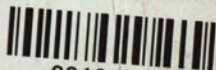


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AND

Trials of Sailing;

ILLUSTRATED BY

DIAGRAMS OF THE SEVERAL EVOLUTIONS.



TO WHICH ARE ADDED,

THE ESTABLISHED PLAN OF LIGHTS FOR STEAM-VESSELS,

AND

Regulations to avoid Colliston.

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BY GEORGE BIDDLECOMBE, MASTER, R.N.,

OF HER MAJESTY'S YACHT "VICTORIA AND ALBERT."

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P R E F A C E .

A PROFESSIONAL career of twenty-seven years' active service, three of which employed as Master of the *St. Vincent*, flag-ship, in the Squadrons of Evolution, has impressed upon me the great necessity of a work such as I now submit to the Naval Service and the public.

It may be a matter of surprise that a work of this kind, up to the present period, should not have been undertaken by a more competent authority. I may be permitted to state, that it has been compiled in no hasty manner, and that every portion has received the most careful consideration.

Fully aware of its importance, and feeling the great responsibility of such an undertaking, I have not entirely relied on my own humble abilities, nor yet satisfied with my own experience; but have, with much care and minuteness, examined the best authors on the subject. Material assistance has been afforded in the arrangement of it by a work published by DAVID STEEL, which the present proprietor was pleased to place at my disposal.

Such a work as this cannot be expected to be perfect; but I offer it to the Service, in the hope that much useful information may be gained by the perusal, which is not readily obtained from other sources.

The TRIALS OF SAILING are those used by me in the Squadrons of Evolution, and will, I trust, be considered simple and concise.

The PLAN OF LIGHTS FOR STEAM-VESSELS is that established by the Lords Commissioners of the Admiralty, for the use of Her Majesty's steam-vessels; and introduced in this work, being generally adopted in steam-vessels of all nations.

The REGULATIONS TO AVOID COLLISION are those established by the Corporation of Trinity House, London.

To arrange the diagrams some difficulty was at first experienced in connecting each with the explanation, so as to render the subject sufficiently explicit. MR. J. S. HOBBS, (in the establishment of Messrs. NORIE & WILSON,) after examining the manuscript, undertook the general superintendence of the Work; and, in justice to him, I readily acknowledge that he has far exceeded my most sanguine anticipations. My best thanks are likewise due to him for the many important suggestions for the improvement of the whole, all of which met with my entire approval.

“VICTORIA AND ALBERT,”

Portsmouth, May, 1850

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The Work is divided into Seven Parts.

PART I.

Explanation of Positions, with the Orders of Sailing, and the Order of Battle and Order of Retreat.

PART II.

To form and manœuvre in the Fifth Order of Sailing, without changing from or into another Order; and the method of preserving the proper Bearings, by the Naval Square.

PART III.

To form and manœuvre in the Line of Battle; changing the Squadrons; and the Order of Retreat.

PART IV.

To manœuvre the Line of Battle, changing from one Order into another, and interchanging the different Columns.

PART V.

To change and re-form upon shifts of wind.

PART VI.

Explanatory Remarks on different subjects connected with a Fleet or Squadron.

PART VII.

Trials of Sailing; Table of the heights of Masts in different classes of vessels; also a Table for ascertaining the Distance by Angles.



PLAN OF LIGHTS FOR STEAM-VESSELS,
AND
REGULATIONS TO AVOID COLLISION.

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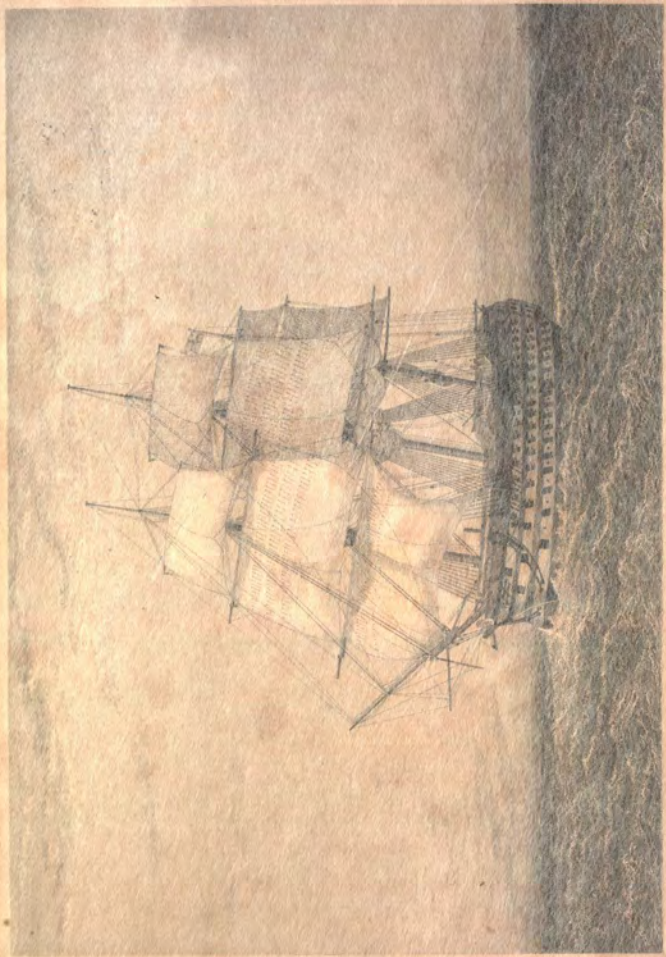
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H. M. S. ST VINCENT,
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NAVAL TACTICS.

PART I.

FLEETS.

EXPLANATION OF POSITIONS,

WITH THE

Orders of Sailing;

AND THE

ORDER OF BATTLE AND ORDER OF RETREAT.



NOTE.—The lines in the diagrams refer only to the change of position, and do not indicate the exact course to be steered in performing the evolution.



FLEETS.

THE evolutions of a fleet are the movements made for preserving order, either in sailing, or placing it in the best position to attack an enemy or to defend itself; and are denominated NAVAL TACTICS.

A fleet is divided into two or three squadrons. If two, they are designated the *van* and *rear*, when the commander-in-chief may lead the *van*, and the second in command, the *rear*; but when divided into three, they are designated the *van*, *centre*, and *rear*: the *centre* being commanded by the commander-in-chief (who directs the whole); the *van* by the second in command; and the *rear* by the third.

In the disposition of fleets it is intended to preserve your own safety, as well as to injure and destroy the enemy. The greatest order is therefore necessary in every movement; for without order, nothing can be accomplished. Hence arises the necessity of devising such dispositions and evolutions as shall strengthen the whole, and be at the same time applicable to the various objects either of engaging the enemy or protecting commerce.

There are five orders of sailing, one order of battle, and one order of retreat; and as this system is most usually practised, we shall confine ourselves to the elucidation of it.

Before entering upon a discussion of the different orders, it is necessary to understand what is meant by the terms—

ABREAST.

TO BEAR OR KEEP AWAY.

TO HAUL TO THE WIND.

TO LIE TO OR TO BRING TO.

TO TACK.

TO WEAR OR VEER.

IN THE WAKE.

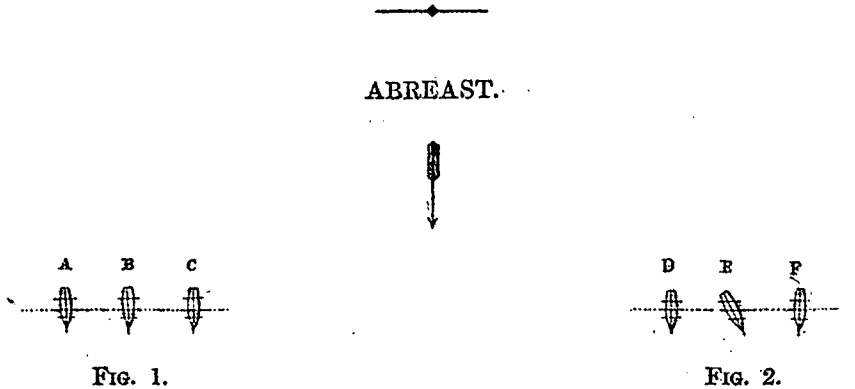
STARBOARD AND PORT LINES OF BEARING.

MANGUVRING IN SUCCESSION.

THE LINE ABREAST.

THE BOW AND QUARTER LINE.

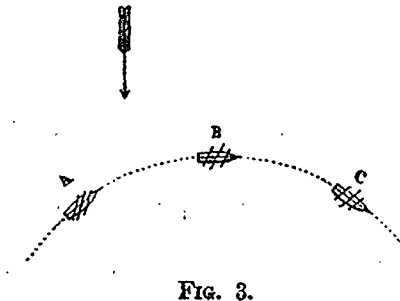
EXPLANATION OF POSITIONS.



When two or more ships be with their sides parallel, and their heads equally advanced, they are abreast of each other, as are the ships A B C; but if their sides be not parallel, then that ship which is in a line with the beam of the other, is abreast of her, as the ship E is abreast of D and F, but neither D nor F are abreast of E.

—————

TO BEAR OR KEEP AWAY.



To change a ship's course, so as to make her sail more before the wind. Thus,—the ship A bears away from a close-hauled course when she gets on either of the courses B and C. And so, equally, does the ship B bear away from a course two points free, when she steers on the course C four points free.

TO HAUL TO THE WIND.

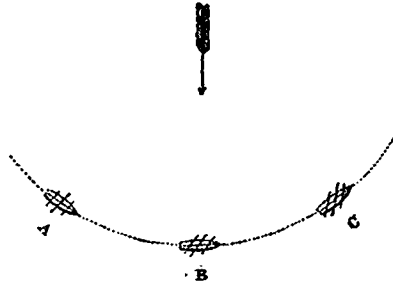


FIG. 4.

To direct the ship's course nearer the point from which the wind blows. Thus,—the ship A hauls her wind, when, by the trim of her sails and the action of her rudder, she gets on either of the courses B and C; and in like manner does the ship B haul her wind when she changes to the course C.

TO LIE TO OR BRING TO.

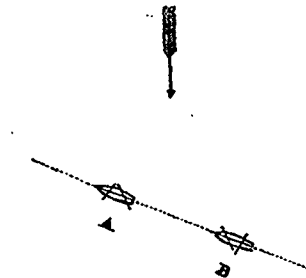


FIG. 5.

To retard a ship in her course, by arranging the sails in such a manner as to counteract each other with nearly an equal effort, rendering the ship almost immoveable with respect to her progressive motion or head-way. Thus,—the position of the yards in the Figures A and B, causes the sails to counteract each other: the wind blowing upon the after-surface of the one, and the fore-surface of the other.

TO TACK.



FIG. 6.

To turn a ship about from one tack to the other, by bringing her head to the wind. Thus,—the ship A passes from the port to the starboard tack *a*.

TO WEAR OR VEER.

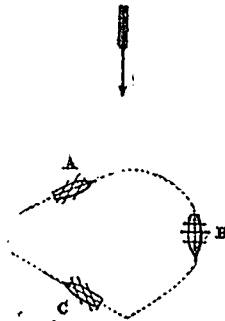


FIG. 7.

To change a ship's course from one tack to the other, by turning her stern to the wind. Thus,—the ship A wears in passing from the close-hauled port tack A to the close-hauled starboard tack C, by turning her stern to the wind, as in B.

IN THE WAKE.

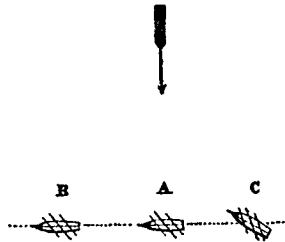


FIG. 8.

A ship is in the wake of another when she follows her in the same track, or on a line supposed to be formed on a continuation of her keel. Thus,—the ship A is sailing in the wake of B, and the ship C is crossing in the wake of A and B.

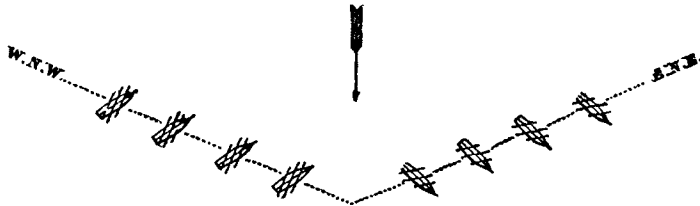
 THE STARBOARD AND PORT LINES OF BEARING.


FIG. 9.

These are the two close-hauled lines, the wind being in any given point. If upon either of these lines a fleet be ranged, whatever course they steer they will, by hauling the wind, or by tacking together, be found in order of battle—that is, close hauled on either the starboard or the port tack. Thus, for instance, the ships on the E.N.E. line, Fig. 9, are on the port line of bearing, as well as port tack; for it will be readily seen, that if they haul their wind together, they will be in order of battle on the port tack. But the ships on the W.N.W. line are on the starboard line of bearing, though running with their port tacks aboard; and when they tack together, they will be in order of battle on the starboard tack. Hence we see, that ships may be on one tack, but different line of bearing; and accordingly as they are ranged for thus readily forming the order of battle, they are said to be either in line of bearing for the starboard or port tack.

MANŒUVRING IN SUCCESSION

Is performed by a fleet, when ranged in one of the orders of sailing, and standing on the same line. The same manœuvre is successfully performed by every ship as she arrives at the wake of the van ship of the whole fleet, (if in one line,) or if the van ship of her particular squadron (if divided into squadrons). So that a fleet tacks or wears, bears away or comes to the wind, in succession, when all the ships of every line execute, one after the other, the same manœuvre on the same point, in the wake of the leading ship.

In all successive movements, great attention should be paid to the ship ahead.



THE LINE ABREAST

Is formed when the ship's sides are parallel to each other on a line which crosses their keels at right angles, as represented hereafter. (Fig. 11.)

This line is most commonly used with the wind right aft, so that the line forms a perpendicular with the direction of the wind.



THE BOW AND QUARTER LINE

Is formed by ships being ranged on the bow and quarter of each other. This will always be the case when the whole fleet, being in order of battle, have either tacked or bore away together.

In Fig. 9, the ships on the W.N.W. line are in bow and quarter line; for it is evident that, upon re-tacking together, they would form in order of battle; and those which are keeping away on the E.N.E. line, are likewise in bow and quarter line, and would equally form in order of battle, upon hauling their wind.

THE ORDERS OF SAILING.



There are five orders of sailing. To judge which is the best, we should consider in which the course of the fleet is the least impeded, and from which the order of battle can be most easily and quickly formed. Upon this principle, experience determines in favour of the fifth order, which is accordingly in general practice. Of the others, however, we shall give explanations, so that correct ideas may be entertained of their relative advantages and defects; and we shall likewise explain such of their manœuvres as are ever practised.



THE FIRST ORDER OF SAILING.

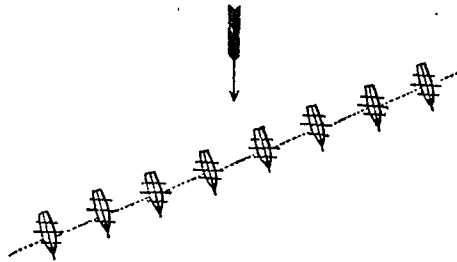


FIG. 10.

The fleet is ranged on one of the lines of bearing, steering at the same time their proper course. (Fig. 10.)

This order extends the fleet too much, if many in number, rendering a communication between the van and rear, difficult to be preserved. When ships do not steer in the wake of each other, they cannot so easily preserve the line; and the motions of a fleet thus extended are rather slow. This form can only be of service when in sight of an enemy, for the execution of some particular evolutions, and for the more readily forming in order of battle.

THE SECOND ORDER OF SAILING.

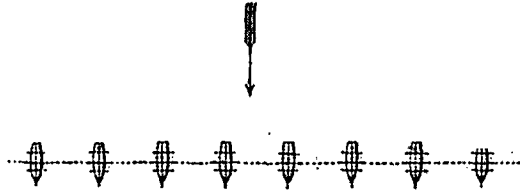


FIG. 11.

The fleet is ranged on a line perpendicular to the direction of the wind, steering at the same time their proper course. (Fig. 11.)

This is by no means preferable to the first, with this additional defect,—that if the ships are very close in tacking, there is great danger of falling aboard the next astern.



THE THIRD ORDER OF SAILING.

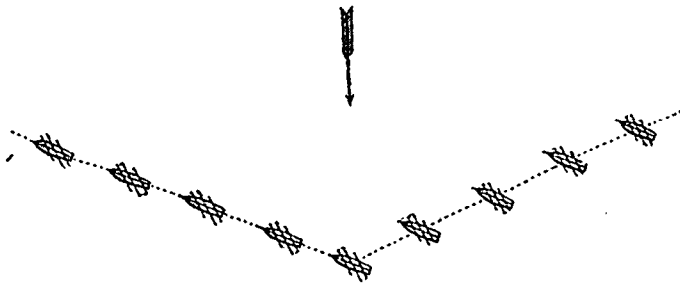


FIG. 12.

The whole fleet is ranged on the sides of an obtuse angle of 135 degrees, formed by two lines, upon a wind; the senior officer making the angular point to leeward: and thus the fleet may continue on any course. (Fig. 12.)

This order, which is not without defects, is preferable to the other two: it collects the ships closer together, but still gives too great an extent for the sailing form of a fleet.

THE FOURTH ORDER OF SAILING.

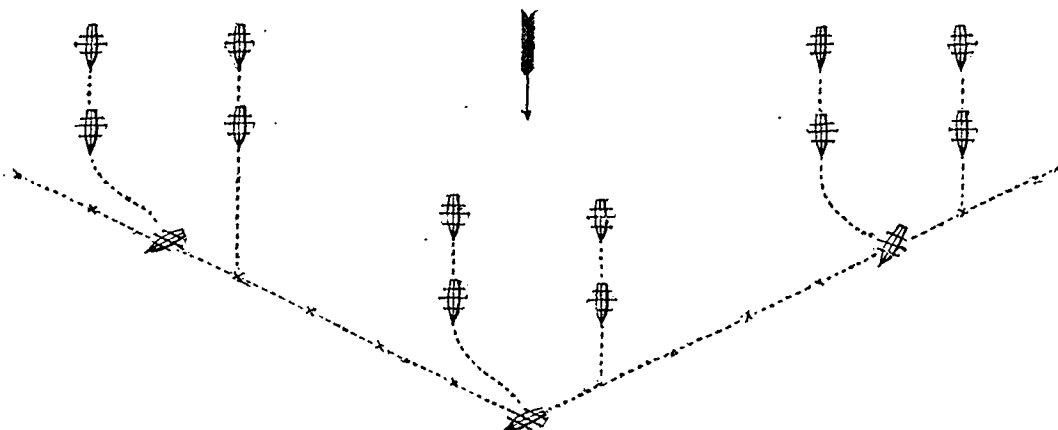


FIG. 13.

The fleet is divided into six columns:—two for the van, two for the centre, and two for the rear. (Fig. 13.)

Each commanding officer is in the middle, ahead, and to leeward of his two columns.

The commanders ranged upon the two close-hauled lines, have their squadrons astern of them, upon two lines parallel to the direction of the wind; the first ships of each column being, with respect to the commander of their squadron, the one on his starboard, the other on his port quarter. The distance of the columns should be such as to permit the fleet to reduce itself easily to the third order of sailing, to pass from that to order of battle.

The deficiency of this order is easily seen. If the fleet was in sight of an enemy it would require too much time to reduce it to the order of battle,—a movement which ought to be executed with promptitude and facility.

It is, besides, liable to be broken in sailing; because it is difficult, in sailing, for the ships to preserve their proper bearings and distance from each other.

THE FIFTH ORDER OF SAILING.

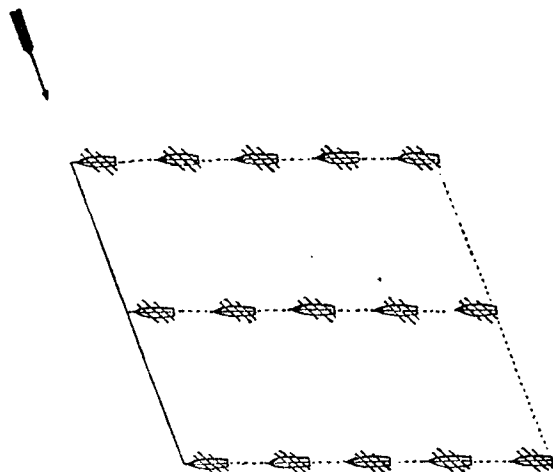


FIG. 14.

The fifth order of sailing in three columns is particularly practised, because it unites in itself all the advantages of the others, without their defects. The fleet thus collected together, as Fig. 14, can better observe signals, and is more readily formed into order of battle.

The leading and other ships bear from each other respectively in the line of the wind. The admiral (or senior officer) may not be regarded as a leading ship of either column, although he may be at the head of one of them.

Distance of the columns from each other is directed to be one mile or more; and the reason is, that when tacking in succession, as in Fig. 20, the leading ships of the centre and lee columns may pass astern of the last ship in the column next to windward, continuing on the former tack. But the senior officer, according to circumstances, will order this distance to be shortened or lengthened, according to the length of the columns.

Distance between the Ships.—There are two sorts, called the close order and the open order. By close order, is meant from one to two cables' length, or a quarter of a mile, according to the state of the weather. By open order, an interval from three to four cables' length, or half a mile, is intended. As these distances are from time to time varied, the variations take place by signal from the senior officer, and thus the order is closed or opened. The distance, however, should at all times be such as to allow sufficient space for the second ahead to come to the wind, when tacking in succession, before the second astern puts in stays; by which they will be enabled to fall into the wake of their leaders when put about.

To prevent accidents that might arise by crossing each other in the night, those lines which happen to be to windward or to leeward when the fleet hauls to the wind, or upon a change of wind, keep those stations, until otherwise ordered by signal.

THE ORDER OF SAILING BY DIVISIONS OF SQUADRONS.

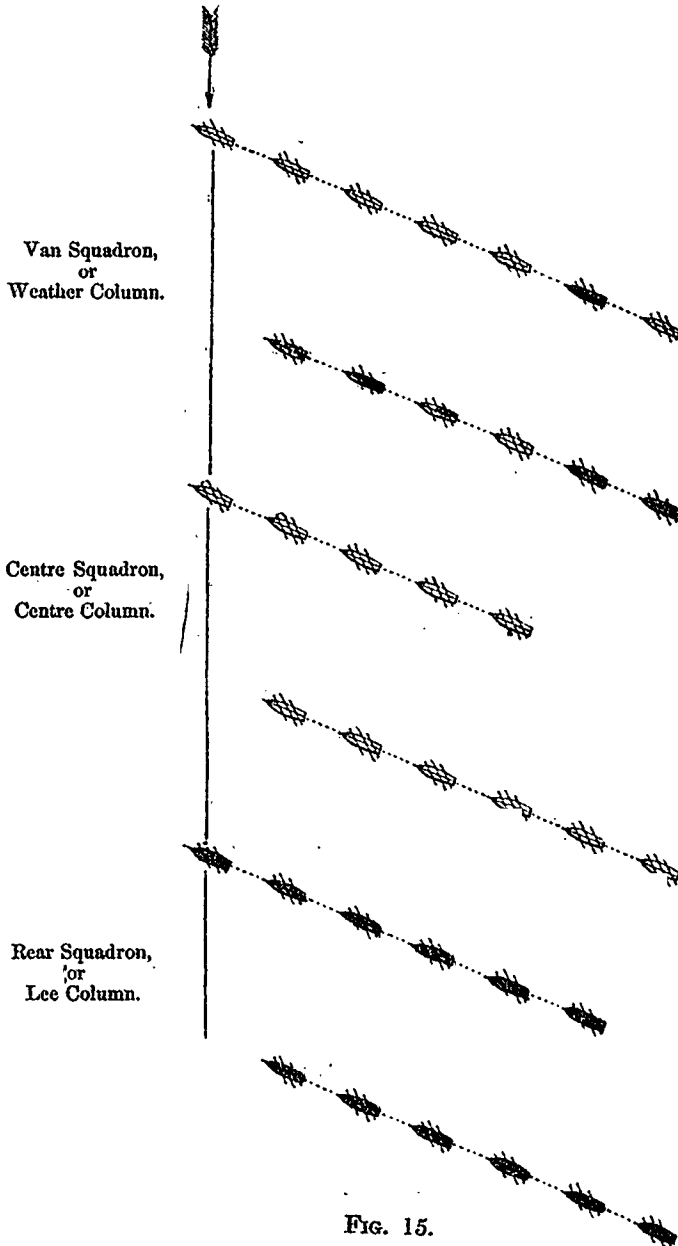


FIG. 15.

This order is formed by each of the three squadrons being divided into two columns, by which the fleet will consist of six columns.

When sailing by the wind, the leading ships of each squadron keep in a line with the direction of the wind; the leaders of the weather column of each squadron

being advanced ahead of such columns. When sailing large, the leading ships keep abreast of each other, as Fig. 17. The distance between the columns of each squadron is about half a mile; and the distance between the squadrons, about one mile. The distance from ship to ship, nearly two or three cables in fair weather, according to the senior officer's directions.



TO CHANGE FROM ORDER OF SAILING BY DIVISIONS TO THE ORDER OF SAILING IN THREE COLUMNS OR SQUADRONS.

The starboard or weather division of each squadron falls in ahead of its respective lee or port division. Or it may be thus performed.—The lee or port division of each squadron tacks together, and re-tacks astern of its respective weather or starboard division. In either way, the ships of each division must so proportion their sail as to facilitate the evolution; and when the three squadrons are thus formed, they regulate their distances.



THE ORDER OF SAILING IN TWO COLUMNS, OR GRAND DIVISIONS.

