WINTERING IN THE ARCTIC.

A ship may winter in the ice under somewhat varied circumstances. She may be drifting in the pack during this time, unable to make a harbor, as in the cases of the Terror, Tegetthoff, Jeannette, Fox, and others (this may happen under two conditions, that is, whether liberated or not from the pack; these cases have been already noticed); or the ship may be frozen in, in the hummocky pack, but not subject to drift, as in the case of the Erebus and Terror, off King William's Land; or she may be safely ensconced in some good sheltered haven. In the first case, the most dangerous of all, it is seldom that any thing can be done but await events. A northward drift is a most perilous circumstance; and, although in the case of the Tegetthoff the crew managed to escape unscathed, it was only by a miraculous combination of favorable events. The disaster to the Jeannette and her unfortunate crew shows better what may usually be expected. It is this fact, to a great extent, that has led so many arctic expeditions to follow that continuity of shoreland which is swept by southward-trending currents, in preference to all others. Many arctic sailors of experience have even strongly contended that it is a matter to be at once considered, when a ship is thus probably circumstanced, if she should not be immediately abandoned before the northing gained would seriously compromise all hopes of escape. In a winter's drift it is impossible to properly 'bank' a vessel, as the incasing with snow-walls is generally termed, and it is consequently a severe labor to keep an equable temperature in the unprotected ship. In the case of the unfortunate Tegetthoff, "while in the berth close by the stove there was a temperature ranging between 100° F. and 131° F., in the other there was one which would have sufficed for the north pole itself. In the former a hippopotamus would have felt himself quite comfortable; and Orel, the unhappy occupant of it, was often compelled to rush on deck, when the ice-pressures alarmed us, experiencing, in passing from his berth to the deck, a difference of temperature amounting to 189° F." (Payer). The story of the Jeannette and the Terror also shows the miseries of unbanked vessels. In vessels properly 'banked,' however, no such variations of temperature need be encountered, even in the severest weather. The illustration (fig. 1) showing the Germania wintering in the ice is given to show an improperly 'banked' vessel, although well housed. Sketches (if they be accurate) of by far the greater majority of exploring-ships wintering in the ice show the same (and generally greater) lack of proper arrangements for keeping out the cold. A good contrasting picture is the one given (fig. 2) of the whalers wintering at Marble Island, in North Hudson's Bay; they being experienced icemen, and aided by Eskimo in the snow-construction. The sketch was taken by Mr. Klutschak of my party, while in the bay during the winter of 1878–79. I visited these ships that winter for a short while, and lived in one the next winter for no inconsiderable time; and, although the temperature outside was about the usual mean of arctic wintering-harbors, that inside was comfortable in all parts of the ships. To contrast with Payer's statement above, I would say, that, while the cabin showed about 80° or 85° F., the captain's room, separated from it by a door with lattice shutter, would seldom be over five or ten degrees lower; while in the 'houses' built over the ships it was generally a little below freezing, and very comfortable for persons who spent a proper time out of doors for exercise. This 'banking' is most conveniently done by Eskimo, when their services can be secured, as their superior ingenuity in snow-construction enables them to enclose the vessel in even several concentric snow-houses, thus securing the most equable temperature with

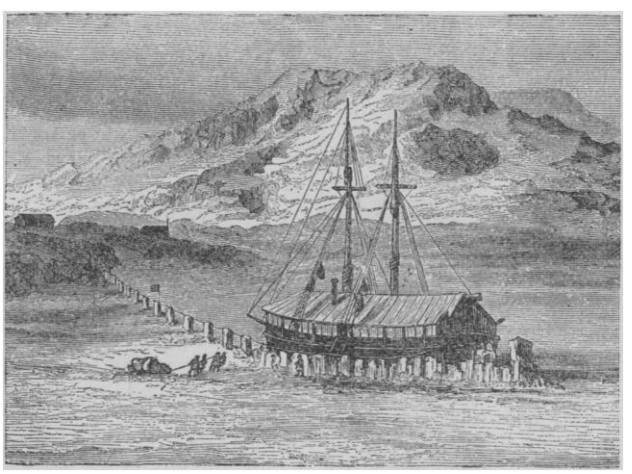

Fig. 1.—The Germania wintering in the ice.

the least amount of material, which is quite a consideration when this monstrous mass has to be removed in the spring.

