incidentally tides, which might well result in the loss of a valuable ship and cargo. The presence of a Salvage Association surveyor will in the vast majority of cases cut short discussion and alleviate much suspicion, with the result that unquestionably great saving to all parties is achieved.

THE FAMILY TREE OF TROUBLES

It is now time to describe the practical side of salvage. Why ships become casualties, and the remedies we have at hand in the first place to either prevent, minimize or reduce in intensity, or in the second place to succour repair and return to service.

A glance at the family tree of troubles will obviously indicate that in the space of time available for the reading of this paper, it is quite impossible to go into each in detail and in consequence it is intended only to describe the composition of a first class marine salvage company capable of performing many



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of the tasks which arise from this illustration. It goes without saying that, in peace-time, even the largest concerns are limited in their resources and, therefore, it is quite impossible for all contingencies to be covered, indeed, unless salvors are in association with some more consistent business particularly allied to their particular field, such as towing, in order to absorb heavy outgoings between operations, the maintenance of specialist staff, buildings, equipment, vessels, and kindred requirements would be out of the question.

The Salvage Company

The first requirement is a suitable building rectangular in shape with a floor area of not less than 2,000 square feet, so constructed as to sustain heavy weight and fitted with both half shelves for the stowing of light equipment, and a heavy fore and aft overhead beam for the carriage of a heavy duty chain hoist necessary for the rapid removal or stowage of machines, and so forth.

This store should contain at least a 50 per cent reserve stock of similar equipment carried in the salvage vessel in order to guarantee smooth and efficient turnover of machinery after each successive operation. The salvage store, unless other arrangements are to hand close by, should be so arranged as to contain a small fitters' workshop, and the whole building must be heated to obviate damp in summer and freezing in winter. An example of the type of equipment one would expect to find in such a store would be: all classes of cordage and wire; canvas; oakum, wedges and plugs of various sizes; heavy four-fold purchase blocks, together with carpenter's stoppers for use in ground tackle; fondu cement for patching or plugging; steam and air hose; shipwright's tools; blacksmith's tools; pumps of various sizes; compressors; all types of hose required for the pumps; diving equipment; under-water and surface burning and welding equipment. Further to this one would expect to find the multitude of small items such as air gauges, adapters, wire cutters, handy-billies, bottle screws, and so forth.

The Salvage Ship

There can be no hard and fast rule as to design of this particular class of vessel for the most advantageous is, of course, that which will be most suited to the locality in which it is to work, and the function it is to perform. It would be for instance, quite ridiculous to build a deep drafted ocean-going type of ship for operations in the sheltered shallow rivers of Europe and, similarly, one would not expect to find the river dump type operating say on the coast of Newfoundland. In consequence of this observation, this paper will confine itself to the ocean class of vessel, capable of operating far from base as an independent unit. It is sufficient to say however, that both types of craft have one thing in common; they have to be extremely heavily constructed, capable of sustaining heavy weight, and will demand somewhat similar equipment.

The observer will become immediately aware of two unusual features when studying the ocean type of salvage ship. The horns extending beyond the bow, and the bulbous stern. The horns are spaced eight to ten feet apart and generally have an outreach of about 15ft. and, depending on the requirements of the owners, are usually capable of taking a weight of 25-30 tons on the outer sheaves independently or 60 tons in combination. Between the horns is a heavy doubling plate capable of sustaining weight up to 100 tons.

These vessels, when working, generally operate from the fore end, therefore it becomes obvious that it is greatly to advantage to keep this end of the vessel clear of her own anchor obstructions and to have some means of holding herself in position when pinned over an obstruction or whatever she may be attempting to lift. The bulbous stern allows for this and is so constructed as to allow for the stowing of heavy anchors attached to wires passing to the after winch.

Other unusual features very noticeable are the clear run of deck, from fore to aft on both sides, and the enclosed winches. The deck must be free of obstruction in order to allow for the rigging of 100-ton purchases if required, whilst the 10-ton

winches are enclosed to ensure the protection of their operators. 10-ton winches, by the way, are placed both fore and aft.

A further feature the observer will notice is the towing hook. It must be emphasized that this class of vessel is not a tug, but that she is fully capable of performing that function within limits until relieved by her more suitable sister.