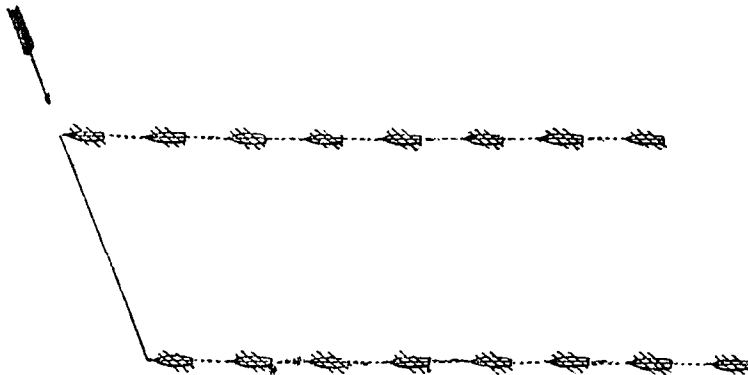


FIG. 16.

In this order, the whole fleet is divided into two columns: the weather or starboard containing the whole of the van, and a part of the centre squadrons; the lee or port column containing the remainder of the centre and the whole of the rear squadrons.

The distances between these columns and from ship to ship are the same as those prescribed for the "Order of Sailing in Three Columns." The bearings of the columns, either in a line with the direction of the wind, or abreast of each other, depends, as in the order of sailing, whether the fleet is sailing large, or on a wind.

THE ORDER OF SAILING BY DIVISIONS OF SQUADRONS GOING LARGE.

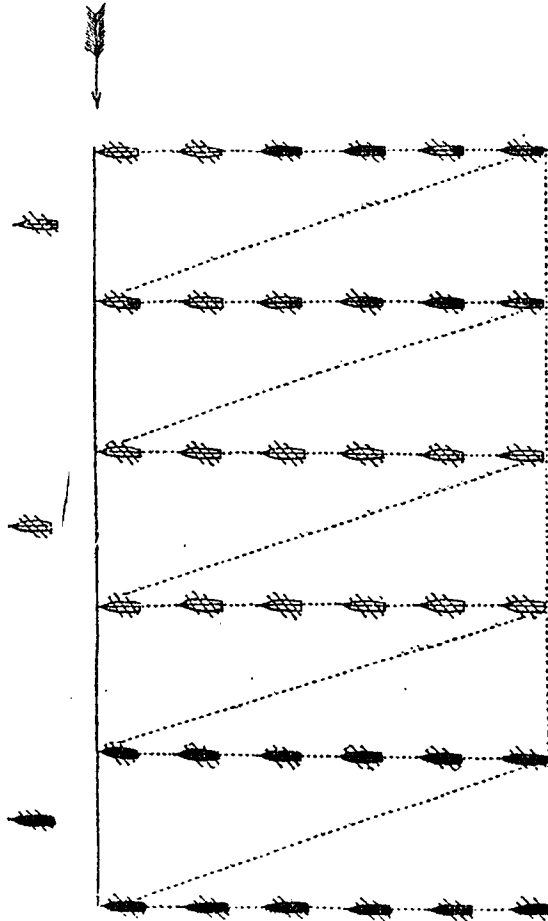


FIG. 17.

In this order the divisions are sailing large, observing the same arrangement. They may be formed into two or three columns, if the fleet be very large (Fig. 17). Each chief of a squadron will, if directed, place himself in the middle, at a little distance ahead of his division.

The ships in this order will steer their proper course, and form abreast of each other, perpendicular to the course, whatever way the wind be.

STATIONS OF FRIGATES, FIRE-SHIPS, STEAMERS, &c.
IN THE ORDER OF SAILING.

The frigates, fire-ships, and other small vessels attached to the fleet, keep to windward of the line-of-battle ships when sailing by the wind; when sailing large, they are stationed as most convenient; steamers to leeward, or as pointed out.

THE ORDER OF BATTLE.

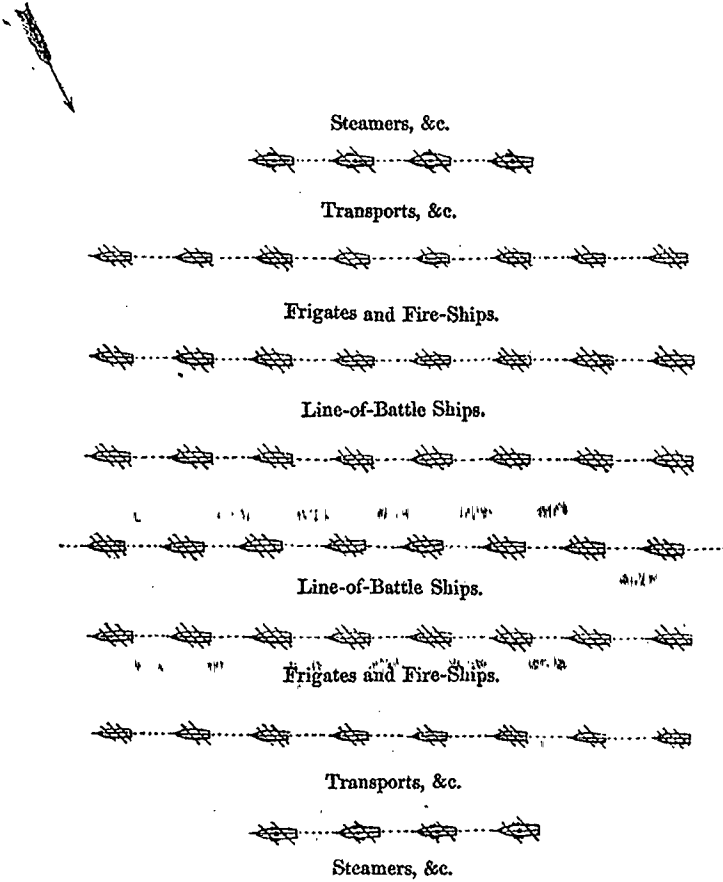


FIG. 18.

It has been found that there is no mode of preserving order in battles at sea, but by keeping on a line, not quite close hauled, ahead of each other, and under very moderate sail; the distance being according to circumstances.

The fire-ships should be distributed, some abreast of the van, centre, and rear, at a convenient distance to windward, if the enemy be to leeward; or to leeward if the enemy be to windward, and in a line with some frigates ahead and astern of them.

Beyond these, a third parallel line is formed of the hospital ships, transports, &c., with frigates ahead and astern. Steamers would be kept to windward of all if belonging to the weather fleet; but if to the lee fleet, they would be to leeward of all, or as otherwise appointed.

Fig. 18 represents two hostile fleets in order of battle, with their respective convoys.

The line upon a wind is chosen for the order of battle; because, if the fleet to windward was ranged on any other line, the enemy might gain the wind of it; and if he should not even seek to obtain that advantage, he could, nevertheless, choose the time and distance for engaging. The fleet to leeward, being ranged parallel to the enemy, can more readily avail itself of any shift of wind and oversight of an enemy, to gain the wind; which, if it should not accomplish, it must still keep on that line by the leading ship, keeping abreast of the leading ship of the enemy, the line preserving their respective distances, to avoid being cut off. This disposition is sometimes altered to suit the purposes of particular evolutions.

THE ORDER OF RETREAT.

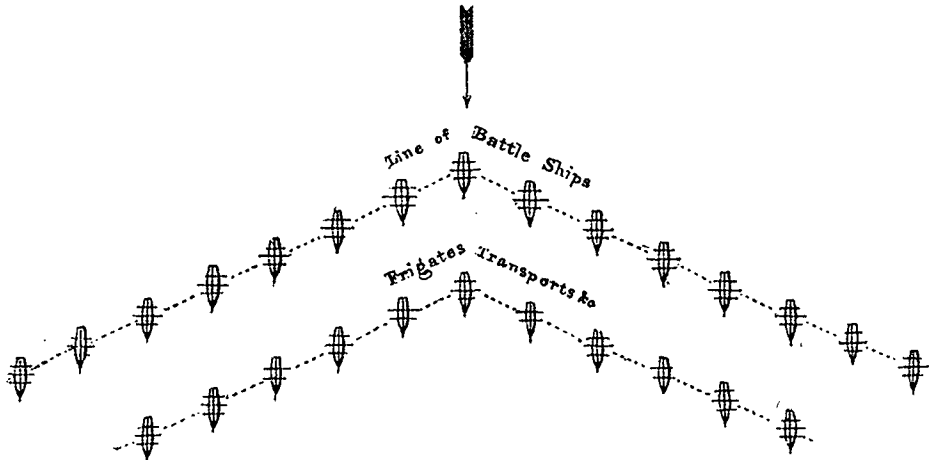


FIG. 19.

This form (the inverse of the third order of sailing) is practised only in the presence of an enemy by an inferior fleet to leeward; when, either beaten or obliged to avoid an action, it makes choice of its disposition, rather than either of the orders of sailing;—because, from this order it can more easily recover the line of battle; the frigates, fire-ships, transports, steamers, &c. are more protected; and the whole is more completely under the command of the admiral, or senior officer. (Fig. 19.)

The fleet is ranged on the two sides of the obtuse angle of 135 degrees, forming the lines upon a wind. The admiral forms the angular point to windward and in the middle of his fleet; the fire-ships, transports, frigates, &c. are placed between the two wings to leeward. The course of a retreat is generally before the wind; but the fleet may go more or less large, according to the exigency of the moment. Steamers may be used as a rear-guard in a retreat, and annoy the advancing party considerably.

End of the First Part.

NAVAL TACTICS.

PART II.

TO FORM AND MANŒUVRE IN THE FIFTH ORDER OF SAILING,
WITHOUT CHANGING FROM OR INTO ANOTHER ORDER;

AND THE

Method of preserving the proper Bearings, by the Naval Square.

NOTE.—The lines in the diagrams refer only to the change of position, and do not indicate the exact course to be steered in performing the evolution.

TO FORM AND MANŒUVRE

IN

THE FIFTH ORDER OF SAILING,

WITHOUT CHANGING FROM OR INTO ANOTHER ORDER.

TO FORM THE FIFTH ORDER OF SAILING.

If the fleet is in no prescribed order, and it is intended to form the order of sailing in three columns on a wind, the three leading ships are to run a little to leeward (if necessary), and then take their positions under easy sail, keeping the leading ship of the column to windward in the wind's eye, at the prescribed distance; then the ships of each column making sail, will arrange themselves in their respective stations astern of their immediate leaders, keeping the same course as the leading ship.

TO TACK THE COLUMNS IN SUCCESSION.

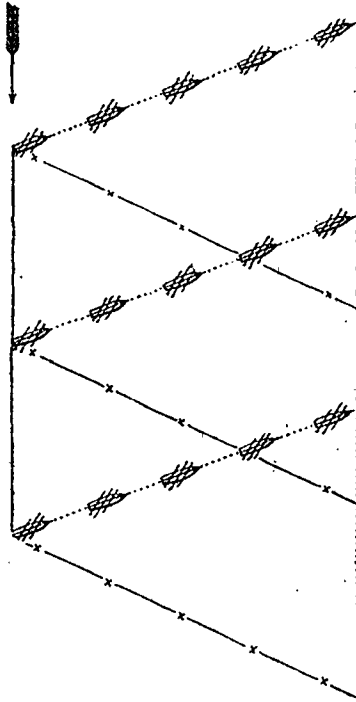


FIG. 20.

In the day, or *clear weather* at night, the columns being on the starboard tack, when the signal is made to tack in succession, the three leading ships put their helms down together, the succeeding ships doing the same as they arrive where the leading ships put their helms down; and so on, in succession. When all round, they will be, as shown in Fig. 20, on the port tack.

On no account must one column pass through the other (without previous arrangement), but always astern of the last ship of the column to windward.

Should the columns have closed too much during the evolution, or be too far asunder (either of which may happen from the inequality of ships' sailing), the order may be recovered, by either the weather or lee columns keeping away until they are the prescribed distance.

TO TACK THE COLUMNS IN SUCCESSION AT NIGHT.

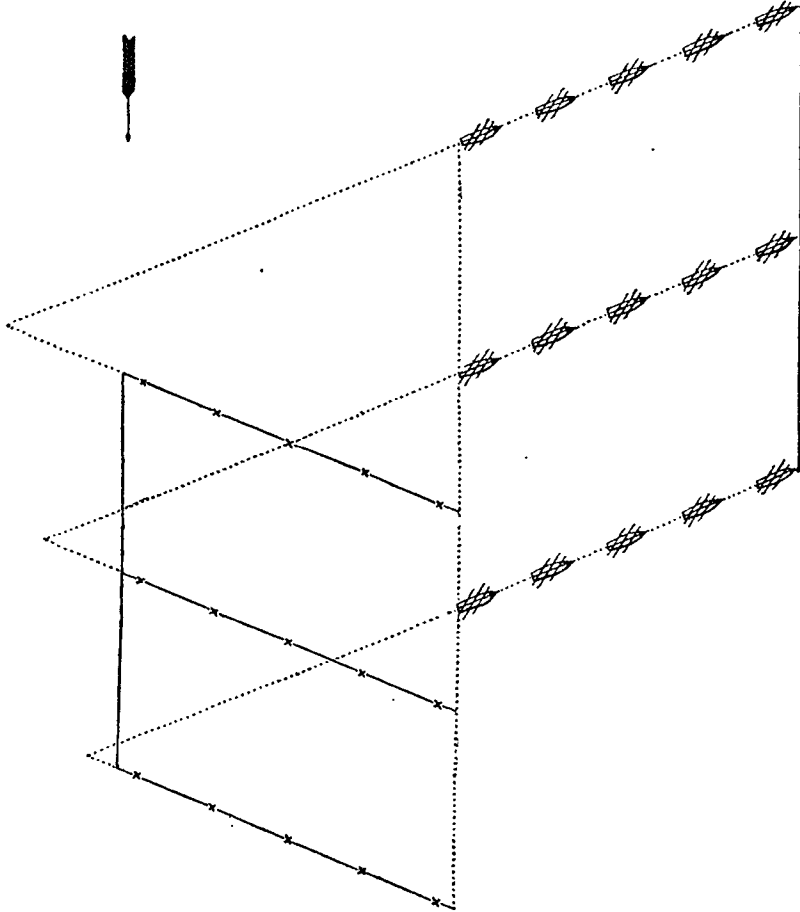


FIG. 21.

As risk attends tacking the columns in succession *at night* as at day, it may be performed by the leading ship of the lee column tacking first; when she is round, the leading ship of the centre column; and when she is round, the leading ship of the weather column: their columns following in succession. When all round, the weather columns are to make sail, to preserve the proper bearing of the lee column (as Fig. 21) from starboard to port tack. This manœuvre increases the distance of the columns a little, which may not be considered objectionable at night.

TO TACK THE COLUMNS TOGETHER.

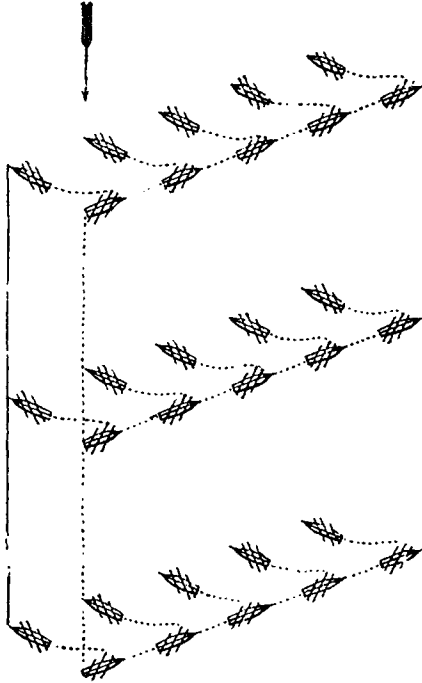


FIG. 22.

It is advisable at night to tack the columns together, which should not be performed at the same instant; nor is it necessary that one ship should finish going about before the next puts in stays. But the sternmost ships of the three columns put in stays together; and when they are observed to do so, their seconds ahead immediately put their helms down, and so on through the whole fleet. Each column will then be in a bow and quarter line, as from port tack to bow and quarter line, Fig. 22.

TO WEAR THE COLUMNS IN SUCCESSION.

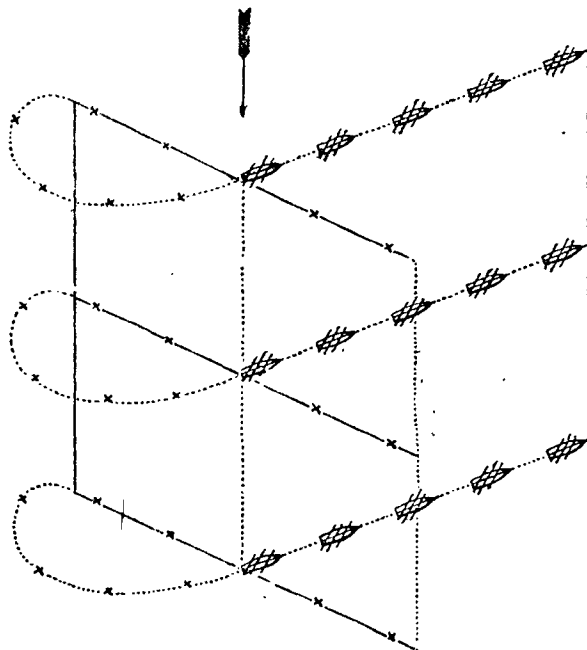


FIG. 23.

The three leading ships of columns put their helms up together, and keep away until they bring the wind on the opposite quarter; if they are then far enough from their second, they can haul up a little on the opposite tack, until they head for the position where the centre ship of the original column was: steer in that direction; and if the columns were in station previous to the evolution, they will pass astern of their line; but should they not have been in position, they must keep away sufficiently to pass the sternmost ship, except when orders have been previously given to pass through the line.

The remaining ships will perform the same evolution when they come to the position where their original leader was (Fig. 23), from starboard to port tack.

TO WEAR THE COLUMNS TOGETHER.

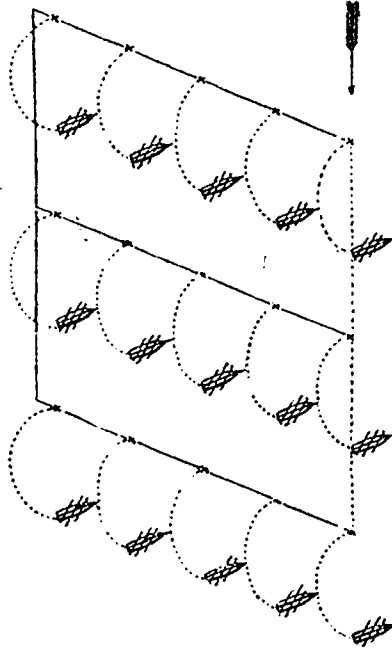


FIG. 24.

The ships being prepared, suppose on the starboard tack, the sternmost ships of the columns put their helms up; and when fairly off the wind, the next ahead performs the same evolution; and so on throughout the columns, wearing short round, when they will all be on the starboard line of bearing, as shown in Fig. 24.

TO INTERCHANGE THE CENTRE AND WEATHER COLUMNS.

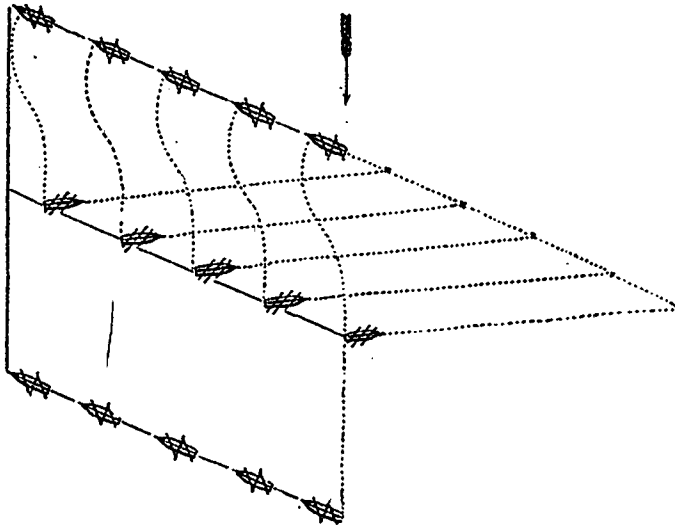


FIG. 25.

The weather and lee columns lie to, or at most, keep steerage-way. (Fig. 25.) The centre column tacks together, and, forming a bow and quarter line, goes close-hauled, to gain the wake of the weather column; it then re-tacks together, and stands on; while the weather column bears away to its new station in the centre, and the lee column fills.

TO INTERCHANGE THE CENTRE AND LEE COLUMNS.

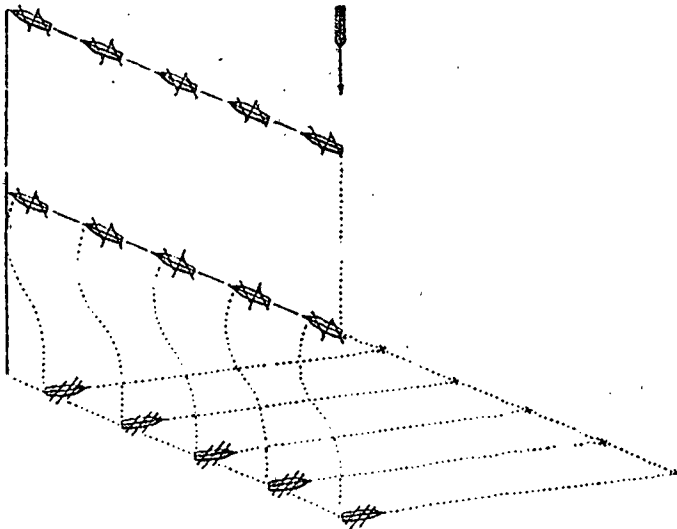


FIG. 26.

The centre and weather columns bring to, or keep steerage-way, whichever is most convenient (Fig. 26). The lee column tacks together, and carries sail, to gain the wake of the centre column; when they have effected which, they re-tack together, and stand on. Then the centre edges away under easy sail, (steering, if the weather column lies to, eight points from the wind, and if it kept steerage-way, only two points,) till it comes into the station of the lee column, where it hauls to the wind, and the order is re-established, by shortening or making sail, as requisite.

TO INTERCHANGE THE WEATHER AND LEE COLUMNS.

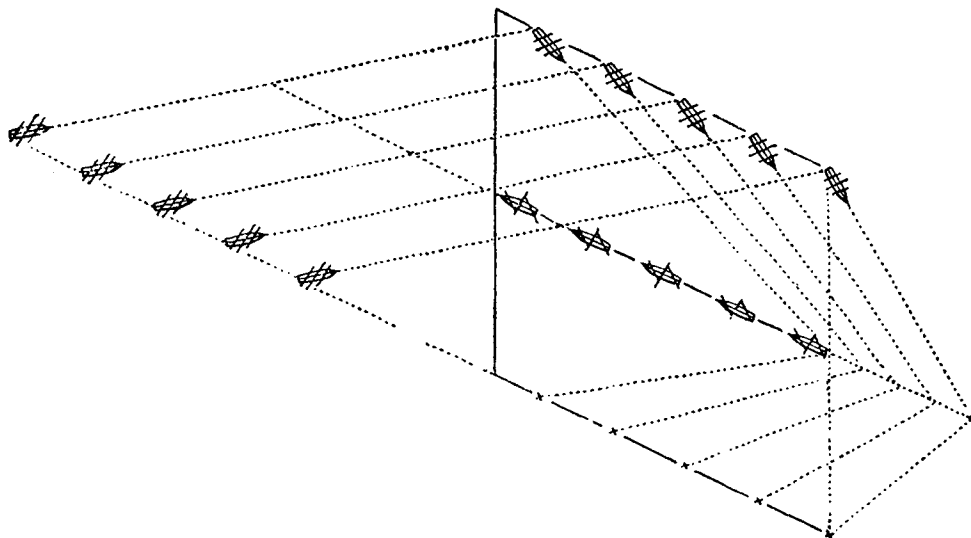


FIG. 27.

The centre column brings to. The lee column carries all sail (keeping close order); and when the sternmost ship can weather the leading ship of the centre column, they tack together and stand on close hauled, till it comes on a line with the centre column; when it keeps away, if necessary, to get into the station of the former weather column.

At the beginning of the evolution the weather column wears round, bringing the wind on the opposite quarter, to pass astern of the centre column; when in its wake they haul round, and run into the station the former lee column had, and bring-to, until the weather column is in station. (Fig. 27.)

This evolution may be performed quicker, by allowing the lee column to tack singly; when they can weather the leading ship of the centre column: and by keeping their wind until in the line of the former column, then re-tack.

THE WEATHER COLUMN TO PASS TO LEEWARD.

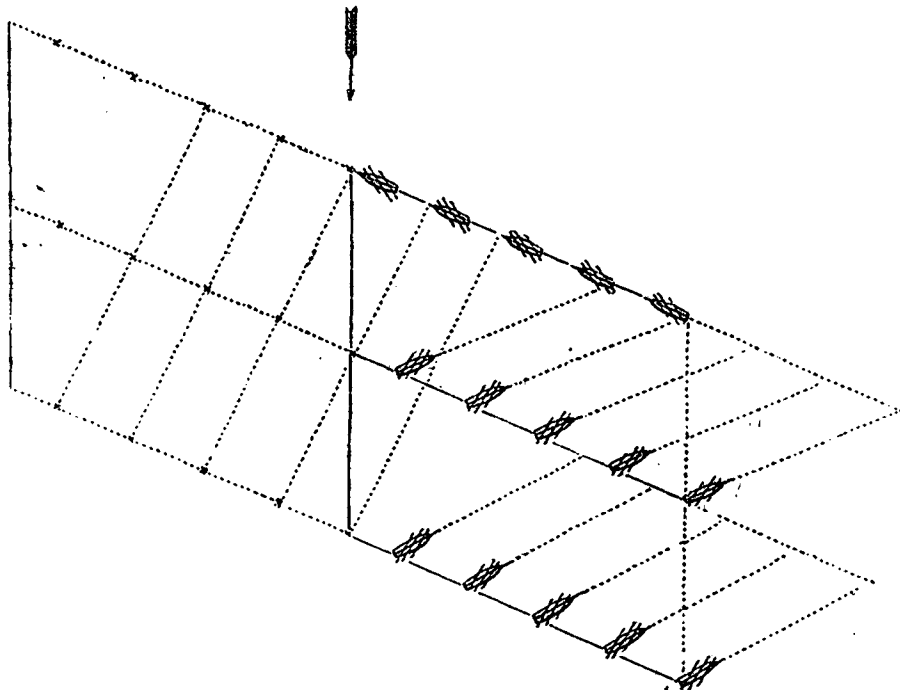


FIG. 28.