The drifting winter-beset ship has one advantage worth noting. If drifting towards warmer waters, as is generally the case in following the usual routes, she is almost certain of a safe and speedy release in the early spring months; and the constant state of alarm experienced by all ships' crews while in these involuntary journeys from ice-pressures, and threatenings of a general destruction of the ice-fields, has almost its compensation in the necessarily banished *ennui* and lonesomeness of the long polar night, with its accompanying evils of idleness and disease. Forced activity to overcome lonesomeness soon wearies, loses its effect, and becomes really a punishment, while that prompted by danger never loses its stimulating effect.

A vessel wintering in the ice, unable to secure a harbor, but not subject to drift, may be liable to much danger when the fields break up in the following summer; and this danger will generally be greater the farther she is from land, owing to her earlier liberation, probably long before the navigable season commences. In a vessel far from land much of the benefit derived from the voluntary exercise indulged in by the crew by short rambles and hunts is lost.

A vessel safely anchored in a good harbor is, of course, in the most favored condition of all. She may unbend her sails, lower her yards and topmasts, presenting a minimum of surface to the heavy arctic gales of that season of the year, while she is awaiting her freezing in, and which is especially necessary when the character of the bottom of the harbor is such that there is danger of dragging the anchors. Once frozen in securely, the anchor can be raised, the rudder cut out and unshipped, and all these, with masts, and yards, and spare stores, and provisions, may be placed on the shore conveniently by, and then room be made for the winter's entertainments, exercises, and studies. The very first thing a ship should do, after selecting her winter harbor, is to get ample provisions ashore, to be prepared for the loss of the ship by wreck or fire. This is always done by the whalers. A vessel is then 'housed in,' which is done by building a shed over the deck with lumber brought for that purpose. This house is generally about seven feet high, the lumber covered with canvas, this with a layer of moss or turf six inches to a foot thick, cut in the early fall before it has frozen, and dried as much as possible, and this layer of

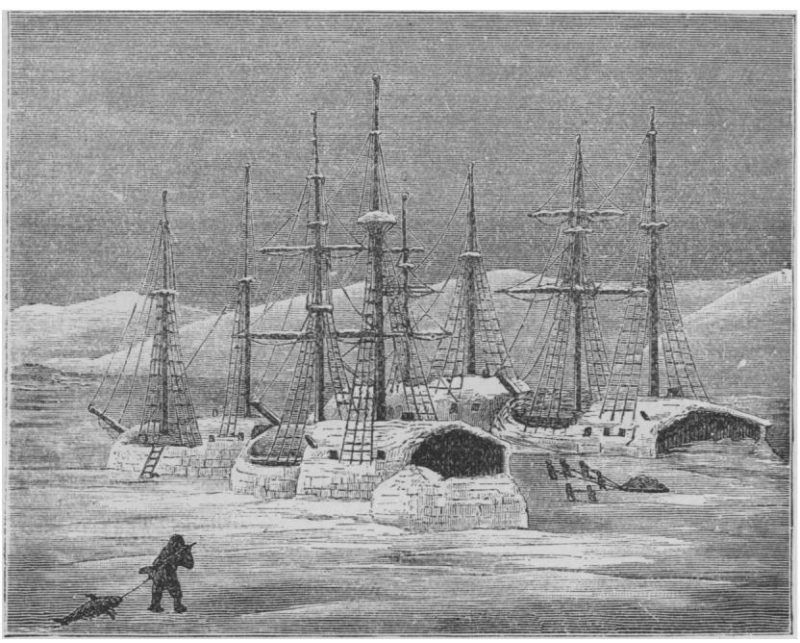

FIG. 2.— WHALERS AT MARBLE ISLAND.

turf again covered with from three to four feet of snow, which should be continuous with the snow-walls or snow-heaps placed along the sides of the ship. I give (fig. 3) my idea of a ship fixed for winter, shown in cross-section.