With regard to her internal arrangements, this class of ship will generally be found to contain a shipwright's shop, salvage fitter's shop, and diving store, and these will be found to contain many of the following items of equipment: a heavy duty motor-driven lathe, milling machine, screwing machine, grinding machine, pipe bending machine, and all the required tools associated with the particular function.

The hold, both lower and 'tween-deck section, will be found to contain cordage of all sizes and description, wires of varying lengths and sizes made up into various forms such as bollard strops, pendants, grommet strops, etc., pumps ranging from the 2½-in. sump to the 8-in. motor type, compressors, welding machines, surface and underwater burning equipment, timber of various lengths and sizes, hook bolts, channel bar for the making of patch templates, and indeed many items far too numerous to mention. It may be said that this class of vessel is so stored as to enable her to conduct at least the initial stages of a major salvage operation completely without immediate assistance from shore, or from additional vessels which may later be required for the purpose of transporting additional material and the rendering of assistance in the final stages of the work.

Staff

Before discussing the question of staff, it is well to once again draw attention to the fact that it is essential for a well found salvage organization to have large financial backing behind it or as parent, a company, preferably marine, of considerable magnitude. The reason for this is that salvage companies are in the main non-productive between operations, incurring heavy expenditure without immediate prospect of return. Furthermore as has been explained most "live" salvage is conducted on the basis of Lloyd's Open Form or "no cure—no pay". Under those conditions, salvors must of necessity accept an ever-present prospect of great financial loss as a result of inactivity or perhaps professional error by those in charge of an operation.

In view of this it becomes immediately obvious that choice of staff both professional and artisan is of the utmost importance, perhaps of even more importance than in most spheres since the men and the welfare of all concerned must be dependent upon their judgement and skill.

Salvage Officer

The Salvage Officer must be possessed of an unusual nautical background, inasmuch as he must have served in the practical sense in all branches of the marine profession, for it would bode ill for him and his employers were his knowledge limited to hearsay and the basic few principles to be gleaned from text books.

He must have served preferably in all classes of vessels, since knowledge of different types of construction and cargoes and their stowage is of great importance. Not only must he be capable of making stability calculations when necessary, but must be of a type instinctively knowing when damaged vessels are unstable. He must have the ability to extricate ships and boats from dangerous situations due to rapid deterioration in exposed weather conditions, since many men's lives may depend on this judgement.

This officer, if he is to be efficient, should have had a number of years' service in command of large ships, rescue tugs and salvage vessels, followed by a comparatively long apprenticeship as an assistant to officers well known for their prowess as salvors. Only in this way is it possible for the man to become skilled in the refloating of damaged ships by the use of ground tackle, discharge or jettisoning of cargo, discharge or transfer of ballast, use of compressed air, etc. He must be familiar with the use of such tools as the airlift, the reaction jet, recompression

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chamber, etc., all used in the parbuckling or raising of sunken ships. In addition he must be familiar with the tools used by the various artisans, such as the bolt driving gun, and the great number of uses to which it may be put, the many "windy" tools, types of explosives, primers and detonators, etc., and finally be possessed of expert knowledge of patching seriously damaged hulls, controlled pumping and blowing, and uses of cofferdams.

The efficient salvage officer must also be possessed of the ability to write clear and concise reports, together with a keen business sense.

Salvage Artisans

It is of the utmost importance that artisans engaged in this work be of superior intelligence to those of their trades normally found in routine working life, since often they are called upon to accept responsibility and make important decisions far beyond the normal scope of their calling. The salvage fitter as an example must be a man not only capable of maintaining all types of Diesel and gasoline machinery, but must have excellent knowledge of electricity. He must be capable of preparing blows, vents and spills, for the reception of air under control in compartments and, furthermore, have an excellent knowledge of much of the seaman's salvage duties.

The salvage diver must be a sound practical seaman of considerable skill and experience, since much of his work will depend upon his ability to use the tools of his trade underwater. There can be no doubt that the success or failure of many types of operation will depend on the ability, intelligence, and integrity of the diver, for he represents the eyes of the salvage officer who has to depend in large measure on the precise and intelligent information passed him from the bottom during the course of survey. Not only must this man be a first class seaman, in addition to his prowess as a diver, but he must also be something of a shipwright, capable of cropping damage to the best advantage, and capable also of making templates. A word of warning with regard to the use of divers is that never should they be permitted to work alone, for obvious reasons.