The weather column stands on under very little sail, while the centre and lee columns tack together, carrying a press of sail, till the centre column reaches the wake of the weather column; when the centre and lee columns re-tack, and carry sail till they come into station with the former weather column; which, having (when they gained its wake) borne away and taken its station to leeward, either hauls to the wind, or brings to, till the new weather and centre columns are in their proper bearing, as shown in Fig. 28.

THE LEE COLUMN TO PASS TO WINDWARD.

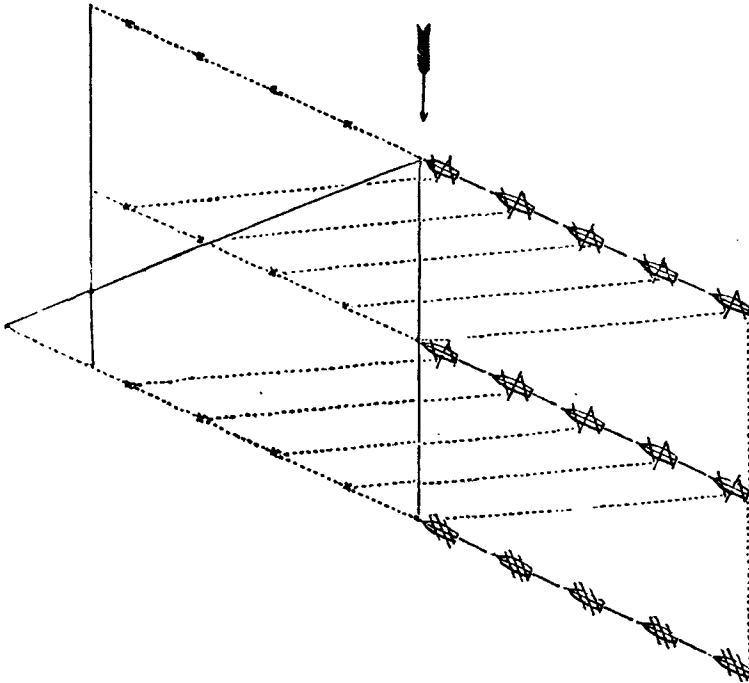


FIG. 29.

The weather and centre columns bring to, while that to leeward carries sail, and tacks in succession, as soon as the leading ship can weather the headmost ship of the weather column; and when arrived upon the line on which the weather column is formed, re-tacks in succession, forms on the same line, and either brings to, or stands on under easy sail. If it brings to, the two other columns bear away together two points, to put themselves abreast of the column now to windward. (Fig. 29.)

If, however, the new weather column should stand on under easy sail, they need go large only one point, to gain their proper stations.

THE METHOD OF KEEPING SHIPS IN THEIR RESPECTIVE BEARINGS,
BY MEANS OF THE NAVAL SQUARE.



The attention of the commanding officer of every ship in a fleet is necessarily drawn to the preserving his ship in the station allotted to her, in whatever order the ship may sail.

This is greatly facilitated by a figure, called the NAVAL SQUARE, being drawn on a board, and placed on the quarter-deck when manœuvring, the construction of which is here explained and drawn.

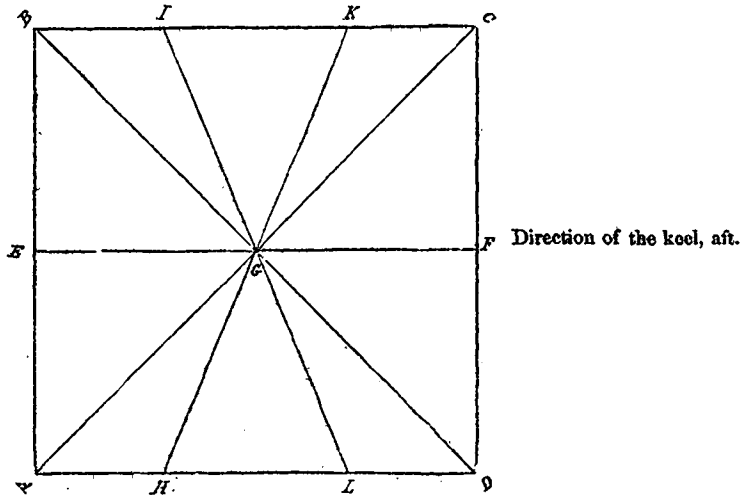


FIG. 30.

Let the square A B C D, Fig. 30, be drawn, and let the line E F be laid in the direction of the keel; draw also the two diagonals A C and D B. Now it will be found that the angles D G E and C G E are each 135 degrees, or 12 points,

equal to the two courses close hauled on a wind. Divide these two angles in half, drawing the lines $G H$ and $G I$; extend them to K and L , and those lines must show the direction of the wind when close hauled on either tack. If, therefore, a ship is running in the direction of $F E$ upon the starboard tack, her close-hauled course upon the port tack will be in the direction of the semi-diagonal $G C$; and if she be running in the direction of $F E$ upon the port tack, her close-hauled course upon the starboard tack will be in the direction of the semi-diagonal $G D$.

But to apply this more particularly to use in the order of sailing, see the following.

Suppose the fleet in three columns, close hauled, the columns coinciding in the direction of the wind on the port tack.

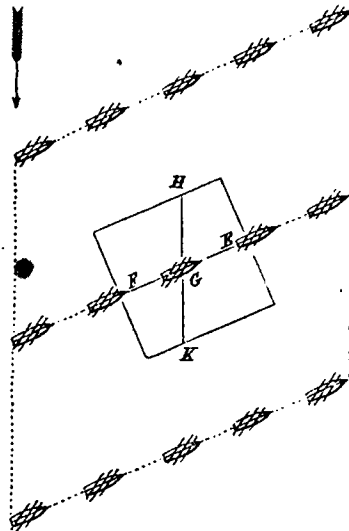


FIG. 31.

The coinciding ships in the columns must be kept in the direction $G H$ and $G K$, while the ships of each column must be in the direction of $E F$. (Fig. 31.)

Suppose the fleet in three columns in the line of bearing, the ships close hauled on the starboard tack.

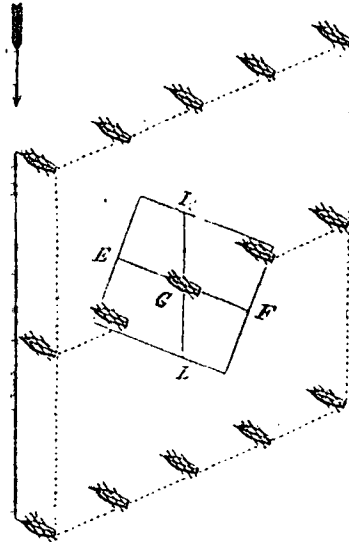


FIG. 32.

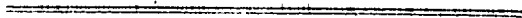
The ships all head in the direction E F, and the coinciding ships in the columns are kept in the direction G I and G L. (Fig. 32.)

End of the Second Part.

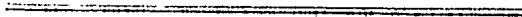
NAVAL TACTICS.

PART III.

TO FORM AND MANŒUVRE IN THE LINE OF BATTLE,
CHANGING THE SQUADRONS;
AND
THE ORDER OF RETREAT.



NOTE.—The lines in the diagrams refer only to the change of position, and do not indicate the exact course to be steered in performing the evolution.



TO FORM AND MANŒUVRE

IN

THE LINE OF BATTLE.

TO FORM THE LINE OF BATTLE.

If the fleet is in no previous order, but promiscuously scattered, the ship which is to lead runs to leeward of the whole, and then hauls the wind upon the tack directed, carrying easy sail. Each ship then makes sail, according to her distance, and takes her prescribed distance from the leading ship, on the line on which the van is moving.

Should any of the fleet be so far away as not to be able to take her station, the next astern is to take the station, and the remainder close up until she arrives and takes it.

Their being expeditiously and compactly formed, is to be particularly attended to.

When sailing in three squadrons, the line of battle is (unless directed otherwise) always formed upon the centre squadron.

It is likewise to be understood that when (by change of wind, or in consequence of any evolution,) the rear squadron either becomes the van, or is leading on the tack not previously directed for it to lead on, such squadron is so to continue until a further change takes place. Should the admiral withdraw his own ship from the line, this is not to alter the bearing or course of the fleet, which is to be continued till altered by signal.



BEING IN LINE OF BATTLE, TO FORM THE LINE ON THE OTHER TACK,
WITHOUT TACKING IN SUCCESSION.

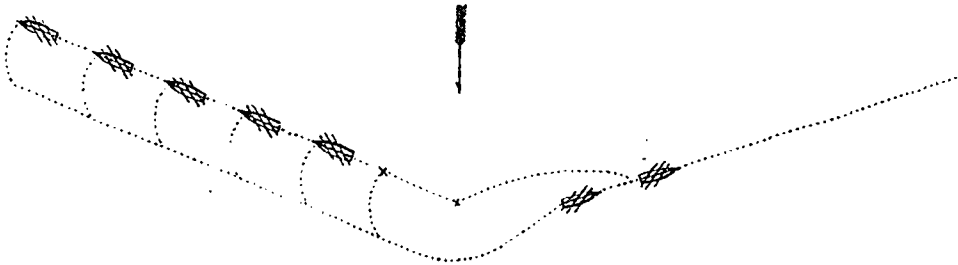


FIG. 33.

This is performed by all the ships of the line wearing together, except the rear ship, which tacks, hauls her wind on the other tack, and stands on; while all the others go free, and haul up as they successively gain the wake of the leading ship. Thus the rear of the line becomes the van. (Fig. 33.)

THE LINE TO TACK IN SUCCESSION.

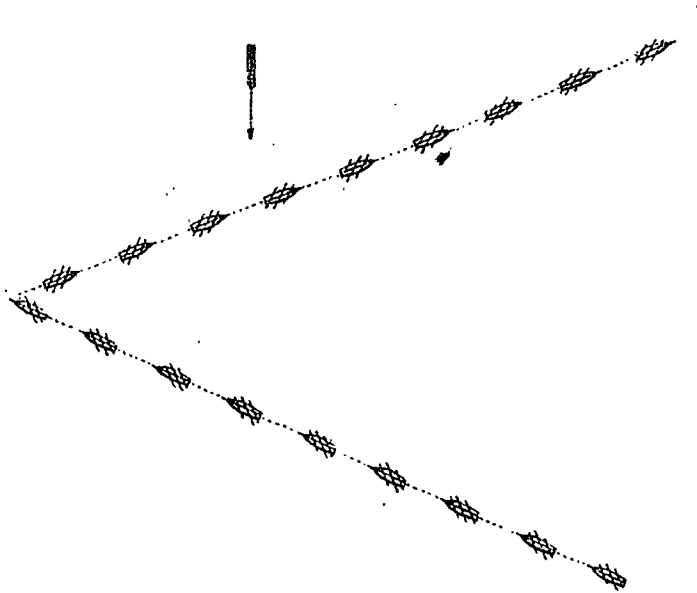


FIG. 34.

To avoid collision, the exact moment when each ship should put her helm down is, when she opens the weather quarter of the ship she follows, and which has gone on the other tack, as Fig. 34, from starboard to port tack.

If a ship miss stays, she is immediately to fill again on the same tack, and make sail with all dispatch, taking care to keep close to the wind. Thus she may get ahead and to windward of those which follow her; and they will perform successively their evolutions in the wake of the ships which are already on the other tack, only standing on a little farther than they would have done if the ship ahead had not missed stays. The ship that missed stays should, if possible, pass to windward of the sternmost ships when taking her station.

THE LINE TO WEAR IN SUCCESSION.



FIG. 35.

The van ship of the line wears away, and steers free upon the other tack, until close to the rear ship of the line, when, passing her, she hauls close to the wind. The rest follow in succession, as Fig. 35, from starboard to port tack.

 THE LINE TO TACK AND RE-TACK TOGETHER.

In tacking together, the sternmost ship of the line puts in stays, then her second ahead, and so on through the whole line, to prevent the ships ahead from falling on board the ships astern.

The fleet will then be in bow and quarter line; from which, if tacking together, no ship must put in stays till the ship on her weather quarter is in the act of tacking.

 THE LINE TO BEAR AWAY TOGETHER, PRESERVING THEIR BEARINGS FOR THE LINE.

The rear begins this evolution, the sternmost ship bearing away first the number of points proposed, and so on, as quick as possible, to prevent falling on board each other.

 TO HAUL TO THE WIND IN SUCCESSION WHEN SAILING LARGE.

The leading ship hauls first to the wind, and the others as they arrive in the wake of the leading ship.

TO ALTER COURSE IN SUCCESSION.

The leading ship of the line first alters to the course directed; the other ships take their stations astern of her in succession, as they arrive at that point of her wake where she began the evolution.

TO INVERT THE LINE, AND ACT ON THE CONTRARY TACK.

If sailing on a wind, the rear ship is to tack; the rest to bear up together, and haul to the wind on the contrary tack as they arrive in the wake of the rear ship, as Fig. 33. If the wind should be abeam, or more aft, the ships are all to wear together.

TO TURN TO WINDWARD IN LINE OF BATTLE.

In a large fleet it cannot be so well done in any other order as in line of battle; for it can tack and re-tack all together, or in succession, according to the exigency of circumstances. For example,—if a fleet in columns be turning to windward between two shores, the wind blowing right through the strait, it can stand on one tack only to a certain point, if the fleet tack together; for the ships to leeward would soon find themselves close to the shore on one tack, while the ships to windward would experience the same inconvenience on the next tack: and thus a number of short tacks would be occasioned. But if the fleet was in line of battle, and to go about in succession, it will make long boards, gain more to windward, and lose less time.

If the fleet has sea-room, or be turning on a coast with the wind parallel to the land, it will gain much more by all the ships going about together; by which the ships will be on one tack, in bow and quarter line, and on the other in line of battle. Each ship going about at the same time as the others, the fleet must then get to windward as much as if a single ship was turning to windward.

TO INTERCHANGE THE CENTRE AND VAN SQUADRONS.



FIG. 36.

The rear brings to (Fig. 36); the van, which is to form the centre, tacks, and carries sail a little off the wind; and when it has gained the position abreast of the former centre, (which has been standing on, to gain the head of the line,) the van then keeps away, and runs into the wake of the new van. When the new centre is in the act of keeping away, the rear fills, and stands on under easy sail.

But the evolution will be more quickly executed in this

SECOND METHOD.

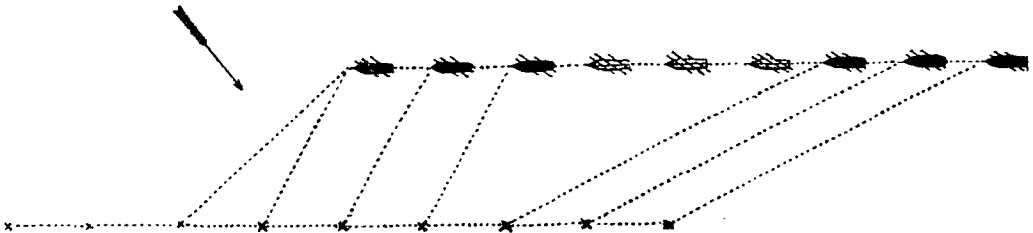


FIG. 37.

The van squadron keeps away a little, and brings to (Fig. 37); the centre passes on to windward, edging away a little, to get ahead of the former van on the same line; the rear, coming on under easy sail, edges away likewise, to obtain the wake of the new centre squadron.

TO INTERCHANGE THE CENTRE AND REAR SQUADRONS.

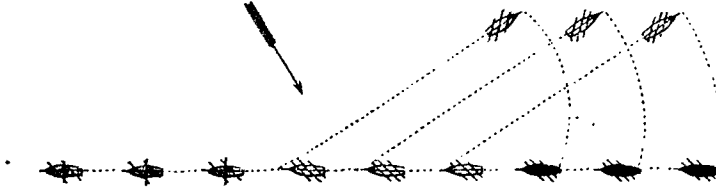


FIG. 38.

The van brings to (Fig. 38), or just keeps steerage-way; the centre tacks, and carries sail, a little off the wind; and the rear stands on. When the centre finds itself ship to ship abreast of the new centre, it keeps away, to take its station as rear. When the new centre is come up, the van, if it brought to, fills, and stands on.

SECOND METHOD.

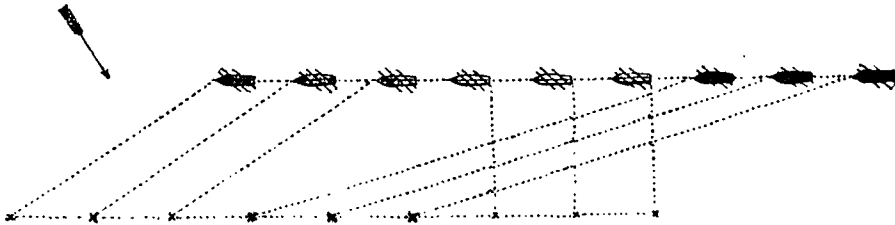


FIG. 39.

If circumstances will not allow the centre to tack, such as if the fleet be in presence of an enemy to windward, or if no inconvenience will result from sailing a little to leeward, the evolution may be quickly executed thus (Fig. 39).—The van stands on under easy sail, edging away, while the centre keeps away more, and brings to; the rear carries sail, to pass the centre to windward, and gets into the wake of the van. The van and centre then edge away, to gain the line with the new rear squadron, which then fills.

TO INTERCHANGE THE VAN AND REAR SQUADRONS.

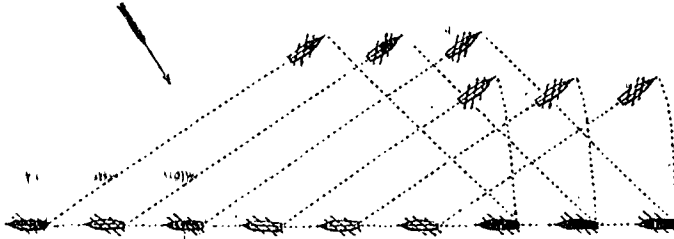


FIG. 40.

The van and centre squadrons tack together, and keep a little away (Fig. 40); the rear stands on under easy sail, to form the van. When the centre comes to be abreast of the rear, it keeps away, and edges into the wake of the new van; and when the former van finds itself abreast of the centre, it bears away, and forms in the rear of the line.

SECOND METHOD.

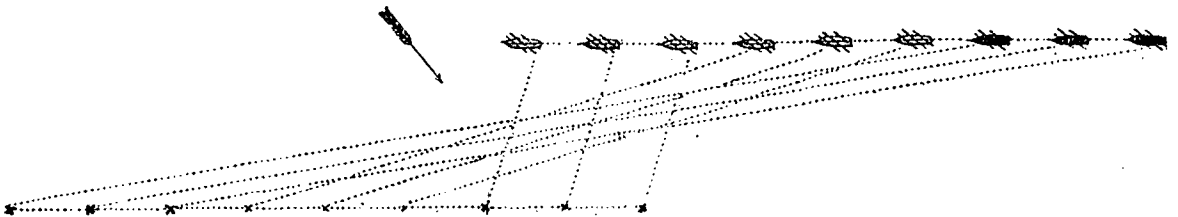


FIG. 41.

This evolution may be likewise executed thus (Fig. 41).—The van and centre squadrons keep away a little, and bring to, the van observing to bear up more to leeward than the centre; the rear stands on, to gain the head of the line. When the rear is come abreast of the former van, the centre fills; and both standing on, form ahead of the new rear, by edging down upon the same line with it.

THE VAN TO PASS, AND FORM THE REAR.

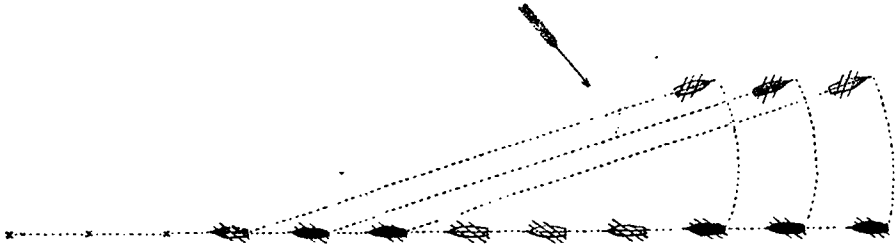


FIG. 42.

The centre and rear move on (Fig. 42); the van tacks together, and runs a little free, until it finds itself abreast of the former rear. It then keeps away into the rear of the line.

SECOND METHOD.

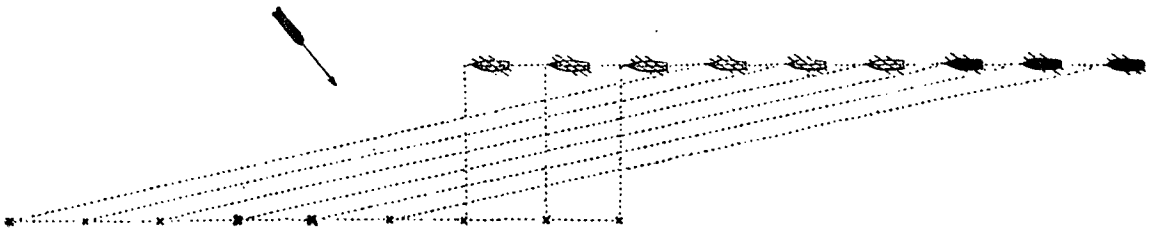


FIG. 43.

The more ready way to perform this is the following (Fig. 43).—The van squadron edges away a little, and brings to; the other two squadrons, carrying sail, stand on until they get ahead of the new rear, and then edge away a little, to form on the line; after which, the rear fills.

THE REAR TO PASS AND FORM THE VAN.

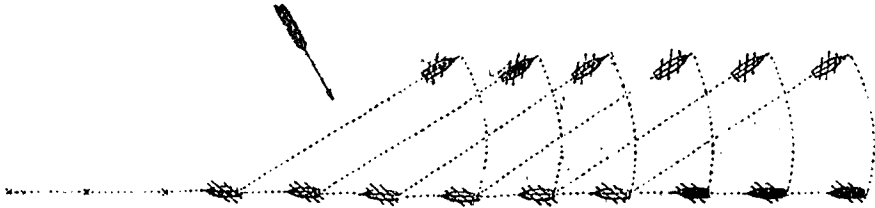


FIG. 44.

The van and centre squadrons tack together; the rear stands on, carrying sail (Fig. 44). When the former van finds itself ship to ship abreast of the former rear, the van and centre keep away for the rear of the line.

SECOND METHOD.



FIG. 45.

This method is more expeditious (Fig. 45.) The van and centre bear away a little and bring to; the rear makes sail, passes to windward of both, and then edges away, to form on the same line.

THE ORDER OF RETREAT.



TO FORM THE ORDER OF RETREAT.

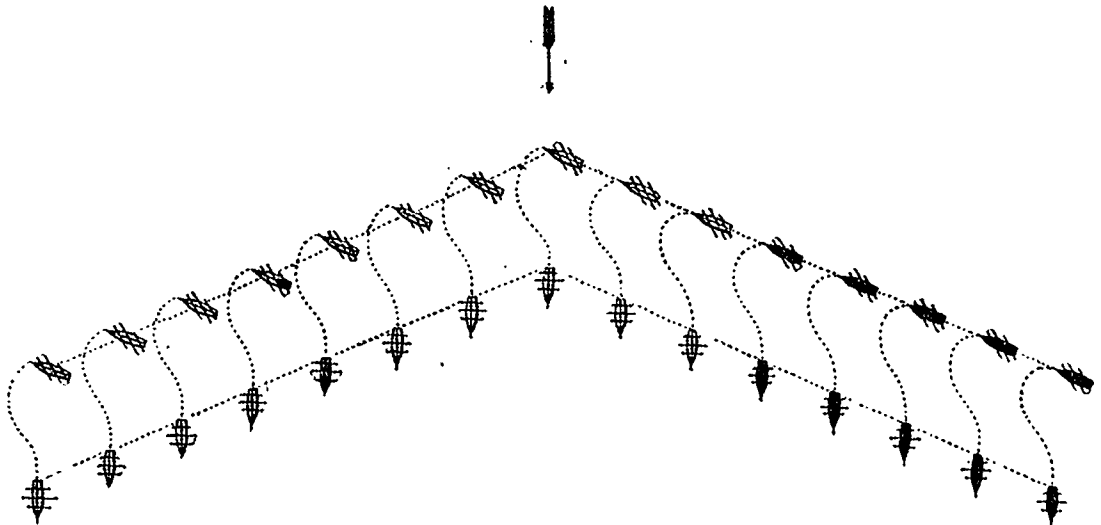


FIG. 46.

If the fleet be promiscuously scattered, the order of retreat is formed in the following manner:—

The admiral's ship, or the ship he appoints to make the angular point, runs to leeward and brings to. The rest, as they are destined in the line, run to take their stations to leeward, taking care to preserve themselves in their respective lines of bearing. For example (Fig. 46),—the wind being North, the admiral brings to W.N.W., starboard tack. The ships of one wing will form on his port

bow, with their mainmasts bearing W.S.W. and E.N.E.; and the ships of the other wing will bring to astern of the angular ship, with their mainmasts bearing W.N.W. and E.S.E. When the fleet bears away before the wind, the ships will find themselves two points before each other's beams, ready to form for either tack; for the ships on the admiral's starboard bow will be in the line of bearing for the port tack, while those on his port bow will be in the line of bearing for the starboard tack.

End of the Third Part.

NAVAL TACTICS.

PART IV.

TO MANŒUVRE THE LINE OF BATTLE,
CHANGING FROM ONE ORDER INTO ANOTHER;

AND

INTERCHANGING THE DIFFERENT COLUMNS.



NOTE.—The lines in the diagrams refer only to the change of position, and do not indicate
• the exact course to be steered in performing the evolution.



TO MANŒUVRE THE LINE OF BATTLE.