The 'house' is of inclined boards, covered with canvas, and again covered with dry turf. Inside it is lined with cheap canvas holding six or eight inches of 'mineral wool,' or other light cheap non-conductor; and this passes over just above the heads of the occupants. The snow-huts are shown by their cross-section of block-work, the inner air-space, *a*, being hermetically sealed, as far as it is possible with snow to do so. The second air-space, *c*, should be left open on warm days, that is, above $-10°$ F. to $-20°$. The house should run the whole length of the vessel, but be divided into two rooms for officers and men, and with only one door leading out, and that from the men's room. The stove in the cabin should have its draught flush with the level of the floor, and its stove-pipe within another of three or four inches more radius, and a propeller-blade ventilator run by clock-work in the latter to 'suck' air into the cabin. This will be the main source of ventilation, warming the air as it enters, and also protecting the ship from possible fire from the chimney. The draught will remove all foul air from the cabin-floor, and the companion-way will purify the lighter gases at the ceiling. Such a stovepipe as shown will obviate the great collection of frozen moisture around it, the descending cold air preventing the escaping warmth from melting contiguous snow and ice. The clock-work should be susceptible of regulation according to will, and run for at least twelve hours. At its exit from the outer dome of snow, the larger pipe should stop short of the smaller or inner, and be protected by a roof springing out from it, as shown in fig. 6. Light is secured by large thick blocks of ice placed in the sides of this 'house' at convenient intervals. If an 'igloo' dome be thrown over the vessel according to the proposed plan, the slabs of ice in it should directly face the double glass windows in the house proper.

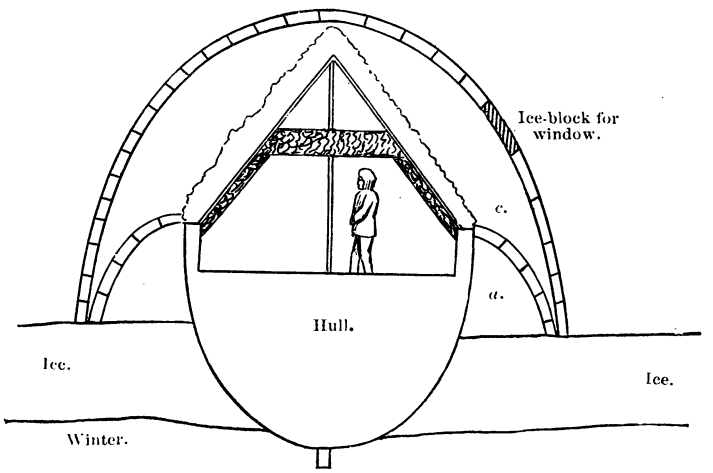

Fig. 3.—Section of wintering ship.

If turf or canvas is not employed in the usual methods, the temperature of the house must be kept below freezing, or the continual melting of the snow, forming pools of ice on the ship's deck, will be disagreeable in the extreme. A housing solely of canvas, as has often been employed, prohibits the use of a thick layer of non-conducting snow or turf, and, except during a wind, it is but little better than no protection at all. The housing should extend the whole length of the ship if possible; but if cut short at the middle portion, a not unusual method to save lumber, the exposed deck should be treated to a covering of snow and turf similar to that placed on the house. Where moss or turf is not to be had, fine sand

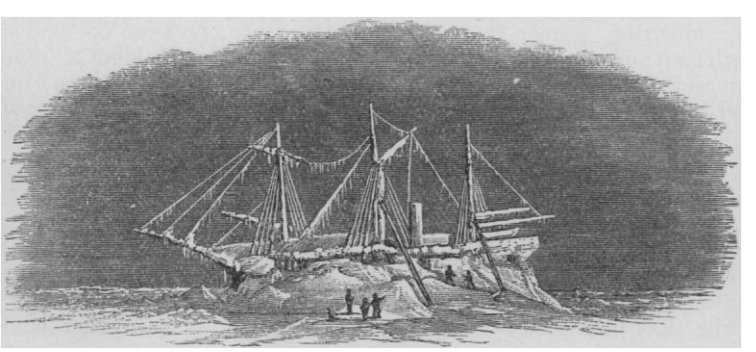

Fig. 4.—Tegetthoff wintering.

is not a bad substitute, but is much heavier, and can only be used on horizontal or slightly inclined surfaces.