In addition to the salvage officer, the salvage fitter, and the salvage diver will of course be found the master and the crew of the salvage vessel, all of whom are generally chosen for their high degree of skill, ability to work as a team or individually, and for their natural cheerfulness and patience. The last two features are of great importance, since short temper and lack of patience under adverse circumstances and conditions might well, and unfortunately frequently do, result in serious and sometimes fatal accidents.

A TYPICAL SALVAGE OPERATION

This example is that of a ship of some 5,000 gross registered tons which, in light condition, had suffered severe damage in way of her engine room, flooded, capsized, and sunk with her fore-foot some fifteen feet from a stone quay whilst her stern almost touched it. Her waterplane at mean low water on spring tide was approximately through the centre line. The rise of tide in the port, in which she lay, was approximately 10 feet. Except for a quantity of bunker coal the ship could be said to be in her light displacement condition.

The case was clearly one of parbuckling and, due to the fact that the vessel was lying in soft mud, one in which most principles of marine salvage in shallow water would be employed.

It must be explained that the action of the true parbuckle is somewhat similar to the turning of a wheel. In order to turn the wheel with the minimum of effort it must be perfectly counter-balanced, ensuring that it will revolve about its own axis or centre of gravity. Therefore it will be readily seen that to revolve or parbuckle a ship with the minimum of effort it is necessary to calculate the position of the centre of gravity with

the utmost care and to reduce weight to a minimum overall for the convenience of counterbalancing.

From this explanation it will be seen it is quite wrong to pass a wire about a wreck, in the form of a parbuckle, and attempt to turn her about her bilge on which most of her weight is concentrated.

On this principle work commenced. A large steel patch was constructed and placed over the damage to the port side; the ship it must be understood had rolled over onto her starboard side, thereby leaving the damage uppermost. In cases of this type it is quite usual to stiffen patches on the outside as was done in this case, since to do otherwise could serve no useful purpose and would cause the loss of much time and labour.

This work was followed by the erection of four heavy 20-ft. sheerlegs or "bents" as they are sometimes termed, two on the ship's port side sheer strake and two on the port side deck stringer exactly in line with each other to form pairs. They were built of steel and kept in position by wire guys, thus granting the salvors ease in dismantling during the process of righting. The purpose of these bents was to increase the lever and thus increase the moment to turn the ship about her axis. Following this, counterweights were suspended from lugs attached to the vessel's side and so arranged as to touch bottom soon after normal range of stability was reached.

All openings in the main deck were sealed, whilst certain of the superstructure in the way of heavy gun platforms, etc., were removed. It should be explained that in order to discharge water from the holds, the specially constructed steel hatch covers were 18in. short of the breadth of the hatches, thereby allowing the passing of hoses directly into the holds, whilst holes were cut in the decks to facilitate the discharge from the peaks. Insofar as double bottoms were concerned, arrangements were made for the flooding of those on the high side, whilst those on the low were blown by means of compressed air.

The eyes of two 8-in. lifting wires were passed under the hull, up the bottom, over the bents and down to toggles associated with the lower sheerstrake. The bights of the wires were then taken to heavy suitable sheaves attached to the hooks of two pontoon sheering tackles. In addition to the heavy pontoon lifting craft, two smaller lifting craft, each capable of lifting 50 tons over their bows were eventually pinned down, one forward, the other aft.

Discharging and blowing commenced on the falling tide, and the pontoons ballasted, whilst slack was hove in on the lifting wires. At dead low water all wires were pinned down and discharge of ballast from the pontoons and craft commenced.

This ship parbuckled with little effort and, as calculated, moved about her axis without appreciably changing her position relative to the quay wall. The estimated weight taken by all craft combined in the operation was approximately 400 tons at the initial lift.

DERELICT OR WRECK

To conclude this paper, a word with reference to derelict or wreck:

It is commonly believed that when a vessel is found abandoned she becomes the property of the finder. This is grossly in error for, except in exceptional circumstances, the property always has an owner. The salvor is bound in law to deliver the ship to the Receiver of Wrecks in the United Kingdom or similar officer abroad under penalty of a heavy fine, forfeiture of any claim to salvage and, indeed, a liability to pay double the value of the wreck. Reports of wreck have to be posted in the nearest Custom House, within 48 hours of finding, and have to describe, state, when and where found, and give an estimation of value, with the present position. If the property is of high value a copy of the notice has to be posted with Lloyd's with the object of attracting the owner. Only after a period of twelve months has elapsed has the finder a right to claim ownership.