TO CHANGE FROM THE ORDER OF SAILING BY DIVISIONS OF SQUADRONS, TO LINE OF BATTLE.

This is performed by first passing to the fifth order of sailing, or three columns; and thence to the line of battle.

TO CHANGE FROM THE FIRST ORDER OF SAILING (THE SHIPS BEING IN LINE OF BEARING, CLOSE HAULED,) TO THE LINE OF BATTLE ON THE OTHER TACK.

This is done by all tacking together; but no ship is to put in stays until the ship on her weather quarter is in the act of tacking.

TO CHANGE FROM THE FIRST ORDER OF SAILING (THE SHIPS RUNNING LARGE,) TO THE LINE OF BATTLE ON THE SAME TACK.

All the ships luff to the wind together; or, at least, immediately after the ship next to windward.

TO CHANGE FROM THE FIRST ORDER OF SAILING

(THE SHIPS BEING IN BEARING FOR ONE TACK, AND RUNNING CLOSE HAULED ON THE OTHER,)

TO THE LINE OF BATTLE, WITHOUT CHANGING THE TACK.

The last ship of the rear, which, by this evolution, will become the first of the van, stands on, carrying sail; while the rest in succession steer for the main-masts of their respective leaders; or merely bearing away a little, and they will fall into the wake of the vessels ahead: when they haul up, and make sail accordingly.



TO CHANGE FROM THE SECOND ORDER OF SAILING

(THE SHIPS RUNNING LARGE, OR BEFORE THE WIND,)

TO THE LINE OF BATTLE.

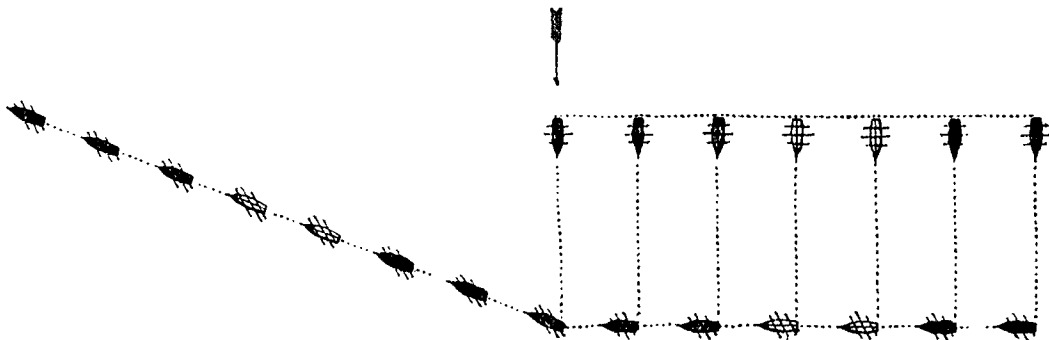


Fig. 47.

All the ships of the fleet haul up together on the tack directed (Fig. 47), presenting their heads on the line upon which they are ranged. The leading ship then hauls her wind, and is followed in succession by the rest. To prevent the ships being too near each other, the ships make sail as they haul their wind; or their seconds astern shorten sail, to open the order.

If a fleet be ranged upon any other line whatever than that which is peculiar to the second order of sailing, these directions would equally apply for forming the line therefrom.

TO CHANGE FROM THE THIRD ORDER OF SAILING
 (THE SHIPS RUNNING LARGE, OR BEFORE THE WIND,)
 TO THE LINE OF BATTLE.

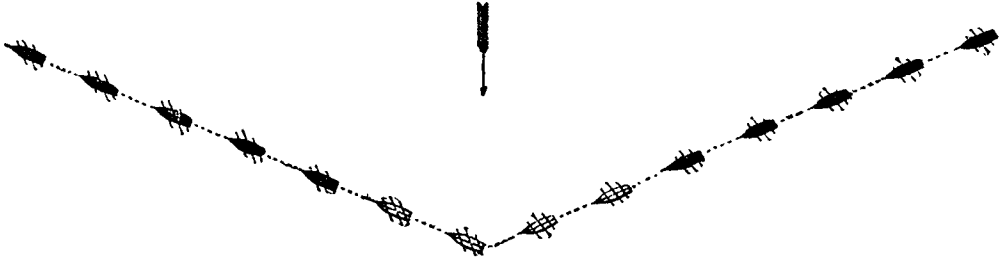


FIG. 48.

The angular ship and that wing of the fleet which is in bearing for the tack on which the line is to be formed, haul to the wind and stand on, as on starboard tack (Fig. 48). The ships of the other wing move on, and form in each other's wake (where the angular ship formerly was); when they haul up in the line.



TO CHANGE FROM THE ORDER OF SAILING IN TWO COLUMNS TO THE LINE OF BATTLE
 ON THE SAME TACK, FORMING UPON THE LEE COLUMN.

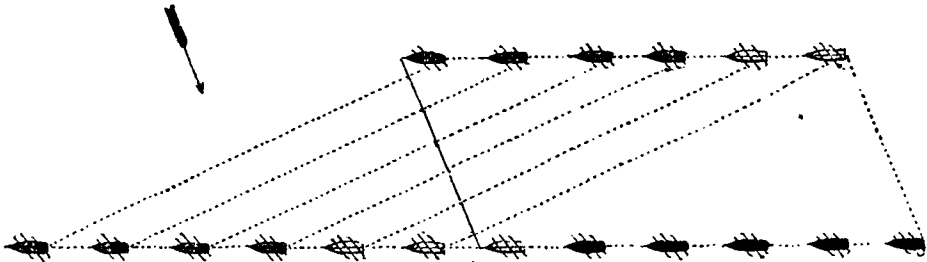


FIG. 49.

The lee column continues on under easy sail; the ships of the weather column bear up together and make sail, preserving their distances; and when in line ahead of the lee column, haul to the wind (Fig. 49).

TO CHANGE FROM THE ORDER OF SAILING IN TWO COLUMNS TO THE LINE OF BATTLE
ON THE SAME TACK, FORMING UPON THE WEATHER COLUMN.

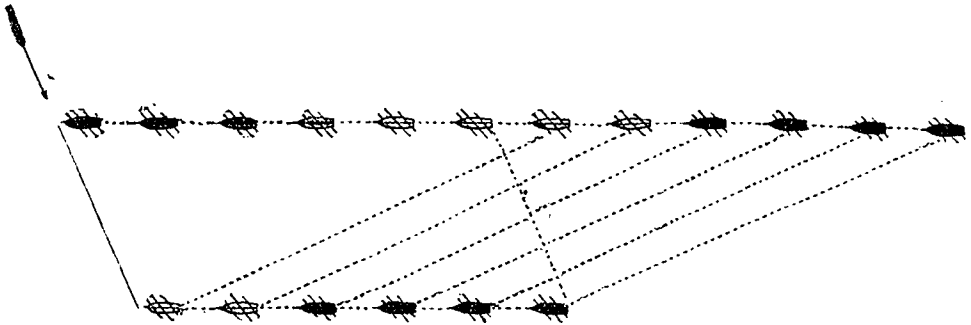


FIG. 50.

The weather column continues its course; the ships of the lee column tack together, preserving their distances; and re-tack in the wake of the weather column (Fig 50.)*

* It has been suggested by some officers, that in performing the above manœuvre (Fig. 50), that space should be left between the ships to enable the lee column, by tacking and re-tacking, to form in the weather column between each ship. To carry out that object, it would be necessary for the lee column to be advanced, so that the leading ship of the weather column would bear perpendicularly to the wind from the leading ship of the lee column; but even then the weather column must bring to whilst the evolution is performing, to enable the ships of the lee column to gain their stations.

TO CHANGE FROM THE ORDER OF SAILING IN TWO COLUMNS TO THE LINE OF BATTLE
ON THE SAME TACK, UPON THE LEE COLUMN, THE WEATHER COLUMN
FORMING THE REAR OF THE LINE.

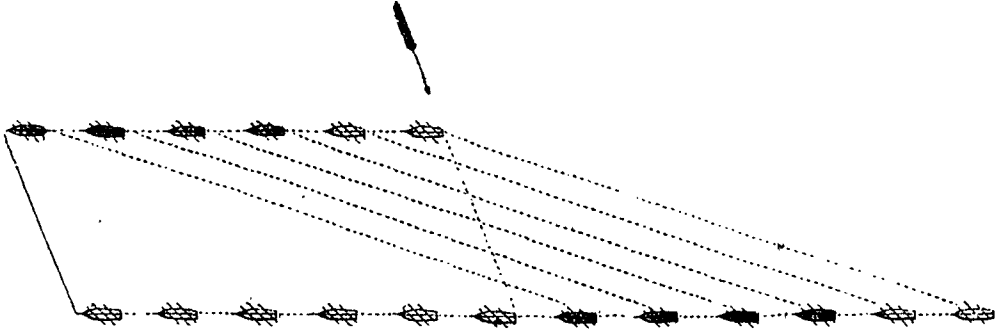


FIG. 51.

The lee column continues its course; the ships of the weather column bear round up together, preserving their distances; and haul to the wind again when in the wake of the lee column (Fig. 51.)

TO CHANGE FROM THE ORDER OF SAILING IN TWO COLUMNS TO THE LINE OF BATTLE
ON THE SAME TACK, UPON THE WEATHER COLUMN, THE LEE COLUMN
FORMING THE VAN OF THE LINE.

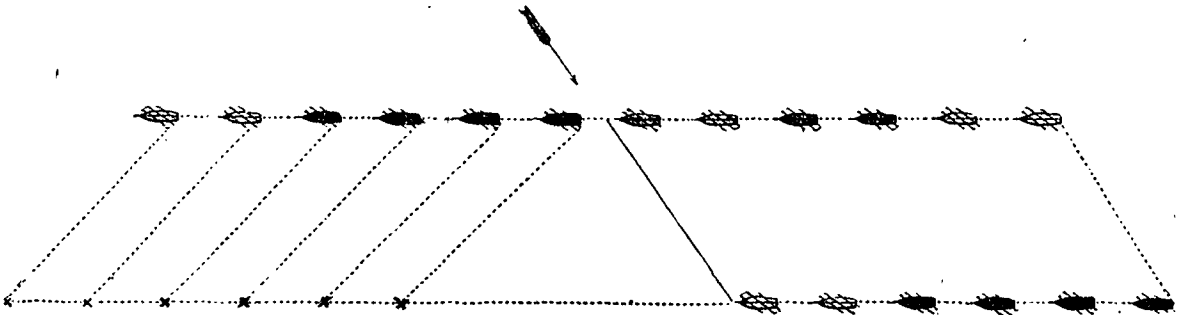


FIG. 52.

The weather column is to continue on its course under easy sail, or bring to; the lee column, making all sail, will stand on until its sternmost ship can weather the leading ship of the weather column, when the ships of the lee column tack together, preserving their distances; and when in line of the weather column, they re-tack, and form ahead of the line (Fig. 52).

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE SAME TACK, THE WEATHER COLUMN FORMING THE VAN, AND THE LEE COLUMN THE REAR.

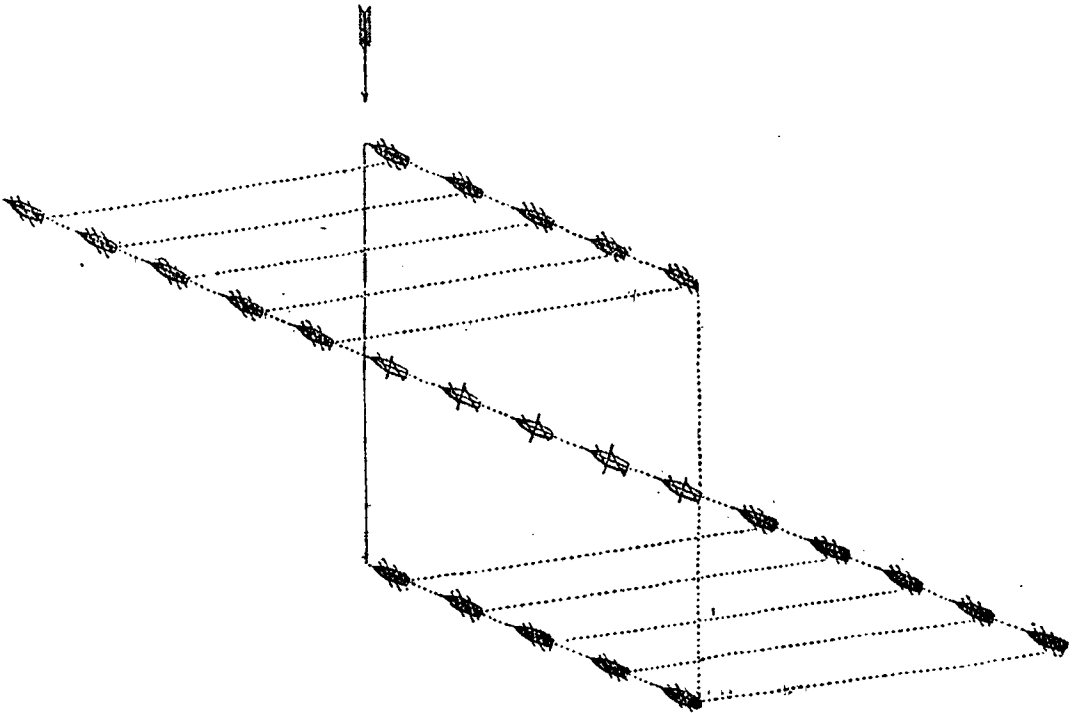


FIG. 53.

The centre column brings to, or continues on under easy sail; the ships of the weather column bear up, preserving their relative distances, and haul to the wind ahead of the centre. The ships of the lee column tack together, and, preserving their relative distances, re-tack when in the wake of the centre, when they form the line of battle (Fig. 53).

SECOND METHOD.

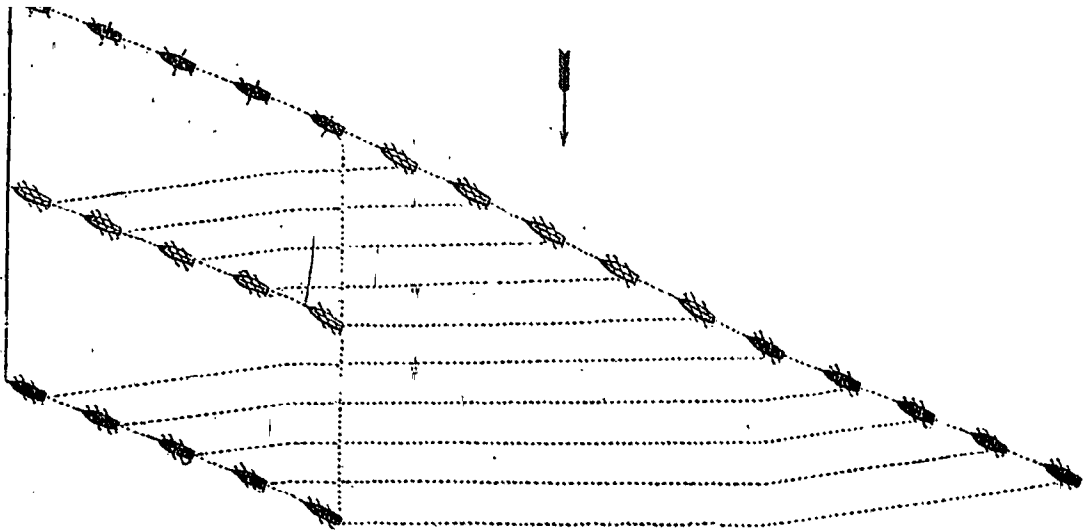


FIG. 54.

The weather column brings to (Fig. 54); the centre and lee columns tack together, and, steering about two points free, gain the wake of the weather column; when they re-tack, and form the line of battle.

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE
ON THE SAME TACK; THE WEATHER COLUMN FORMING THE REAR,
AND THE LEE COLUMN FORMING THE VAN.

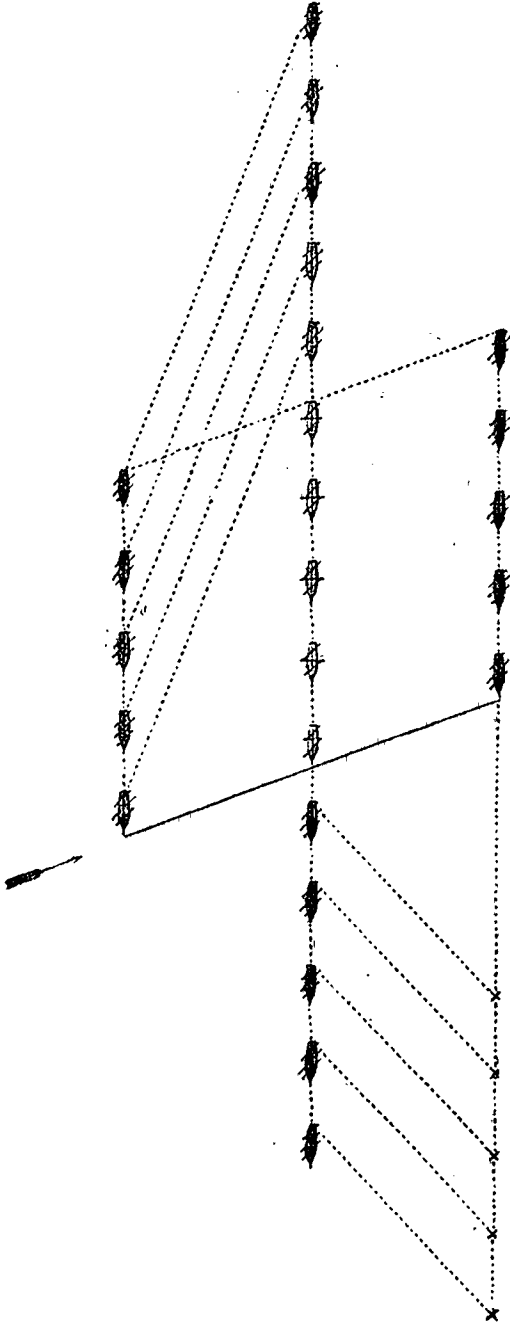


FIG. 55.

The centre column brings to; the ships of the weather column bear round up together, preserving their distances, until they arrive in the wake of the centre, when they form in line astern. The lee column stands on close to the wind, under all sail; and when the sternmost ship can weather the leading ship of the centre, the ships of the lee column tack together; when they are in line ahead of the centre column, they re-tack, and form the van (Fig. 55).

SECOND METHOD.

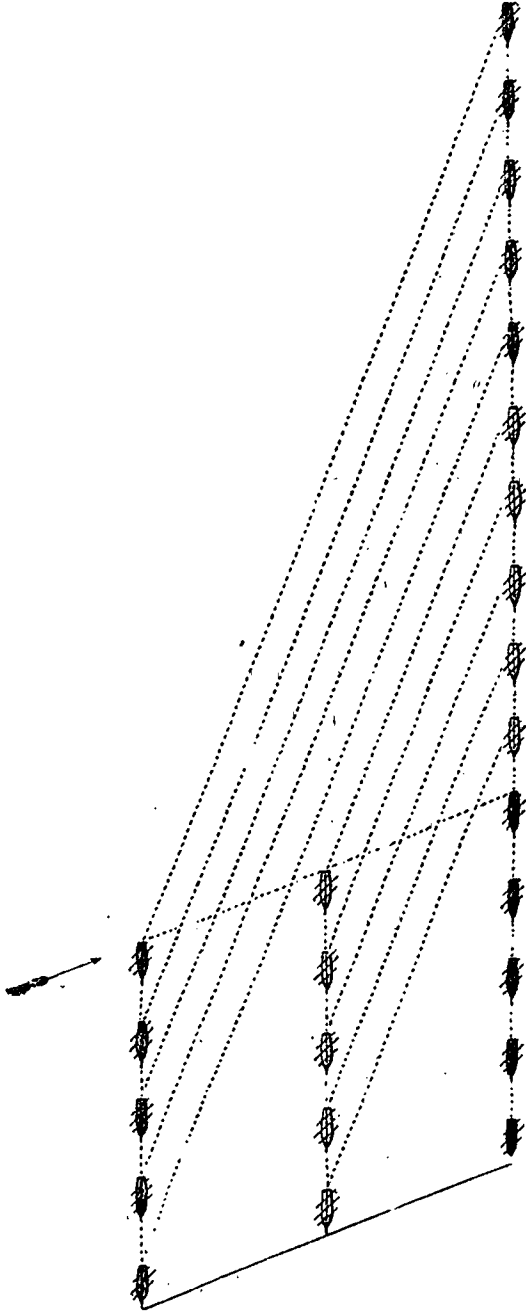


Fig. 56.

The lee column makes all sail; the centre and weather columns bear up together, preserving their relative distances; the centre hauls to the wind again when in the wake of the lee column, and the weather column when in the wake of the centre (Fig. 56.)

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE
ON THE SAME TACK, FORMING AHEAD OF THE LEE COLUMN.

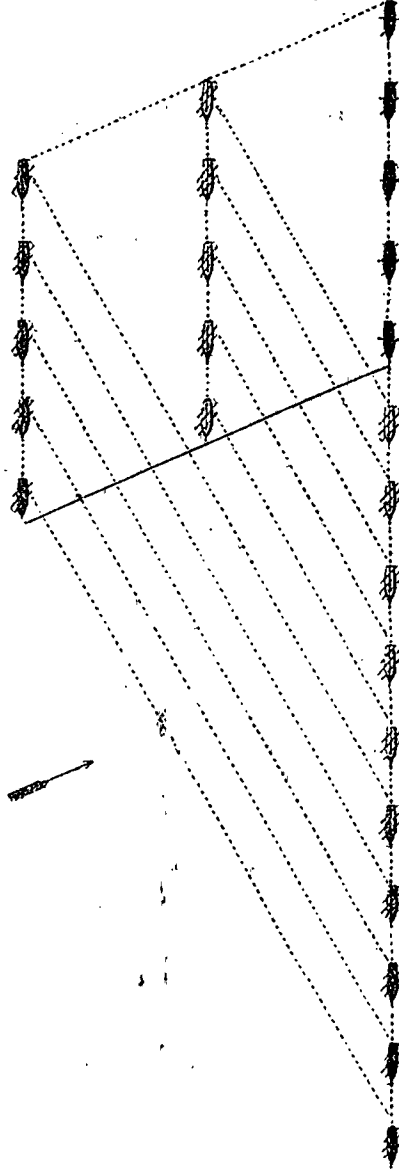


FIG. 57.

The lee column continues its course, or brings to; the centre and weather columns bear up about three points free, keeping their respective distances; and haul to the wind again when a head of the lee column (Fig. 57).

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE
ON THE SAME TACK; THE CENTRE COLUMN FORMING THE VAN, AND THE
WEATHER COLUMN FORMING THE CENTRE.

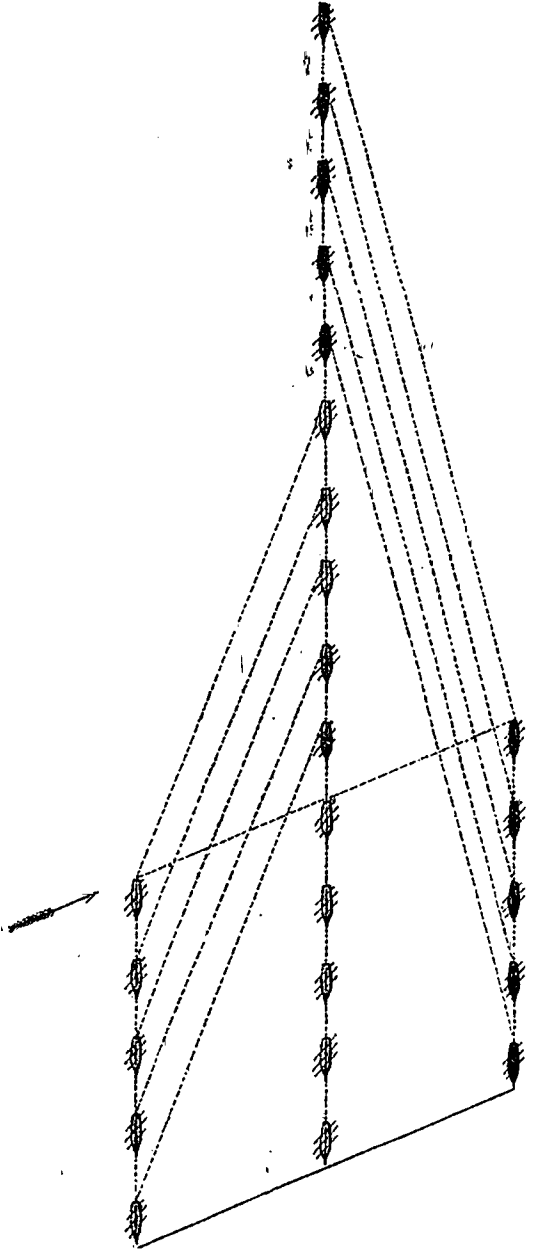


Fig. 58.

The centre column makes sail, and the weather bears up, preserving their distances, and haul to the wind when in the wake of the centre. The ships of the lee column tack together, preserving their distances; and re-tack when in the wake of the new line (Fig. 58).

SECOND METHOD.

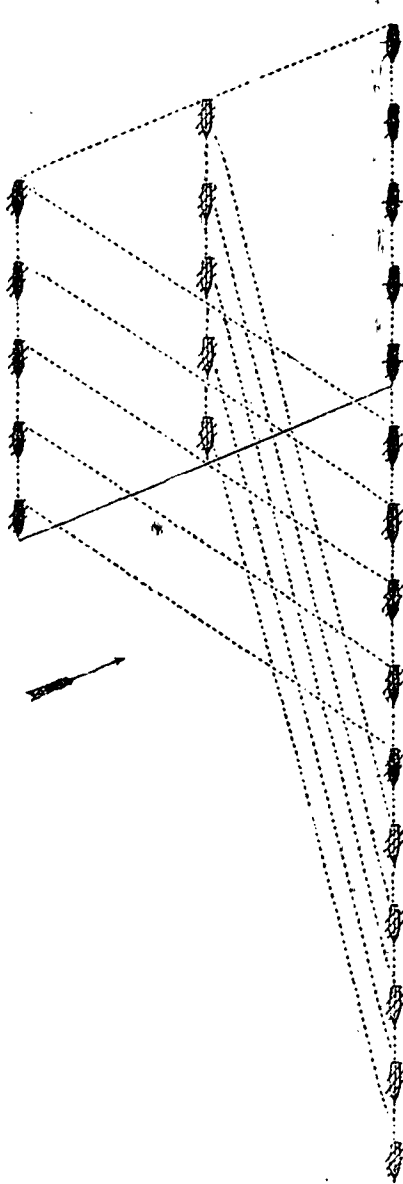


FIG. 59.