The importance of securing a winter harbor near where Eskimo can visit the ships is not

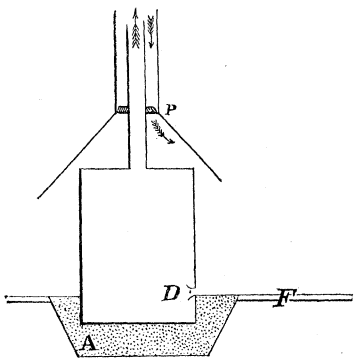

FIG. 5.

to be over-estimated. Besides their aid in snow-construction, the clothing procured from them is far superior to any that can be manufactured in civilization for withstanding the severe temperatures of those regions; their companionship does much to alleviate the lonesomeness of the winter's solitude, for they are generally a most cheerful, merry-hearted, and contented race; their services in procuring game from both land and water, to keep the crew in a healthy state, and especially to combat the scurvy, is apparent; while, in case of disaster, their humble abodes are always open to the shipwrecked sailor until there can be convenient times for

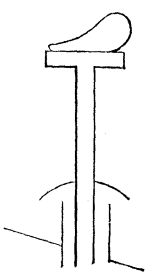

FIG. 6.

retreat to reach more civilized succor, — a retreat in which the white men may be greatly aided by the native method of transportation.

A firehole being dug through the ice near by, which must be opened every morning and evening, and a snow-house (igloo) thrown over it (if natives are at hand to do the work) to protect it from drifting snow, our ship is ready to pass her arctic winter unmolested, until the coming summer opens a renewal of her labors.

Should the circumstances warrant a start early in the season, it will probably be necessary to cut a very long channel through from six to ten feet of ice, of sufficient dimensions to float the ship to the outer open water. The methods of cutting these channels vary. I show the one I have seen adopted, given in plan (fig. 7). The channel *B B B B* is always brought up *alongside* the ship, as shown; since, should she draw more water than the thickness of the ice, and the channel be brought up immediately behind her, the outgoing tide or a strong wind might break her loose, and sweep her out before it was intended she should move. The scarf-lines *c c*, *c c*, *c c*, formed in sawing, are sufficiently intelligible to be understood without an explanation; the ice-blocks, *A*, *A*, *A*, being allowed to float out along with the ebbing tide, a single person directing each one as fast as sawed off with a pike pole, to prevent its horizontal rotation, and consequent binding in the channel. Where the channel is long, and wind favorable, rough impromptu sails have been rigged on each ice-block to carry it out. If cutting very thin ice, as when cutting into harbor in the fall, these slabs can be shoved under the edge of the ice-channel. If the vessel delays her starting until after the solar rays have made considerable impression on the ice of the harbor, it will save much labor to remove the snow along the contemplated scarf-lines of the channel, and place there a covering of black seaweed, sand, dirt, or ashes, which will have cut deeply into the ice by the time the sawing is necessary. These layers, of course, should be very thin: otherwise they will protect the ice, instead of acting as ready conductors of the sun's heat. I noticed in the ice of Victoria Channel, off King William's Land, as late as the middle of July,

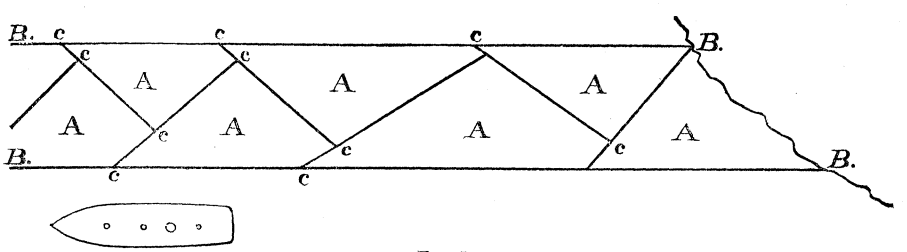

FIG. 7.

that a dark-colored kelp-stalk over twenty feet long had cut five feet into the solid ice a crevice not over an inch or two wider than the stalk, so that it was impossible to get it out.