If the line is to be formed on the lee column (Fig. 59), that column must bring to. The centre column bears away about one point, and carries sail, to gain the head of the line; and the weather column will bear away about three points, under easy sail, to take its station in the wake of the new van.

This evolution is useful when the ships of the lee column are wide apart, or when any of them are astern, as it gives them time to come up into their proper stations.

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE
ON THE SAME TACK ON THE WEATHER COLUMN; THE WEATHER COLUMN
FORMING THE CENTRE, AND THE CENTRE THE VAN.

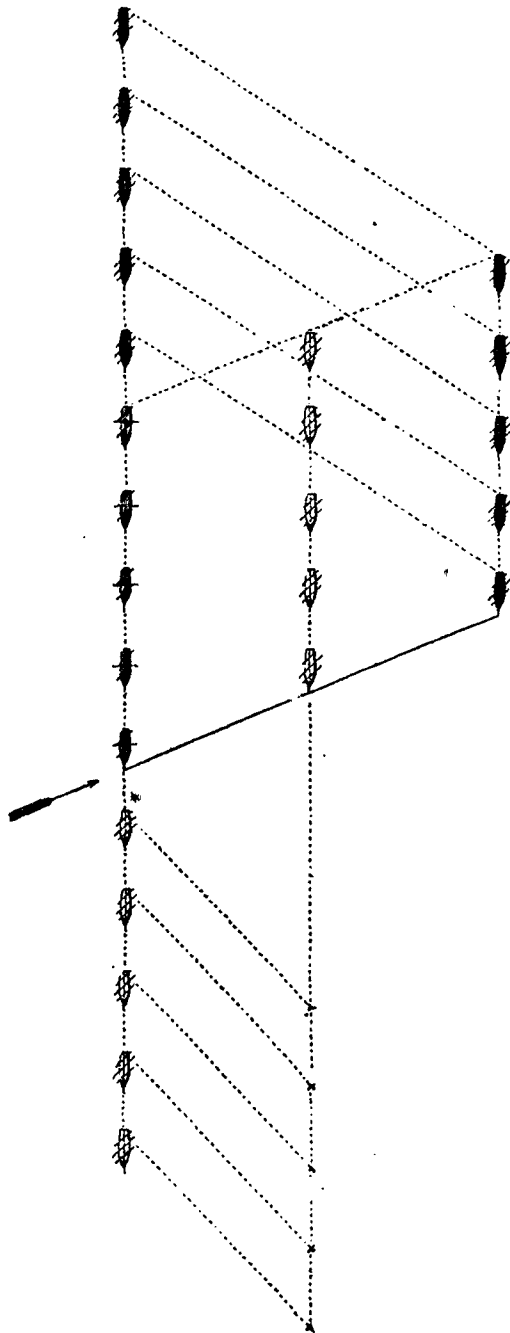


Fig. 60.

The weather column brings to, or just keeps steerage-way. The centre column carries sail, until its sternmost ship can weather the leading ship of the weather column, when it tacks together, and stands on to fetch ahead of the weather column; when in the line of bearing, it re-tacks, and forms as the van. The ships of the lee column, at the beginning of the evolution, tack together; and when in the wake of the former weather column, they re-tack, and complete the line (Fig. 60.)

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE SAME TACK; THE CENTRE COLUMN FORMING THE REAR, AND THE LEE COLUMN FORMING THE CENTRE.

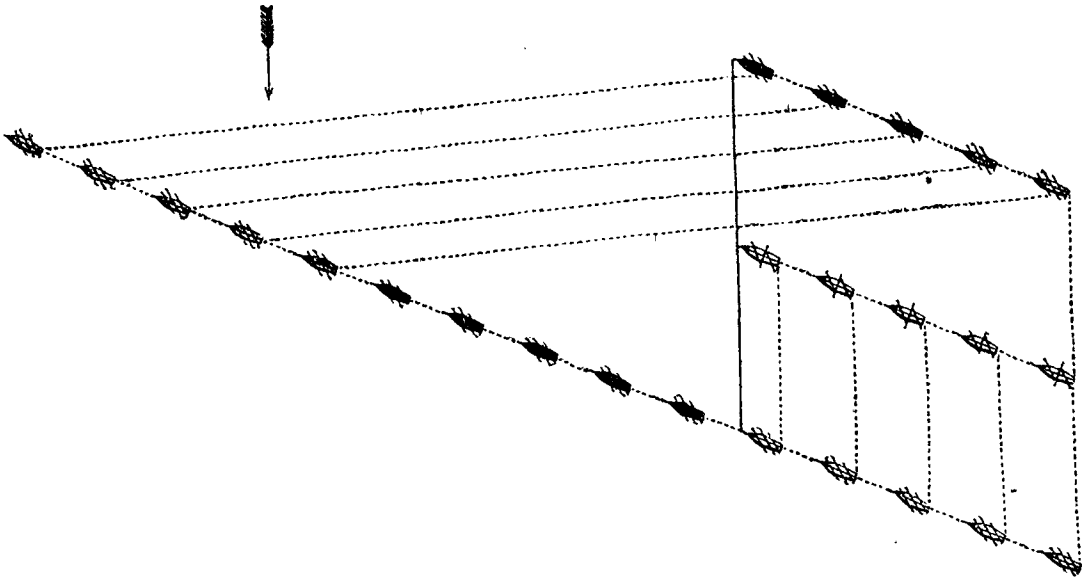


FIG. 61.

The lee column stands on under easy sail, keeping as close as possible to the wind (Fig. 61). The centre column brings to until it can bear away into the wake of the new centre; or it may wear round, and go under easy sail large on the other tack, to gain the rear of the line. The weather column at the commencement of the evolution bears up a little, carrying all sail, to reach the head of the line.

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE SAME TACK; THE CENTRE COLUMN FORMING THE VAN, AND THE WEATHER COLUMN PASSING TO THE REAR.

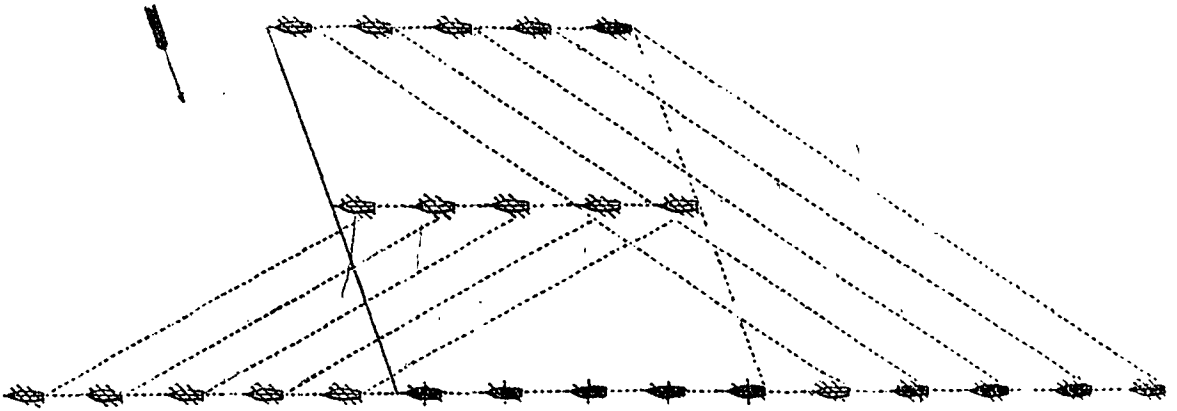


FIG. 62.

The lee column brings to, or keeps steerage-way, as close to the wind as possible (Fig. 62). The centre column keeps away about two points, and forms on the line ahead of the new centre. The ships of the weather column wear together; and running about six points free on the other tack, gain the wake of the new line, when they haul to the wind.

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE SAME TACK, THE LEE COLUMN FORMING THE VAN.

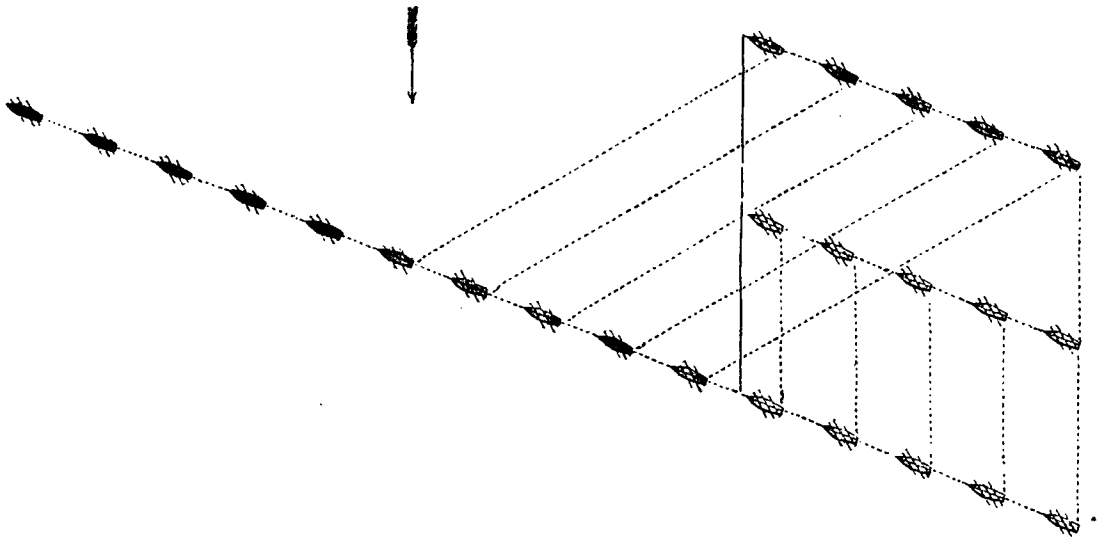


FIG. 63.

The lee column stands on (Fig. 63); the centre column keeps away eight points, under easy sail, to gain the rear of the line; the weather column keeps away, about three points, under easy sail. When the weather and centre columns are in the wake of the new van squadron, they keep their luffs.

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE OTHER TACK.

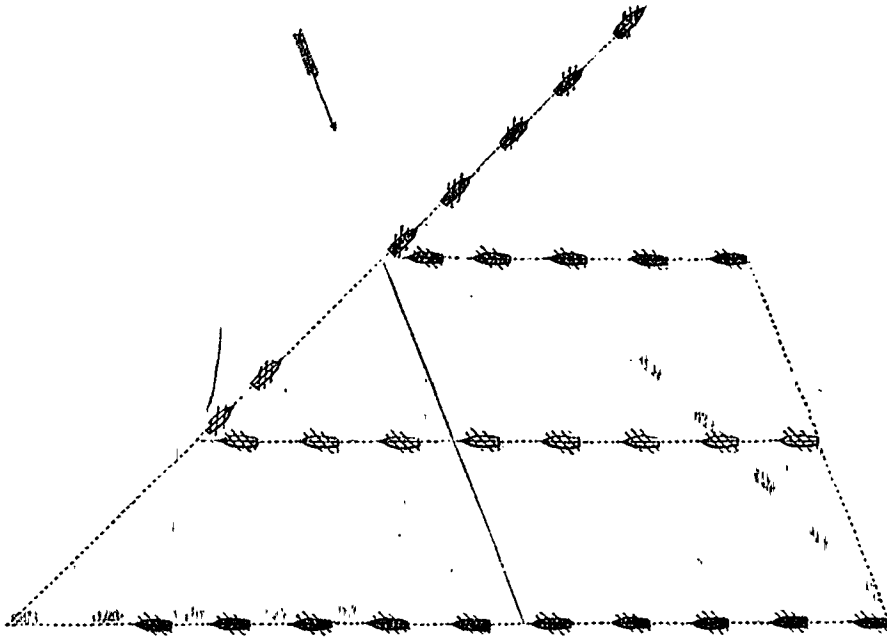


FIG. 64.

The weather column begins the evolution, by tacking in succession; the centre and lee columns stand on, till their respective leaders can tack in the wake of the line: when they tack in succession, thereby forming the line on the other tack (Fig. 64).

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE OTHER TACK, THE CENTRE AND LEE COLUMNS INTERCHANGING.

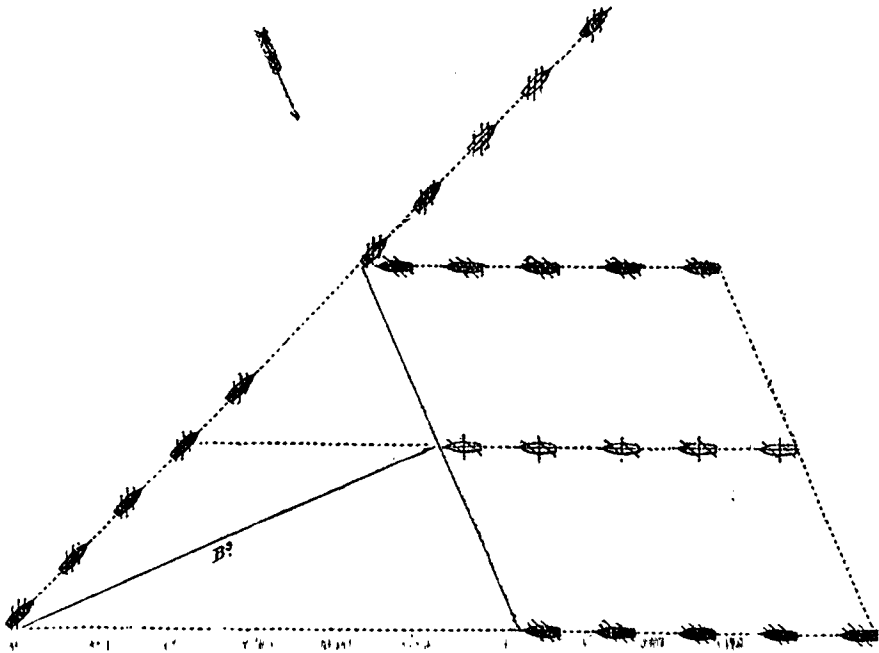


FIG. 65.

The weather column tacks in succession, under easy sail; the centre column brings to; and the lee column carries all sail; when its leader gains the wake of the line, he tacks, and is followed in succession by the column. The centre column is to fill and stand on when its leading ship and the last ship of the lee column bear from each other in a line perpendicular to the direction of the wind; and when they gain the wake of the line, they are to tack in succession (Fig. 65.)

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE OTHER TACK, THE WEATHER AND CENTRE COLUMNS INTERCHANGING.

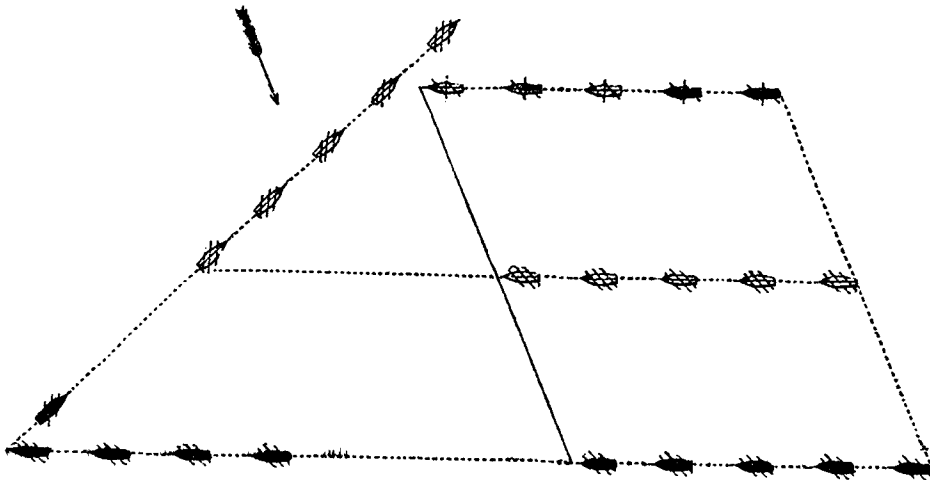


FIG. 66.

The weather column brings to; the centre carries sail, stands on, and tacks in succession when its leader is far enough to pass on the other tack some distance ahead of the weather column; which fills when the last ship of the new van has got into her station; and tacks in succession when the leader is in the wake of the van squadron. The lee column stands on, and tacks in succession in the same line with the van; but the lee column must not come up too fast, that a sufficient interval may be left for the weather column to occupy (Fig. 66.)

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE OTHER TACK, THE WEATHER AND LEE COLUMNS INTERCHANGING.

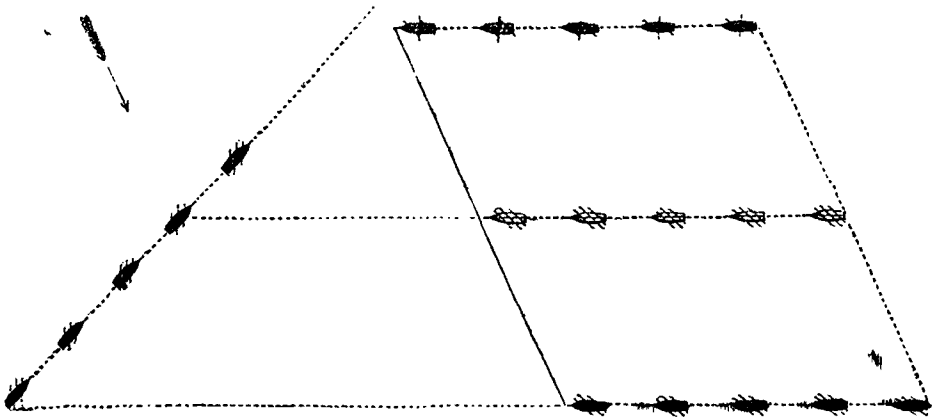


Fig. 67.

The weather column brings to. The lee column carries sail, and tacks in succession, when its leader can pass ahead of the weather leader. The centre column, which keeps steerage-way, continuing in the same direction, tacks in succession as the new van passes. The weather column fills, and tacks in succession, when the new centre has passed it, and takes its station in the rear of the line (Fig. 67).

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE OTHER TACK, THE WEATHER COLUMN PASSING TO THE REAR.

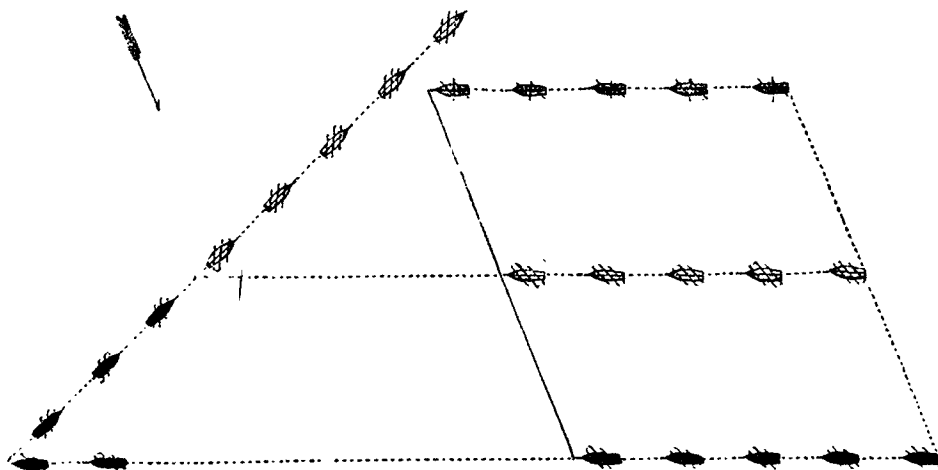


FIG. 68.

The weather column brings to. The other columns make sail, and stand on until they can pass on the other tack ahead of the column brought to, when they tack in succession. When both columns have passed the weather column, it fills, tacks in succession, and forms the rear (Fig. 68).

TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE OTHER TACK, THE LEE COLUMN PASSING TO THE VAN.

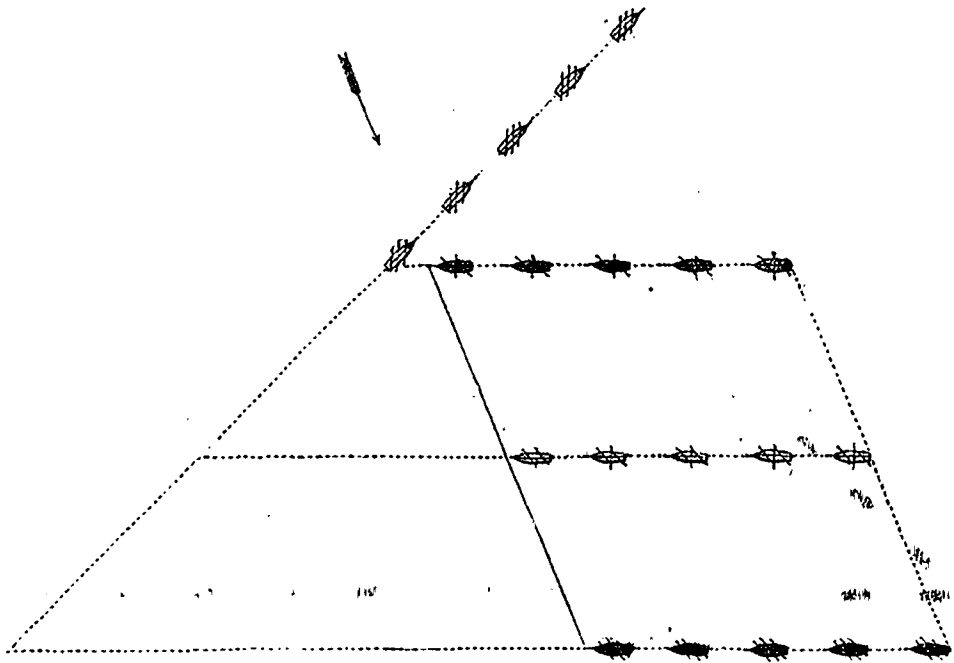


FIG. 69.

The weather and centre columns bring to. The lee column carries sail, tacking in succession when it can pass ahead of the weather column; and when the last ship of the new van has passed the former weather column, the van squadron shortens sail, to give time for the other columns to form. The weather and centre columns fill at the same time, to gain the wake of the line; when they tack in succession.

OF MANŒUVRING IN THE FIFTH ORDER OF SAILING IN SIX OR NINE COLUMNS.

When fleets are numerous, their order of sailing may be in six or nine columns, instead of three; that is, the van, centre, and rear divided into two or three columns each. If the fleet be in six columns, the admirals or commanding officers of squadrons place themselves abreast of each other, as Fig. 17, somewhat ahead, and in the middle of the interval of their respective columns; or, if the fleet be in nine columns, they place themselves at the head of their respective centre columns. But, in either case, each squadron must manœuvre itself in the same manner as if it were in order of three columns. It is therefore here unnecessary to enter into a more particular detail of them. We need only add, that if the fleet be in three columns, it is easily formed in six or nine columns, if the ships which are to form the first columns of each squadron bring to, and the others bear away successively two points, or to leeward of the ships of their respective first column; and if the fleet be in six or nine columns, it may be reduced to three; by each squadron of two or three columns manœuvring in the same manner as if it were a separate fleet, in two or three columns, changing to the line of battle.

For large fleets, the form of six or nine columns is well adapted, since their stations will be easily preserved, the signals better seen, and less time will be consumed in evolutions, particularly in reducing it to the order of battle.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIRST ORDER OF SAILING, CLOSE HAULED ON THE OTHER TACK.

All the ships tack together, by which their tack and line of bearing will be different; that is, they will be in bearing to form the line on the tack which they have left.

The sternmost ship of the line puts first in stays; and when she is observed to be so, her second ahead immediately puts the helm down; and so on through the line.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIRST ORDER OF SAILING, RUNNING LARGE ON THE SAME TACK.

All the ships bear away together the number of points directed by the admiral, observing to keep themselves in bearing for the tack they are on. The sternmost ship bears away first, and so on as quick as possible, to prevent being too near each other.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIRST ORDER OF SAILING,
IN BEARING FOR THE LINE ON THE OTHER TACK.

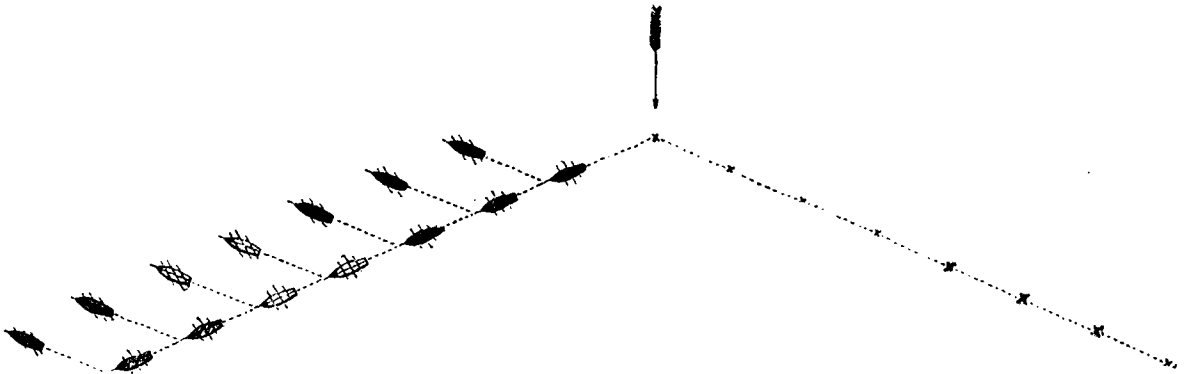


FIG. 70.