The difficulty of sawing increases in a rapid ratio with the thickness of the floe; and, when its depth becomes so great as to allow a play of but a foot or two with the ice-saws, it becomes essentially impossible. Ice-saws, if very thick, impose severe labor on those operating them, by their great weight: if thin, they will warp and cramp in the thick ice, also creating severe labor. As all these contingencies cannot be foreseen, it is desirable to have a considerable assortment of these utensils, varying in length and weight. I think a description, however short, of ice-saws, is hardly needed, but will briefly speak of the ways I have seen them used. A 'one-man saw,' like the same named article in timber-sawing, can be used in ice up to four feet. Another foot, or even to work effectually in from three to four, requires two men, as shown in fig. 8; and it is evident, that, as the labor increases, the force at the bar can be increased, if the saw is only strong enough. As the floe gets thicker, the saw must be larger and have greater play, to work effectively; and this soon gets beyond the power of men and the reach in their arms, and a tackling is rigged, as shown in fig. 9, which can, I think, be understood without explanation. If the weight of the saw is not sufficient to pull it down, with the pushing assistance of the two men, its submerged end must be loaded with an anchor or anvil.

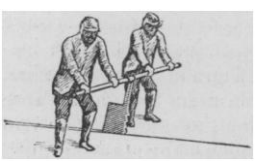

Fig. 8.

A small funnel-shaped harbor, with but few projections along its converging sides, may sometimes be relieved of all its ice at one time by a small amount of sawing along these serrated edges, and a happy combination of tide, wind, and good management. This is especially the case where the rise and fall of the tide exceeds the thickness of the ice, the consequent vertical oscillation of the ice keeping it broken up in hummocky masses along the shore-line.

The use of blasting-apparatus has, so far, been of but little use; still I think a series of small charges, fired electrically, giving rather a pushing than a splintering concussive effect, might be used advantageously in removing quite large masses of obstructing ice favorably situated. Blasting, I believe, would also be more efficacious in harbors not fed by fresh-water streams, as here the ice is more brittle, less tenacious and elastic, and consequently harder to remove by the percussive power of explosives.

A sailing-vessel can wait almost until she is liberated by the forces of nature, as this will

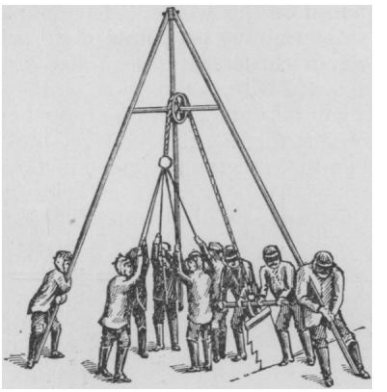

Fig. 9.

probably be the earliest date that she can use her peculiar motive power effectively.

Even a good harbor may have its disadvantages for a ship, if she has entered it during an exceptionally open season; and, unless this recurs within the time for which she is provisioned, she must be abandoned to save the lives of the crew. McClure's Investigator in the Bay of Mercy, in 1854, is an example of such necessary abandonment.

The use of balloons to make slight ascents, — they being made fast to the ship, — to enable the ice-master to obtain a more comprehensive view of the state of the ice, has never yet been experimented with, though by many recommended, and consequently can be neither rejected nor accepted as an auxiliary in this sort of cruising. Certain it is, however, that nothing is more deceitful at times than ice-packs or ice-drifts at a distance; the most invulnerable-looking, upon a closer examination, proving to be the most disjointed, and the reverse. No arctic ship, of course, will be without her 'crow's-nest' of the whalers, — an elevated 'lookout' on the foremast, with good protection from inclement weather, for her ice-master.

The advantage in having two ships over one is apparent. It proved the salvation of Parry on his third journey, and other instances are not wanting. The benefit of two crews to cut in or out of harbor, and in other work where it is the same for one as a dozen vessels, is not to be overlooked.

In general, near the magnetic pole, the ship's compass is more or less worthless, its sluggish oscillations being easily overcome by the most insignificant local attraction, which it is almost impossible to avoid on shipboard. The farther removed from this great centre of magnetic force, necessarily the more reliance can be placed on the needle. The simple plan of rudely determining the points of the compass by a watch or chronometer regulated to mean time, conjoined with the motion of the sun in azimuth, will be sufficient in a land where the sun is shining throughout the day, and especially when the navigation depends rather on the bearings of the 'leads' and ice-barriers than any determinate direction. The fact that a vessel should follow a continuity of land, if possible, lessens the importance of the compass while capes and headlands can be kept in view.

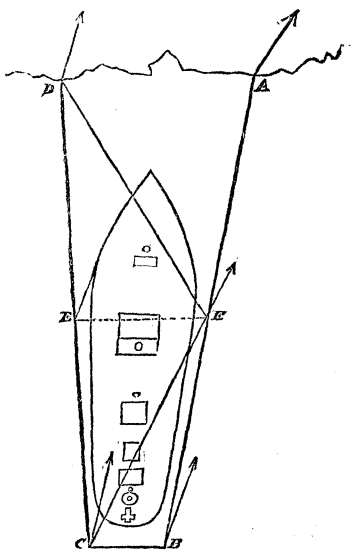

FIG. 10.

The 'ice-blink' is a well-known yellow glare that seems to hang over pack-ice. Any channels of natural sky seen through the glare indicate open water under them; and this is of use in approaching ice. In fact, the 'ice-blink' is more marked when at a distance from a pack in open water than when in one pack viewing another at the same distance.

Having explained ice-sawing, and hinted at a 'dock,' I will briefly describe an artificial one, and take as a typical example the case of the Alert, docked in the ice, Aug. 12, 1875, in Smith Sound. A plan of the dock is given in fig. 10. It was cut in about four hours, and could have been done, says the commander, in half the time, with a better organization and more experienced ice-cutting crew. It is a necessary operation to prevent being crushed between two bodies of ice, when the time will allow it, and also when a natural dock, formed of irregular blocks or floes, is liable to be obliterated by the increasing pressure eroding the fragile edges of the blocks. In this latter case a dock cut into the solid side of the largest block or floe would probably be a safe haven. The use of steam has rendered docks much less necessary than formerly, as the time occupied in cutting one will allow almost any steamer to escape any average danger.

Although, from this rather long list of probable arctic accidents to which a ship is exposed, escape would seem rare, yet, after all, it is wonderful to notice the small number of craft actually lost in this dangerous species of navigation, in proportion to the whole number engaged. Only those that are lost under tragic circumstances being brought before the public, they are generally supposed to be the greater majority of those thus employed.

FRED'K SCHWATKA,
Lieut. U. S. army.

BESTOWAL OF THE GRAND HONORARY WALKER PRIZE ON PROFESSOR JAMES HALL.

SOME years ago Dr. William J. Walker gave to the Boston society of natural history a prize-fund, from which, in accordance with the terms of the gift, annual awards are made to successful competitors who have written essays on assigned questions. But, besides these annual awards, a grand honorary prize was provided for, to be given every five years, and which the society was to grant, on recommendation of a special committee, "for such investigation or discovery as may seem to deserve it, provided such investigation or discovery shall have been made known or published in the United States at least one year previous to the time of award."

The society, in previous years, has awarded this honorary prize, amounting to five hundred or a thousand dollars, at the option of the society, to Mr. Alexander Agassiz and to Professor Joseph Leidy. This year the committee, after due consideration of the subject, has unanimously concluded to recommend for this prize, Professor James Hall of Albany; and the award of the highest sum was accordingly made by the society, at its meeting of May 7.

As the founder would appear to have contemplated some particular or integral 'investigation or discovery,' "we need not," says the committee, "take into account Professor Hall's numerous works or publications upon North-American geology and paleontology for the last forty years and more (comprised in about twenty-six volumes or parts of volumes, and in over two hundred articles or papers, reports, etc.), except as they relate to a special line of investigation, which Professor Hall early made his own, in which he has long been eminent, and which he may be said to have essentially completed, although a considerable portion of the results, which have been from