The leading ship keeps away four points, followed in succession by the rest (Fig. 70). When the sternmost ship has kept away, and the line formed, the whole haul up, when they will be in bearing for the line on the other tack.

TO CHANGE FROM THE LINE OF BATTLE TO THE SECOND ORDER OF SAILING,
RUNNING BEFORE THE WIND.

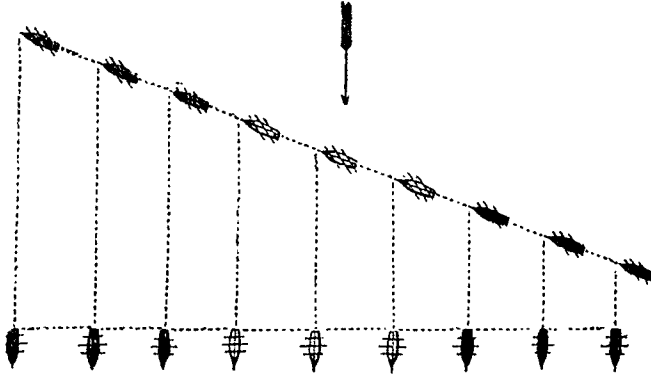


FIG. 71.

The whole keep away together ten points (Fig. 71), and so proportion their sailing from the head to the rear of the line that, when the headmost ship, which first makes sail, shall come abreast of the second ship, the second ship adapts her sail to keep in this bearing; and so on all through, each observing to keep the ship that immediately preceded her in the evolution in a line with herself perpendicular to the direction of the wind. This will rather close the line; but, if it be desired to preserve the same distance between the ships as there was when in line of battle, they must bear away only nine points, observing still the directions for keeping abreast of each other.

In the second order of sailing (Fig. 11,) the ships are ranged on a line perpendicular to the direction of the wind; but if it be intended to form a line abreast upon any other line, the number of points which the fleet must bear away, may be known thus:—Add to 8, being one-fourth of the points on the compass, one-half the number of points between that on which the ships are ranged, and that on which they are intended to be ranged. For instance,—suppose a fleet, ranged on the W.N.W. line in order of battle, is to be formed in line abreast on the S.W. line. Between W.N.W. and S.W. are 6 points, of which the half 3, added to 8, gives 11 points, which the fleet is to bear away, to form the S.W. line.

TO CHANGE FROM THE LINE OF BATTLE TO THE THIRD ORDER OF SAILING,
SO AS TO RE-FORM THE LINE UPON EITHER TACK.

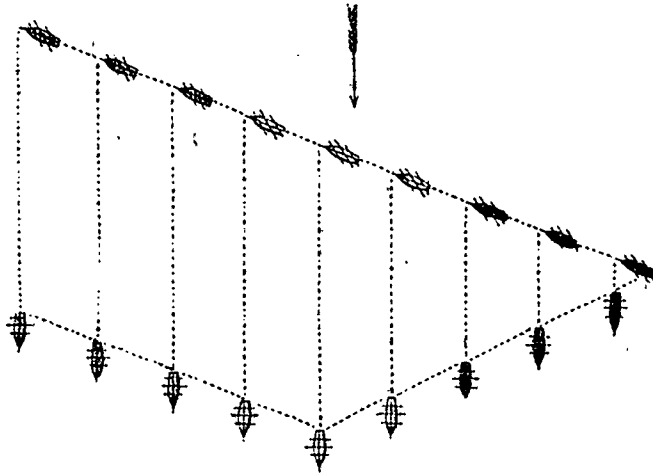


FIG. 72.

All the ships keep away ten points (Fig. 72). One-half of the line,—that is, from the leading ship to the centre inclusive,—carry equal sail, in order to preserve their line of bearing; but the remainder of the ships carry sail only sufficient to form them on the contrary close-hauled line to which they were running before this evolution.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING,
ON THE SAME TACK.

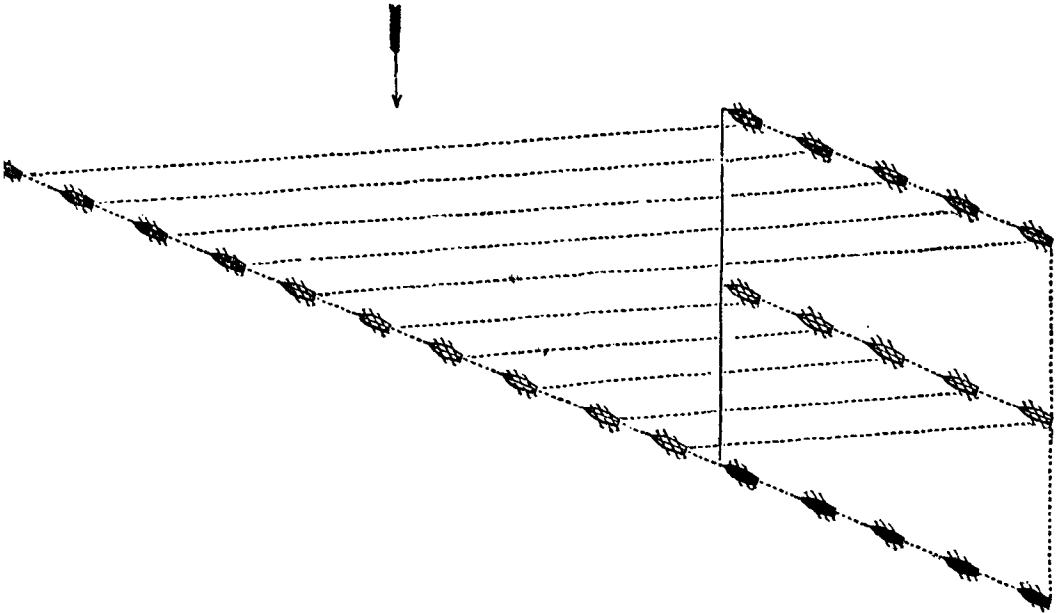


FIG. 73.

To perform this evolution, the van and centre tack together (Fig. 73), and run nearly close hauled in bow and quarter line. The centre re-tacks when it is ship to ship in the line of the wind from the rear. The van stands on until it is ship to ship in the line of the wind from the centre; then it re-tacks, and all the columns regulate their distances.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE SAME TACK;
 THE CENTRE SQUADRON FORMING TO DEEWARD, AND THE REAR FORMING
 THE CENTRE COLUMN.

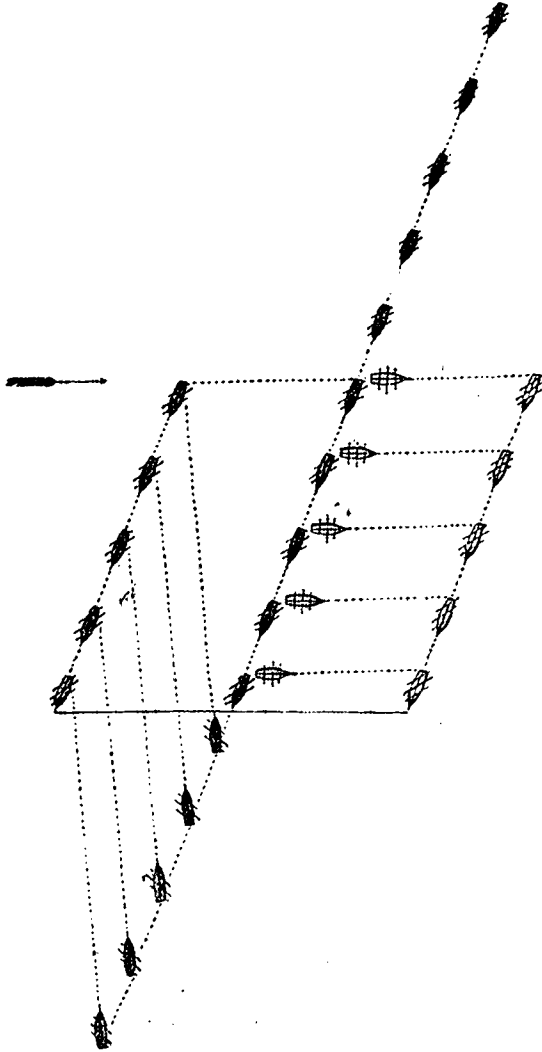


Fig. 74.

The van tacks together (Fig. 74), and goes a little free, to gain the distance of the centre. The centre keeps away ten points, under easy sail. When the van is ship to ship in the line of the wind from the centre, the van re-tacks. The rear stands on, to occupy the centre station; and when the new lee column is the prescribed distance in the line of the wind from the new centre, it luffs to.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE SAME TACK;
THE CENTRE FORMING THE WEATHER COLUMN, AND THE VAN SQUADRON
FORMING THE CENTRE.

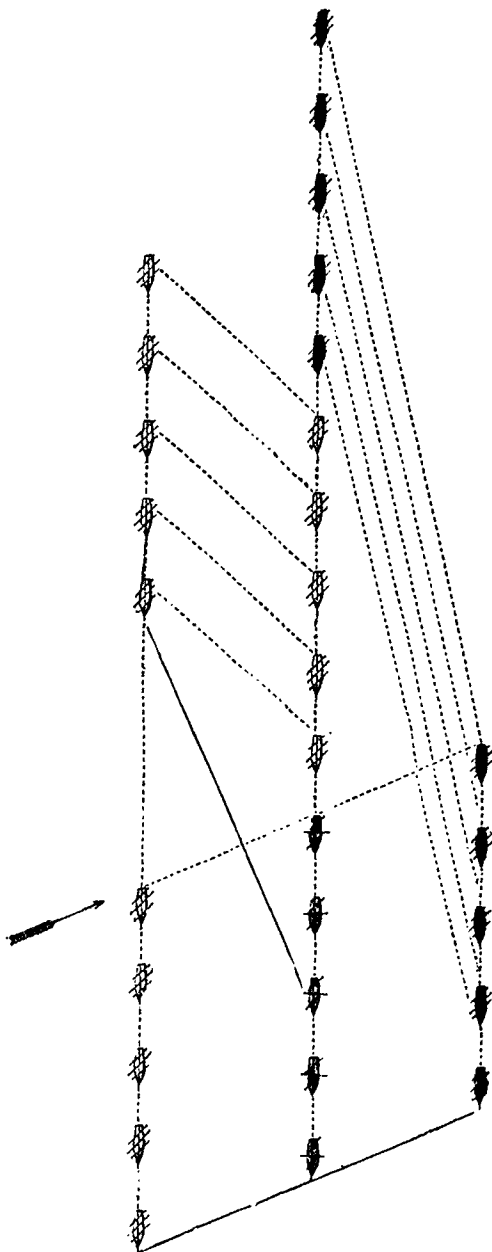


Fig. 75.

The van brings to, and serves as a mark for the evolution (Fig. 75). The centre tacks together, and carries sail, close hauled, until the leader has the centre ship of the van division, which is brought to, bearing at right angles with the wind; the division then re-tack together, and they may find themselves rather farther to windward than necessary. In the mean time the rear squadron keeps away under easy sail, a point free; when the new weather and the lee squadrons are in their station, the centre fills.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE SAME TACK,
THE VAN SQUADRON PASSING TO LEEWARD.

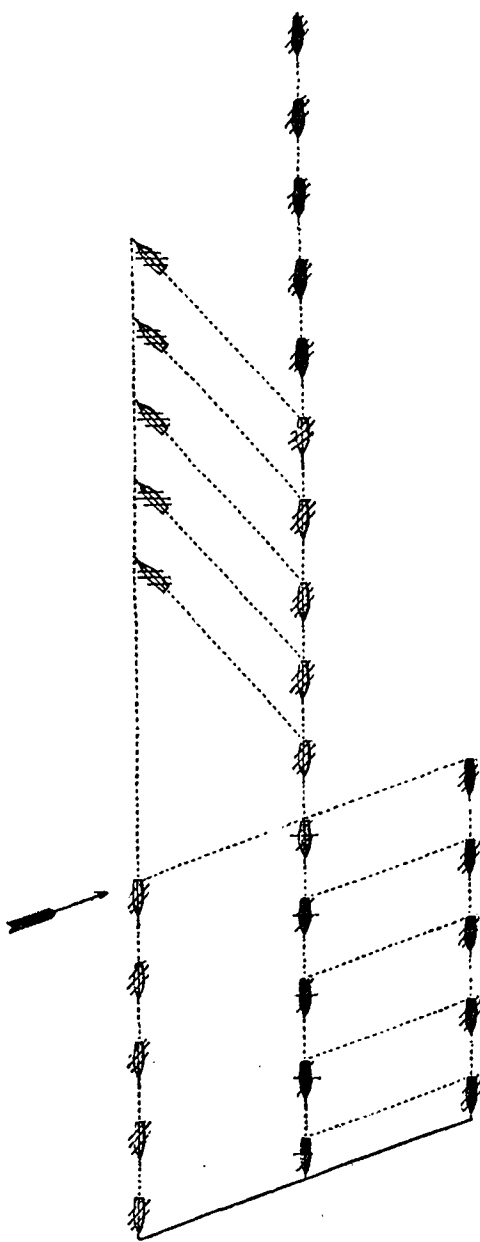


FIG. 76.

The van brings to (Fig. 76). The centre tacks together, and goes close hauled until it comes abreast of the rear (which has from the beginning stood on under easy sail); then the centre re-tacks together. When the rear is close to the van, brought to from the first, the van fills, and keeps away ten points, to form the lee column; and when it is at the prescribed distance, luffs to.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE SAME TACK;
 THE VAN FORMING THE LEE COLUMN, AND THE REAR THE WEATHER COLUMN.

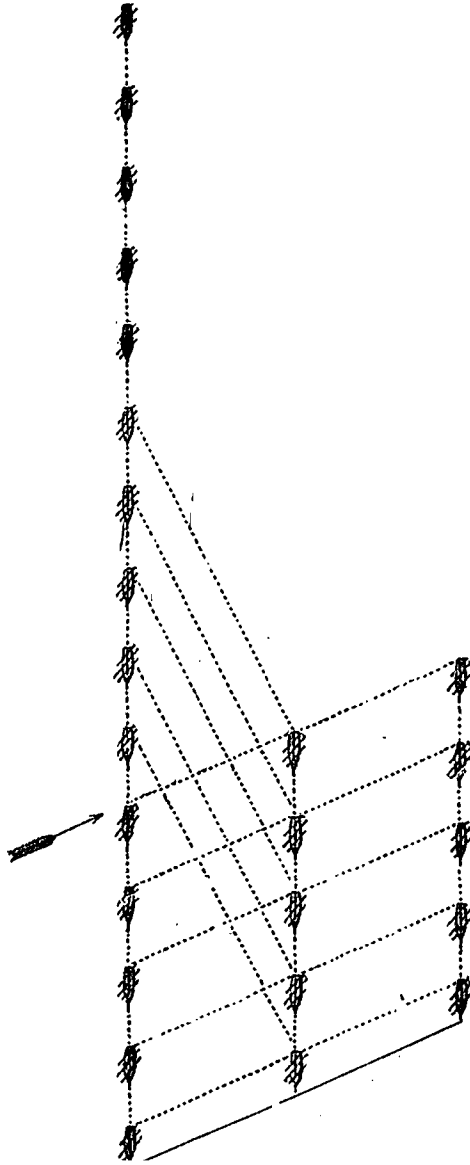


FIG. 77.

The van keeps away ten points (Fig. 77). The centre then keeps away about four points, whilst the rear stands on; and when the van and centre have gained their positions, they luff to, or bring to, if necessary, to wait for the rear to take station as the weather column.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE SAME TACK;
 THE REAR FORMING THE WEATHER COLUMN, THE VAN THE CENTRE,
 AND THE CENTRE FORMING THE LEE COLUMN.

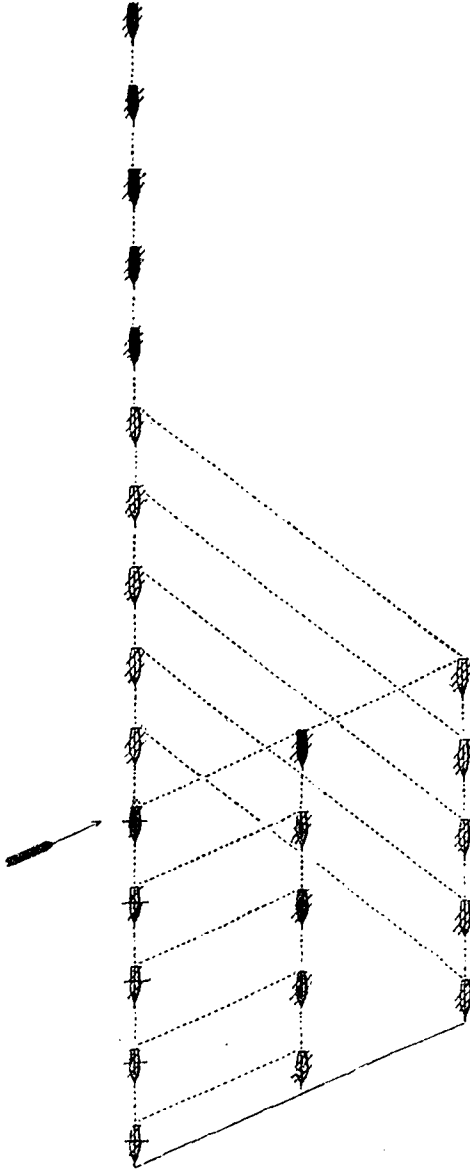


FIG. 78.

The van brings to. (Fig. 78). The centre keeps away five points; and when fairly to leeward of the van, the van bears up ten points, and runs into the position of the centre; when the new centre and rear bring to, or keep steerage-way, until the rear has advanced to the position of the weather column.

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE OTHER TACK,
WITHOUT CHANGING THE DISPOSITIONS OF THE SQUADRONS.

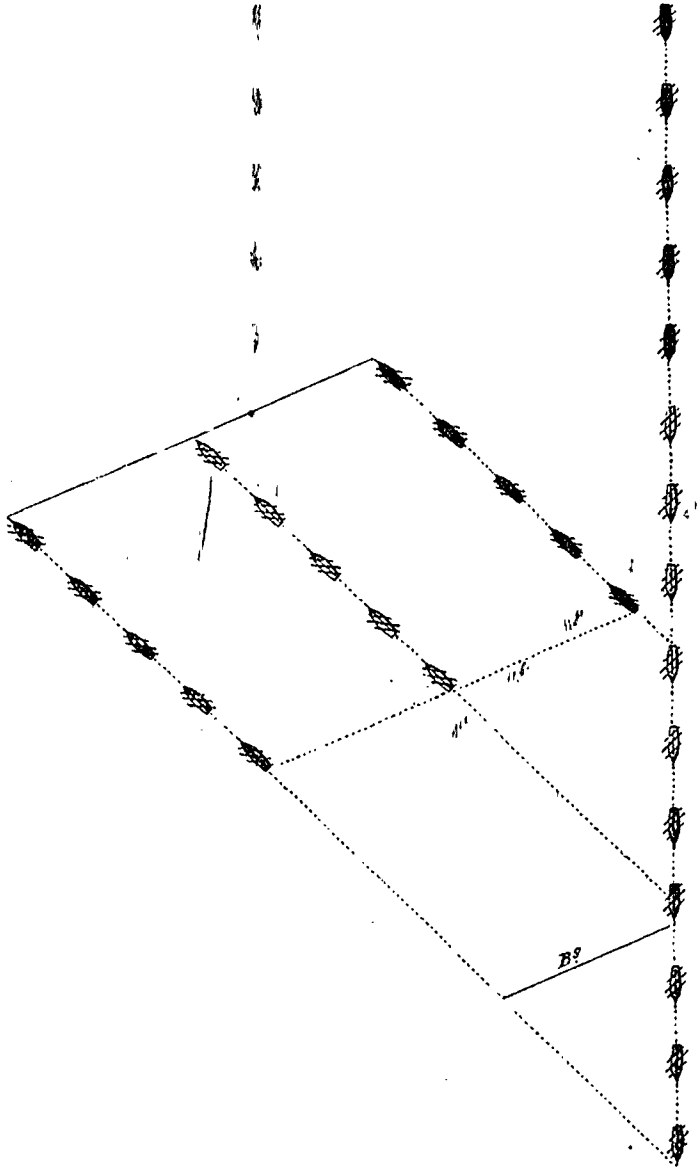


Fig. 79.

The van tacks in succession, and carries all sail. The centre and rear keep under easy sail; and when the leading ship of the van bears in the direction of the wind from the leader of the centre, the leader tacks, and is followed in succession. The rear observes the same with regard to the centre that the centre has to the van (Fig. 79).

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE OTHER TACK;
THE CENTRE SQUADRON FORMING THE LEE COLUMN, AND THE REAR THE CENTRE.

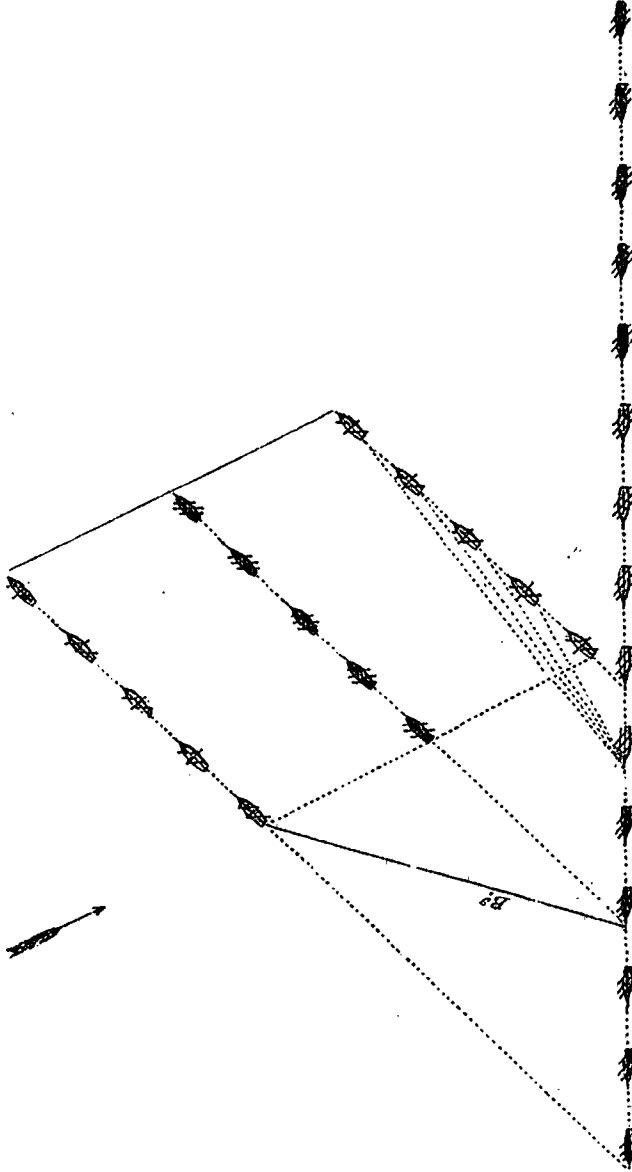


Fig. 80.

The van and centre tack at the same time in succession. The centre keeps away one point; and when the whole of the ships of that squadron are round, they bring to, forming the new rear. The van, having carried all sail, stands on until its leader bears in the direction of the wind from the leader of the new rear, when it brings to. The rear stands on from the commencement of the evolution, keeping close to the centre, and tacks in succession as its leader brings the leader of the van to bear three points from the direction of the wind on the opposite tack, when it tacks, and is followed in succession; and when the leading ship is in the line of direction with the wind from the lee column, it brings to, or carries sail, forming the column (Fig. 80).

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE OTHER TACK;
THE CENTRE SQUADRON FORMING TO WINDWARD, AND THE VAN IN THE CENTRE.

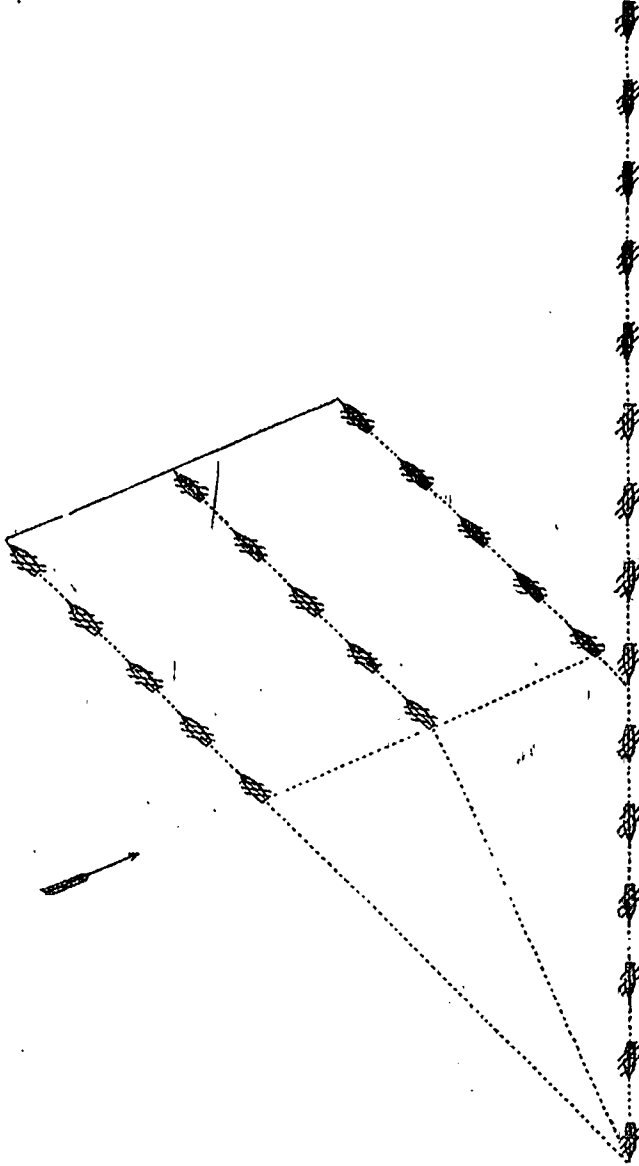


FIG. 81.

The van tacks in succession, and runs a course perpendicular to the direction of the wind, until its leader bears in the direction of the wind from the leader of the rear squadron; it then luffs to the wind, to form the new centre. The rear squadron, which has kept under easy sail, tacks in succession at the time the leader of the new centre luffs to the wind; and when all round, the new centre and rear bring to. The centre squadron from the commencement stands on; and when the last ship of the van squadron has tacked, the leader of the centre tacks, keeping its luff, and is followed in succession; when the leaders are in the line of the wind, they all fill (Fig. 81).

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE OTHER TACK;
 THE VAN SQUADRON FORMING TO LEeward, THE CENTRE TO WINDWARD,
 AND THE REAR IN THE CENTRE.

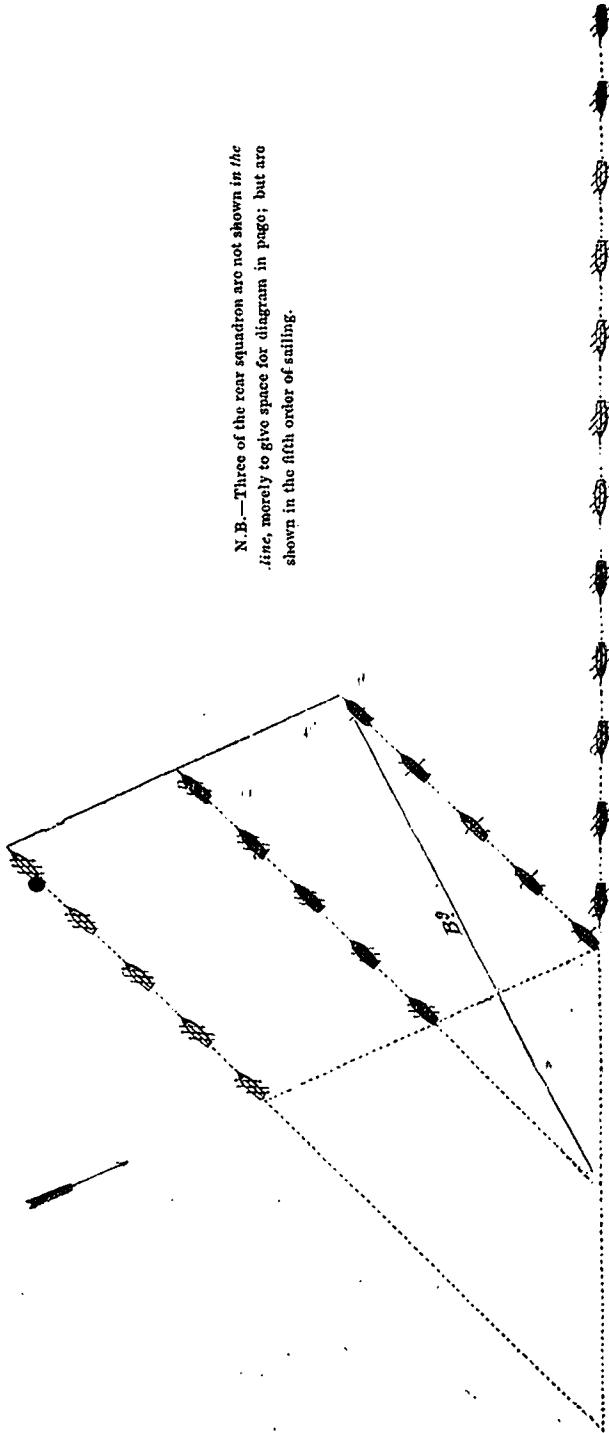


Fig. 82.

The van tacks in succession; when about, the column brings to. The leader of the centre column, which is now to form to windward, tacks as soon as the last of his column passes the new lee column, and is followed in succession by his division. The leader of the rear, which is to form the centre column, tacks when he has the leading ship of the lee column in a line perpendicular to the wind. When the ships of the rear have all tacked, all the columns make the necessary sail for regulating the order (Fig. 82).

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE OTHER TACK;
THE VAN SQUADRON FORMING TO LEEWARD, AND THE REAR TO WINDWARD.

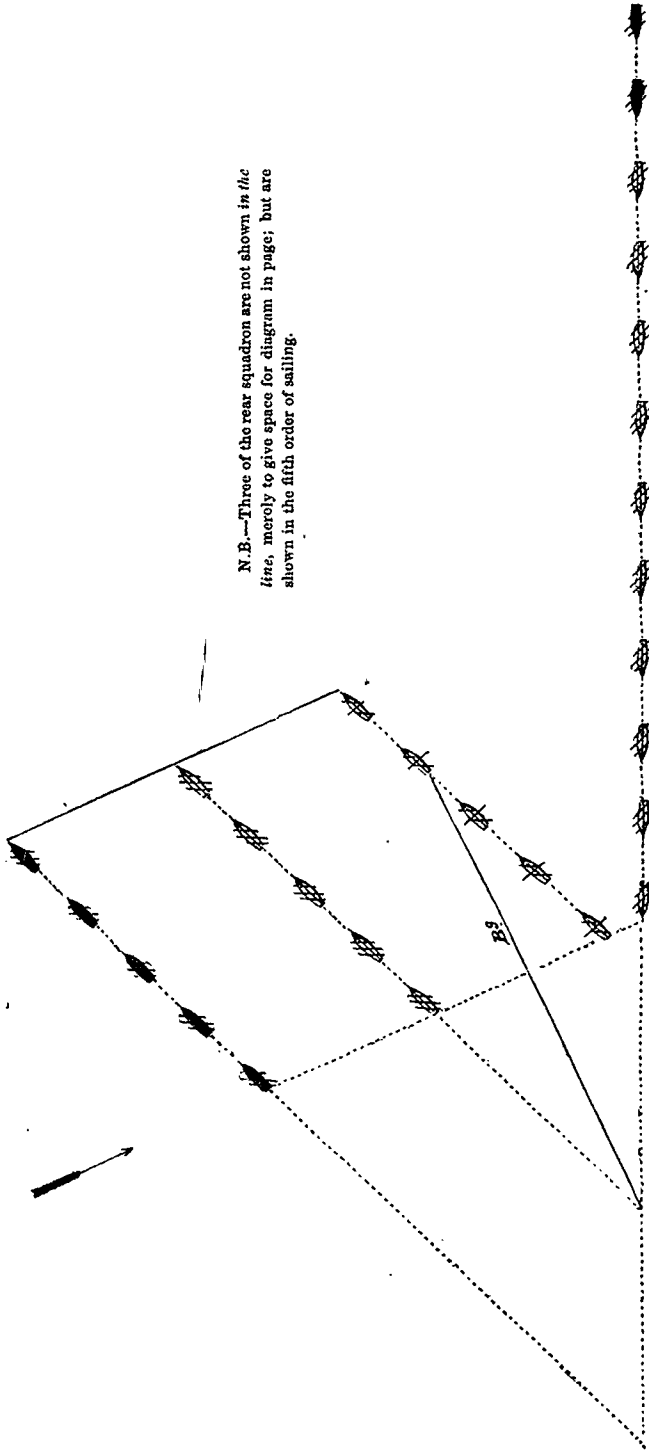


Fig. 83.

The van tacks in succession; and when the column is about, it brings to. The centre and rear carry sail, and tack in succession. The centre tacks when its leader has the second ship of the lee column in a line perpendicular to the wind. When the centre has gone so far as to bring its leader in the line of the wind from the leader of the lee column, it brings to. The rear tacks in succession, when its centre ship passes astern of the centre column; and when all the columns are in the proper bearing, fill (Fig. 83).

TO CHANGE FROM THE LINE OF BATTLE TO THE FIFTH ORDER OF SAILING ON THE OTHER TACK;
 THE REAR SQUADRON FORMING TO WINDWARD, THE VAN SQUADRON AS CENTRE COLUMN,
 AND THE CENTRE SQUADRON TO LEEWARD.

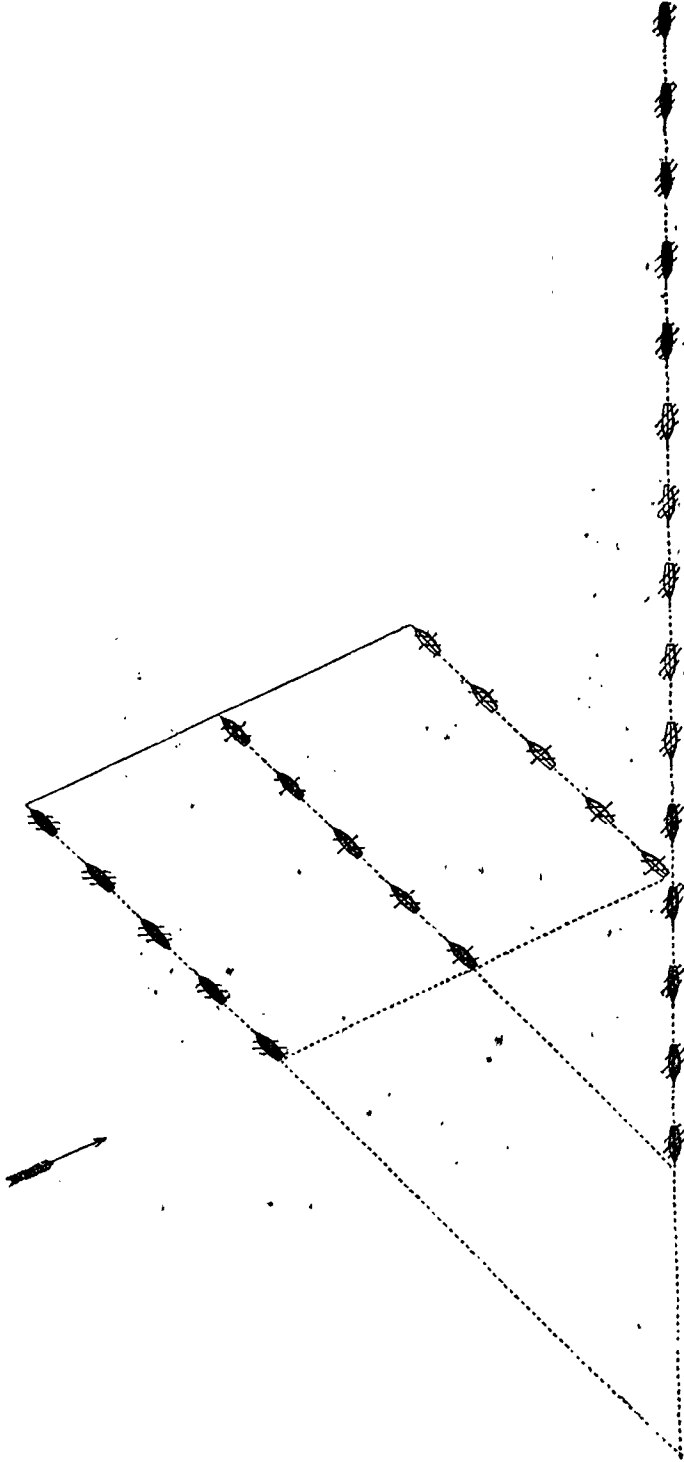


FIG. 84.

The van and centre tack in succession, the centre leader tacking when the centre ship of the van tacks; when they have all tacked, they bring to. The rear, which is to be to windward, carries sail, and tacks in succession when its centre ship passes astern of the centre column. The columns make or shorten sail, to regulate their positions (Fig. 84).

TO FACE PAGE 89.

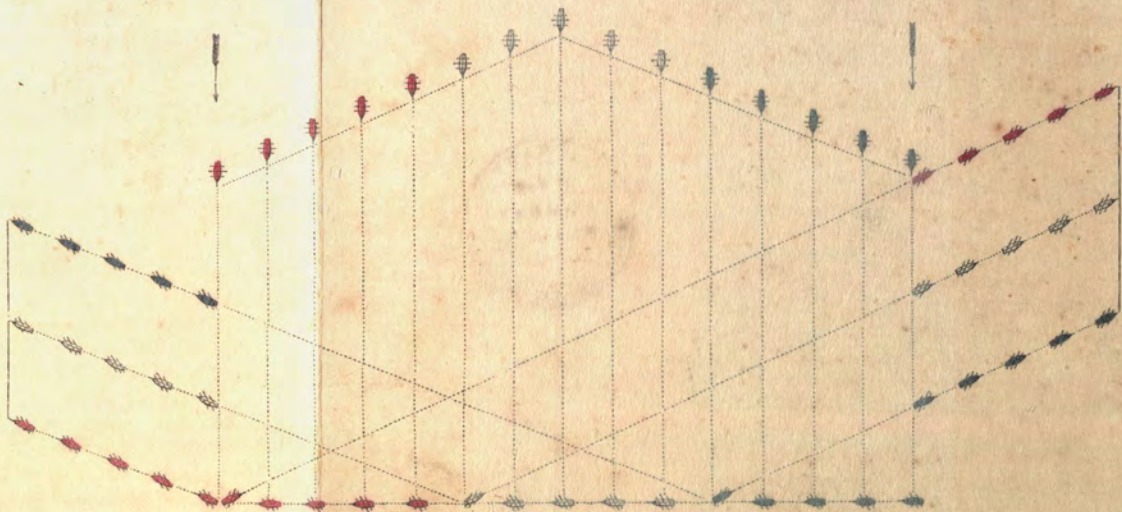


FIG. 85.

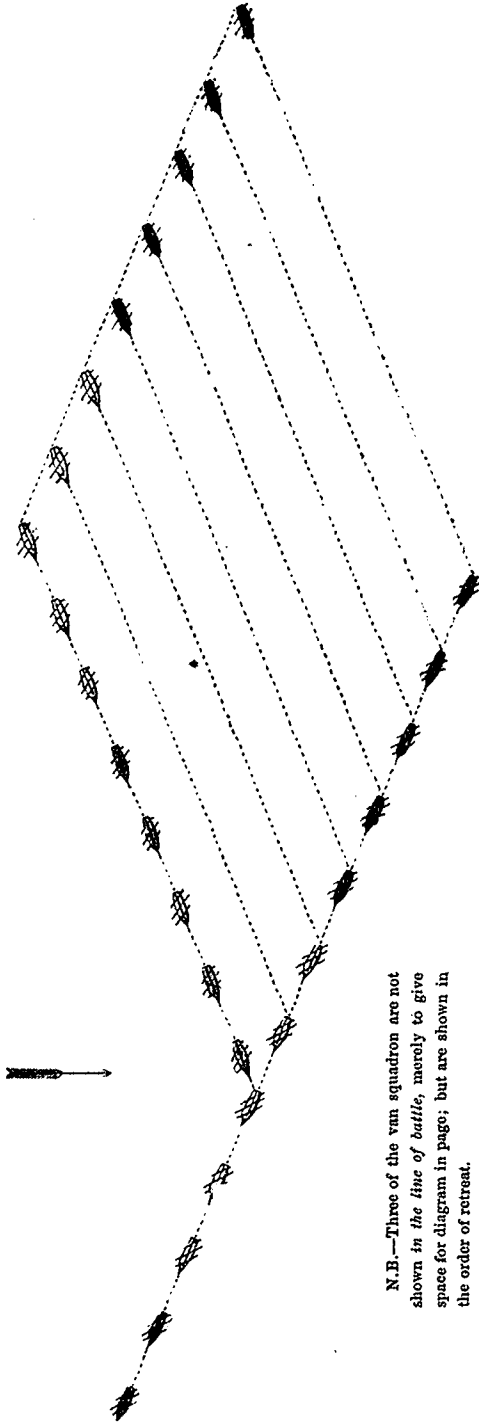
TO CHANGE FROM THE LINE OF BATTLE TO THE ORDER OF RETREAT.

The leader keeps away four points, and is followed in succession by one-half of the line to the centre, included. When the centre has borne away, the order of retreat is formed.

TO CHANGE FROM THE ORDER OF RETREAT TO THE FIFTH ORDER OF SAILING
(OR THREE COLUMNS).

The most simple method is to pass to the line ahead, and thence to form the columns. But, if the fleet be somewhat dispersed, it may be performed thus (Fig. 85):—It must bring to on the line perpendicular to the direction of the wind, as in the second order of sailing; and to effect this, the two extreme ships of the wings having brought to on that line, as soon as the other ships gain their respective stations on that line, they bring to on the same tack. After which, the ships all filling at the same time, the leaders of the columns haul their wind upon the proper tack, while the other ships of the columns run large two points, until they respectively gain the position at which their leaders spring their luffs, when they haul to the wind in succession. The lee column, having less distance to run, carries very easy sail; the centre and weather columns increase theirs in proportion to their distances. According to the tack which the fleet is to take in the fifth order of sailing, the van squadron will be either to windward or to leeward (Fig. 85).

TO CHANGE FROM THE ORDER OF RETREAT TO THE LINE OF BATTLE.



N.B.—Three of the van squadron are not shown in the line of battle, merely to give space for diagram in page; but are shown in the order of retreat.

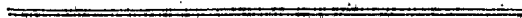
FIG. 86.

The leader of the wing which is to form the head of the line, hauls to the wind (Fig. 86), and that wing follows in succession, steering in each other's wake. The other wing goes four points free on the same tack, and thus runs parallel to the wing which commenced the evolution. They haul up together when they arrive in the wake of the line.

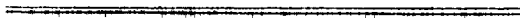
NAVAL TACTICS.

PART V.

TO CHANGE AND RE-FORM UPON SHIFTS OF WIND.



NOTE.—The lines in the diagrams refer only to the change of position, and do not indicate the exact course to be steered in performing the evolution.



TO CHANGE AND RE-FORM UPON SHIFTS OF WIND.



TO RE-FORM THE FIFTH ORDER OF SAILING, THE WIND COMING FORWARD.

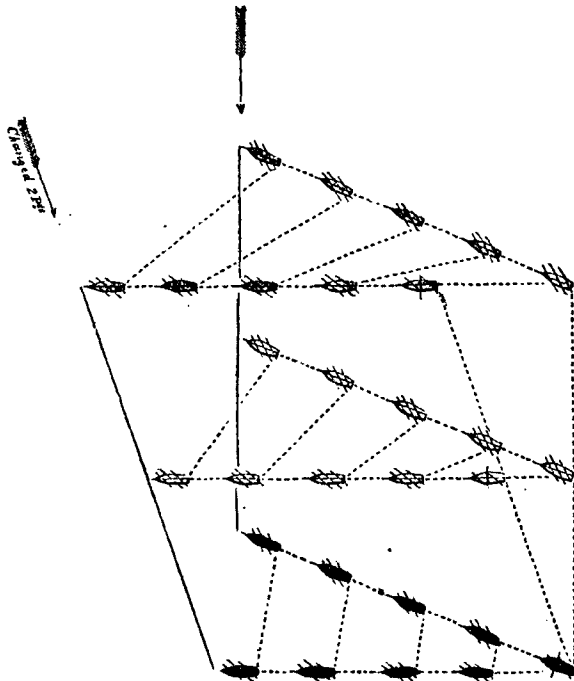


FIG. 87.

If the wind does not alter more than six points.—The sternmost ship of the lee column brings to (Fig. 87), and is used as a mark for the evolution. The lee column keeps away in the direction of the former wind, and brings to when in bearing with the sternmost ship, according to the new wind. The weather and centre columns edge away together, except the sternmost ships, which merely steer by the wind to bring on their bearing with reference to the sternmost ship of the lee column, when they bring to. The weather and centre columns bring to as they form in the column from their sternmost, the leaders observing their bearing and distance from the leader of the lee column, when they all fill. — *If the wind*

comes forward from six to twelve points.—The order is formed by tacking, and proceeding as if the wind had come ahead while on that tack. The weather column then becomes the lee column, and the lee column to windward.

Should the wind shift more than twelve points, the tack being changed, the wind may be said to come aft.



TO RE-FORM THE FIFTH ORDER OF SAILING WHEN THE WIND COMES AFT TWO POINTS.

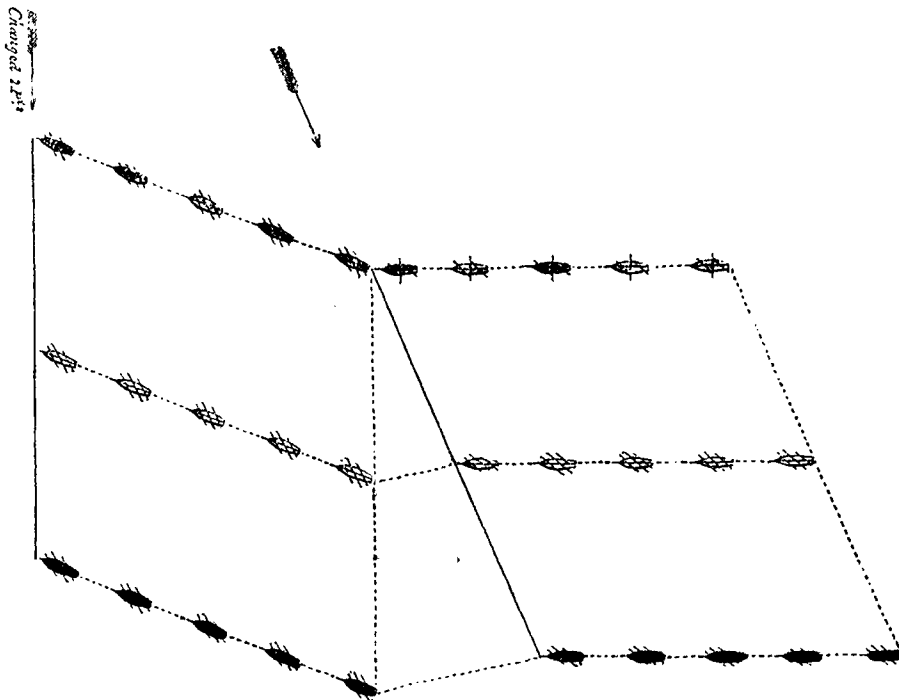


FIG. 89.

The weather column brings to. The leaders of the centre and lee columns keep away three points from the new wind, followed by their columns; and when the leading ship of the weather column bears from the leaders of columns in the direction of the wind, they haul to the wind at the same time the leader of the weather column fills; then the leaders of columns, keeping their wind, are followed in succession by their columns (Fig. 89).

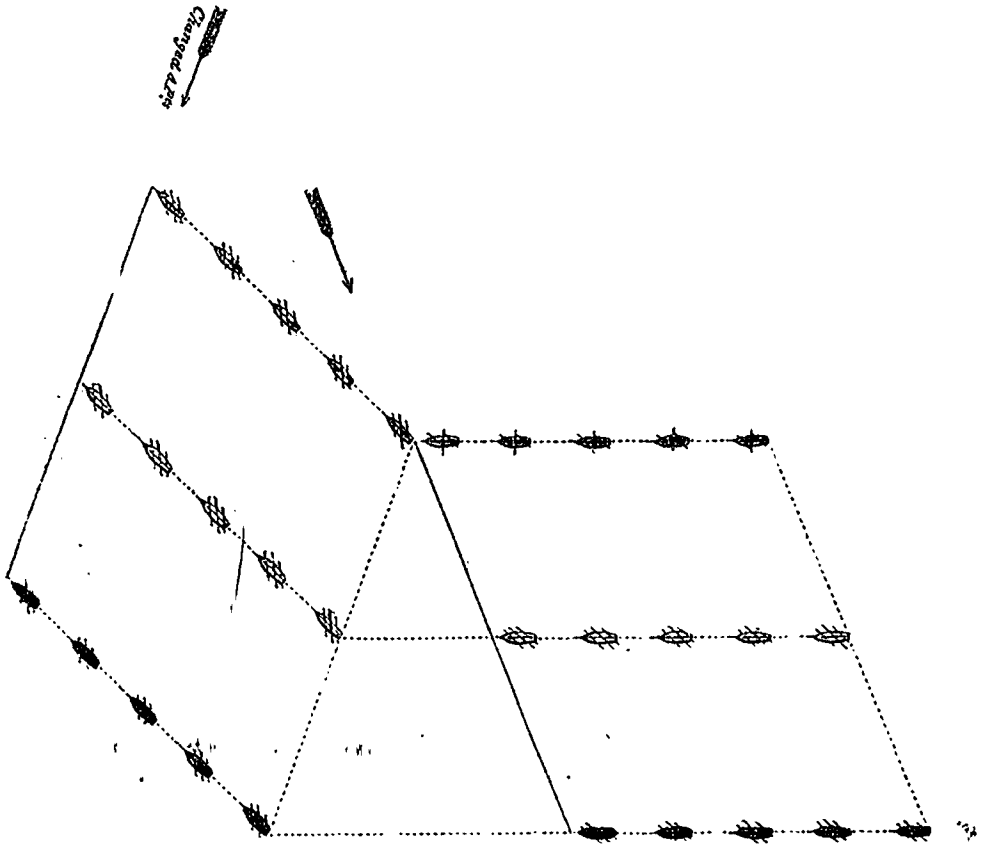


FIG. 90.

If the wind shifts four points aft.—The weather column brings to. The centre and lee columns stand on the same course they laid previous to the shift of wind. When the leader of the weather column bears from the leaders of the other columns in the direction of the wind, the weather column fills, when the whole of the leaders haul to the wind, and are followed in succession by their columns (Fig. 90). The lee column, having the greatest distance, should carry all sail.

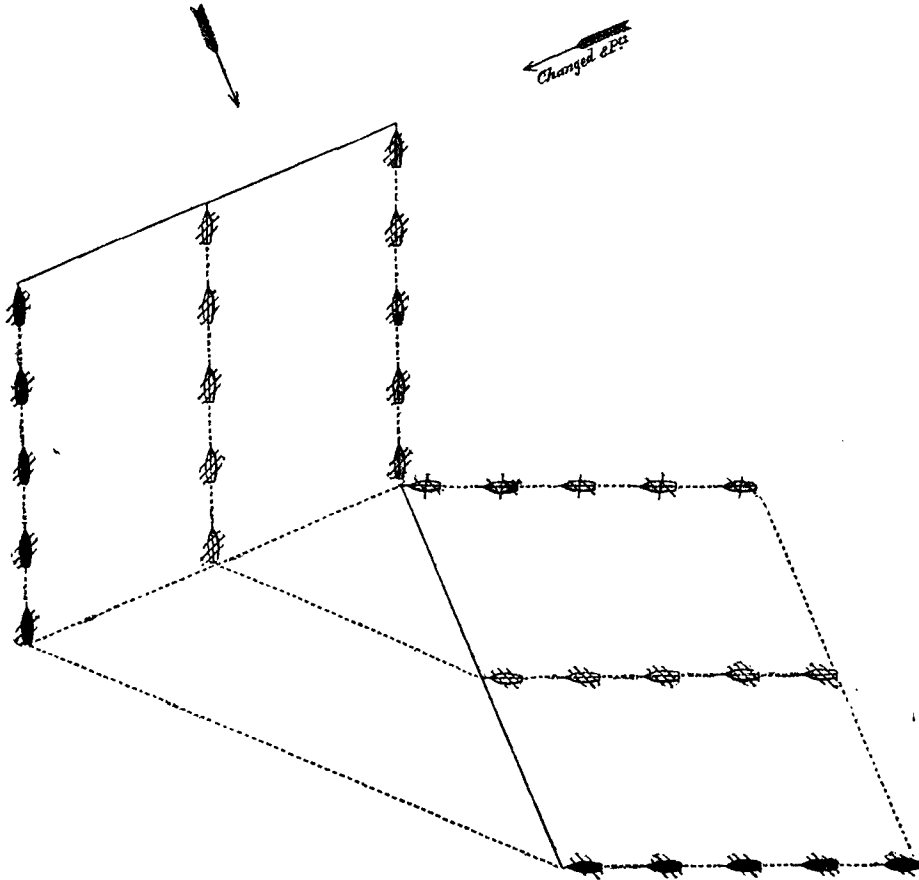


FIG. 91.

If the wind shifts eight points aft, and it is not intended to change the tack.—The weather column brings to. The centre and lee leaders of columns haul up two points, and are followed in succession by their columns. When the leader of the weather column bears from the leaders of the other columns in the direction of the wind, the weather column fills; when all the leaders haul to the wind, and are followed in succession by their columns (Fig. 91). The lee column, having the greatest distance, should carry all sail.

=====

TO CHANGE FROM THE FIFTH ORDER OF SAILING TO THE LINE OF BATTLE,
WHEN THE WIND SHIFTS FORWARD.

If the wind comes forward but inconsiderably, the change may be made in the plan recommended under the head of "TO CHANGE FROM THE FIFTH ORDER OF SAILING (OR THREE COLUMNS) TO THE LINE OF BATTLE ON THE SAME TACK; THE WEATHER COLUMN FORMING THE VAN, AND THE LEE COLUMN THE REAR," page 56.

TO CHANGE FROM THE FIFTH ORDER OF SAILING TO THE LINE OF BATTLE,
WHEN THE WIND SHIFTS FORWARD ABOUT THREE POINTS.

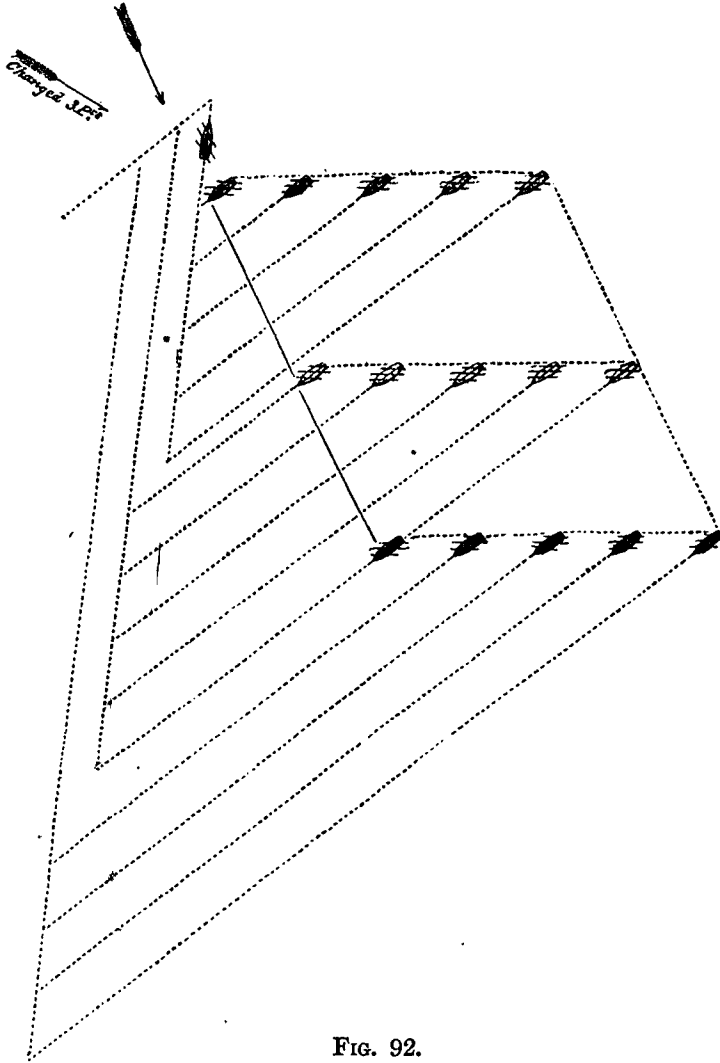


FIG. 92.

The leader of the weather column tacks, and keeps under easy sail. The rest of the column, carrying sail, keeping on the same tack, go away together in bow and quarter line, to gain their leader's wake, where they tack in succession. The centre leader tacks somewhat to windward of the wake of the weather column, in order to tack clear of it. The leader of the lee column acts in the same manner with regard to the centre column; and, as the two last columns will be to windward of the van, they edge away, and form astern of it. If it be intended to continue the first tack, the leader of the weather column must re-tack soon after his first tack, and be followed in succession by the line (Fig. 92).

TO CHANGE FROM THE FIFTH ORDER OF SAILING TO THE LINE OF BATTLE, WHEN THE WIND SHIFTS FORWARD MORE THAN THREE POINTS.

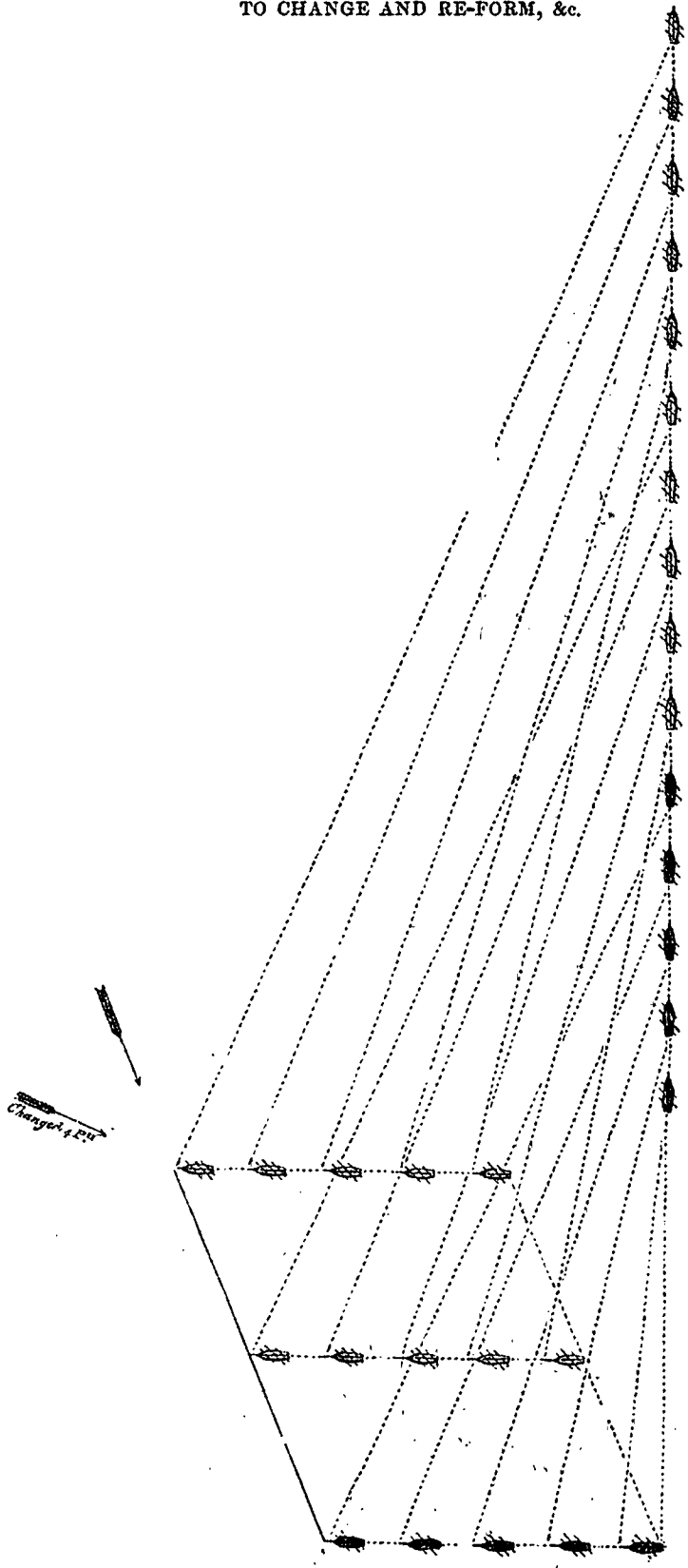


Fig. 93.

The fleet would run too far to leeward by performing the evolution as in the preceding Fig. (92). The whole should tack together, as in Fig. 93; when the leaders of columns go free two points, the succeeding ships doing the same, carrying the necessary sail to preserve their respective positions astern of their immediate leaders, and keeping away, to bring the leading ship of the line in the proper bearing for the tack.

TO CHANGE FROM THE FIFTH ORDER OF SAILING TO THE LINE OF BATTLE, WHEN THE WIND COMES AFT LESS THAN SIX POINTS.

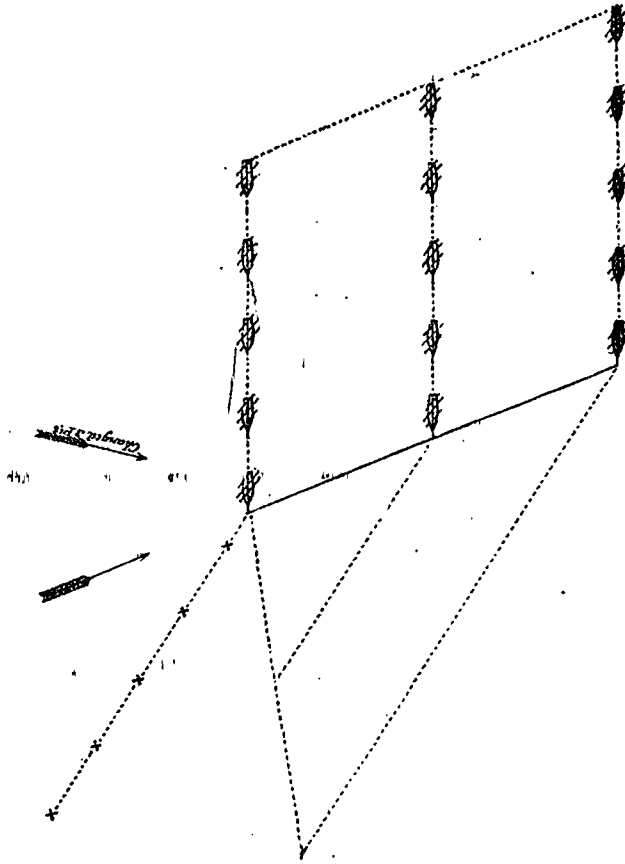


FIG. 94.

The leader of the weather column hauls his wind, and is followed in succession by his column (Fig. 94). At the same time the leaders of the other two columns haul their wind, and carry sail, standing on, until, by tacking, they can fetch the position where the weather leader hauled his wind; when they respectively re-tack in succession, and form in the line of battle.

TO CHANGE FROM THE FIFTH ORDER OF SAILING TO THE LINE OF BATTLE,
WHEN THE WIND COMES AFT LESS THAN SIX POINTS,
FORMING ON THE LEE COLUMN.

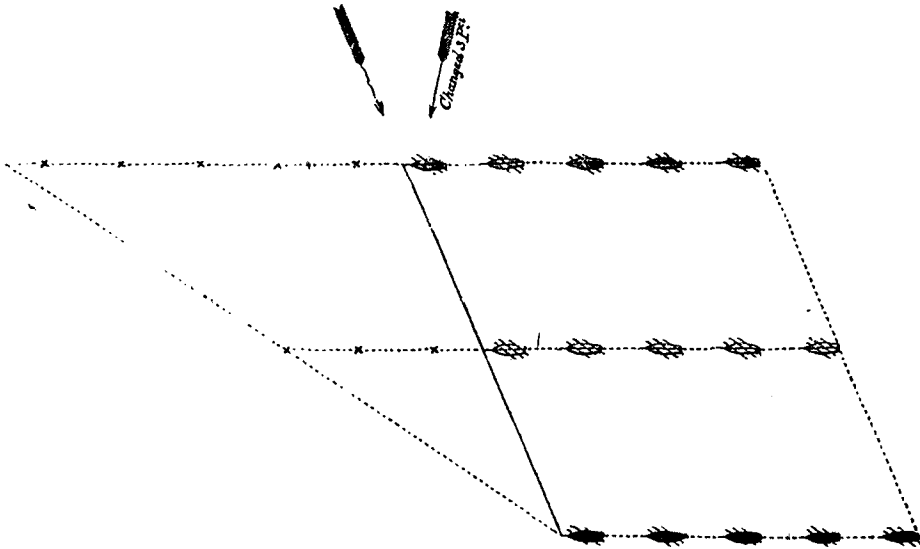


FIG. 95.

The weather and centre leaders bear away the number of points that the wind comes aft, until they bring the van ship of the lee column to bear from them in the direction of the close-hauled line; when they haul to the wind, and are followed in succession by their columns; but the centre should carry less sail than the weather column, to give space for the weather column to form ahead. The lee column at the commencement brings to, and continues so until the leaders of the other columns have hauled to the wind in the line; when the lee column fills, and its leader hauls into the line astern of the centre column, followed by its column in succession (Fig. 95).

TO CHANGE FROM THE FIFTH ORDER OF SAILING TO THE LINE OF BATTLE,
WHEN THE WIND COMES AFT EXACTLY SIX POINTS.

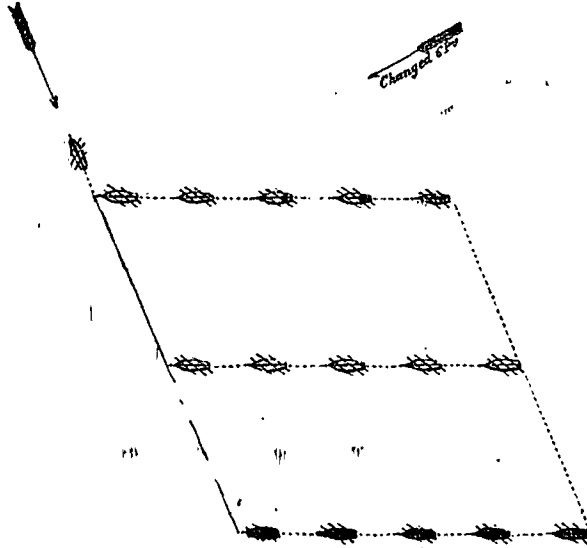


FIG. 96.

The columns, when hauled up after their leaders, will find themselves in line (Fig. 96); but as this would close the line too much, the ships of the weather column must carry sail after their leader, the centre should move on under less sail, and the lee column merely keep steerage-way, to give space for the columns to form astern of each other at their proper distances.

TO CHANGE FROM THE FIFTH ORDER OF SAILING TO THE LINE OF BATTLE,
WHEN THE WIND COMES AFT MORE THAN SIX POINTS.

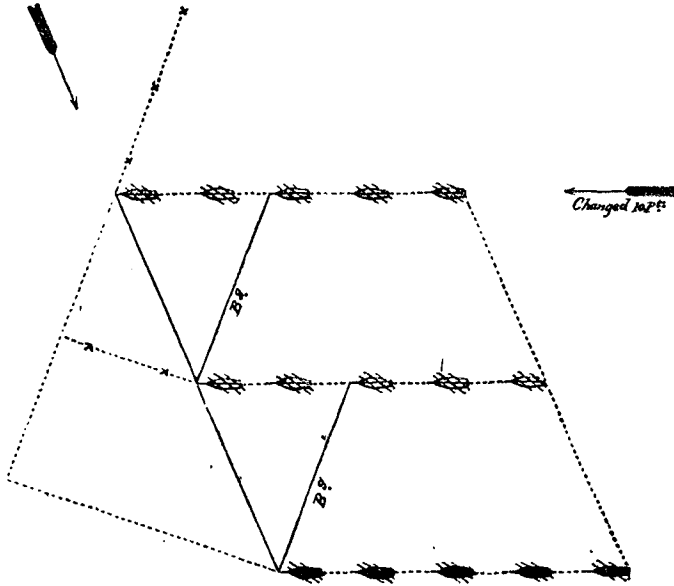


FIG. 97.

The line may be formed, preserving the regular order of the columns, thus (Fig. 97):—The centre and lee columns bring to. The leader of the weather column hauls to the wind, and his division keeps away, and forms successively in his and each other's wake. The leader of the centre fills when the last ship of the weather column bears from him in the direction they will sail when close hauled; he then runs perpendicular with that bearing, and hauls up when in the wake of the van division, his column following in succession. The lee column will manoeuvre with regard to the centre, in the same manner that the centre did with the van.

TO RE-FORM THE LINE OF BATTLE, THE WIND COMING FORWARD.

The most disadvantageous change of wind that can happen to a fleet in a line of battle, is when it comes forward; because the order is then oftentimes with difficulty re-formed, particularly if the enemy is in sight.

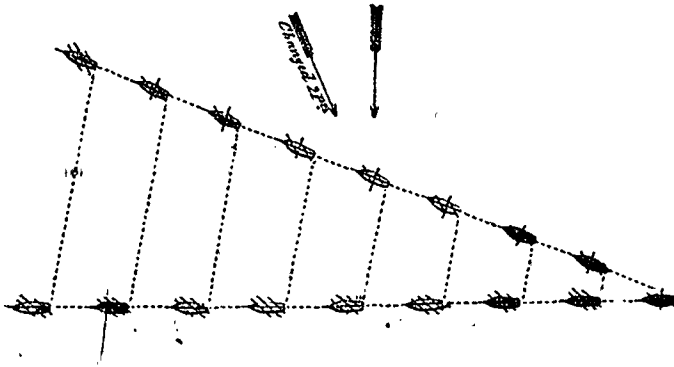


FIG. 98.

FIRST METHOD.

If the wind comes forward from one to six points, and it is intended to keep the fleet on the same tack, each ship having fallen off, the whole line brings to, except the headmost ship, which bears away the necessary number of points.

This number of points is known by deducting from 8 (being one-fourth of the points of the compass), one-half of the points which the wind changed: thus—If the wind has come two points forward, as Fig. 98, deduct 1 from 8, and 7 remain, as the number of points the ships are to run large.

The headmost ship having borne away, the ship which follows her fills, and bears away as soon as she brings her leader to bear on the close-hauled bearing. All the other ships proceed successively in the same manner; and at length they altogether haul to the wind in the wake of their leader; when they get upon the close-hauled line with the sternmost ship, which then fills, and stands on, close-hauled.

SECOND METHOD.

The whole line tack together, and go in bow and quarter line, the rear ships carrying all sail, and the headmost ships shortening sail, until the fleet is on the close-hauled line of bearing for the other tack, when they re-tack together. Should the proper distances not be preserved, the fleet will pay attention to it immediately after re-tacking (Fig. 99).

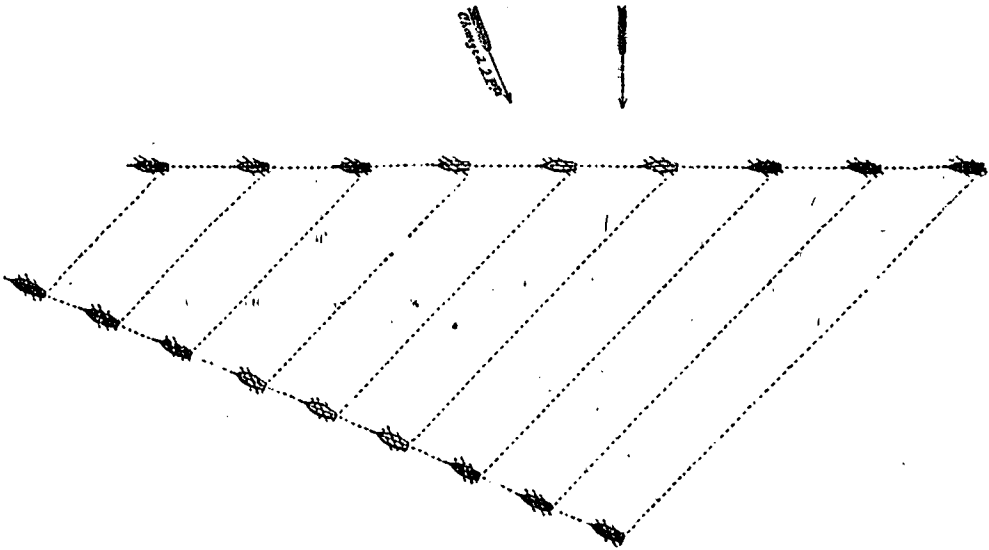


FIG. 99.

ANOTHER PLAN TO RE-FORM THE LINE OF BATTLE, WHEN THE WIND COMES EXACTLY
FOUR POINTS AHEAD.

The whole fleet is to wear round until their heads come to the point exactly opposite to their former course; when the rear ship (now become the van) is to run four points free on that tack, the rest of the fleet follow in succession; and when the last ship (the former van) is in the wake of the headmost in the line, all the fleet wear together, and the order will be re-formed on the former tack.

If the wind comes eight points ahead.—The fleet is to wear altogether, until their heads come to the opposite point from their former course; then the rear ship, having become the van, is to haul close to the wind on the same tack. All the other ships are to haul in succession, and range in the wake of the leading ship (Fig. 100).

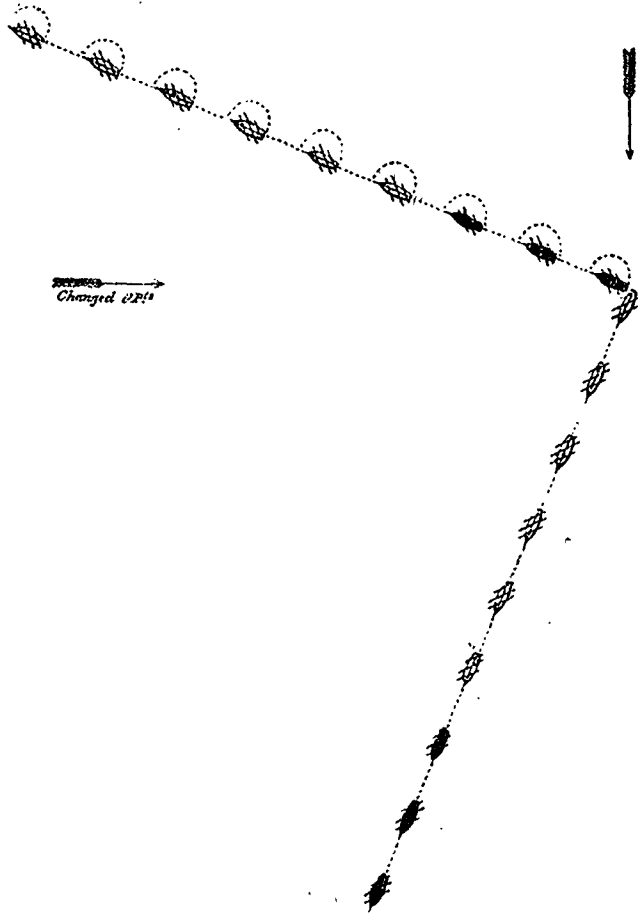


Fig. 100.

If the wind comes twelve points ahead.—The fleet need only change its tack, and the order is not disturbed; but if necessary to preserve the tack, the ships must all wear together, and haul their wind in succession on the port tack.

TO-RE-FORM THE LINE OF BATTLE ON THE OTHER TACK, IN A SHIFT OF WIND
FROM ONE TO SIX POINTS FORWARD.

All the ships of the fleet are to wear, until their heads come to the opposite point from their former course; and then the rear ship (now the van) is to haul close to the wind on that tack: the other ships haul in succession. This would place the fleet to windward; and from this, by wearing in succession, they would be in line of battle for the former tack.

If the wind comes ahead more than six points, and less than twelve.—The fleet, changing the tack, will manœuvre in the same way as if it had come ahead not more than six points. In this situation, if two fleets are in sight, the advantage of the weather gage will be gained by the fleet that was before to leeward.

Should the wind change more than twelve points, it cannot then be said to come forward.

TO RE-FORM THE LINE OF BATTLE, THE WIND COMING AFT.

If the wind has shifted but a little.—The leader hauls his wind, while the seconds go under easy sail, steering a little large, for the masts of the preceding ship.

If it be intended to change the tack, the whole fleet tack together; and then the sternmost, becoming the leader, hauls up, and the rest bear up, steering for each other's masts, and forming respectively astern.

If the wind comes aft four points.—The whole tack together, and the line is re-formed on the other tack immediately. By this, however, the van becomes the rear,—an expedient necessary on many occasions to save time, and keep to wind-

ward. Indeed, if it change only two or three points, the fleet may, by tacking together, and hauling to the wind in succession after the van ship (the former rear), be readily re-formed on the other tack.

If the wind comes aft many points.—The leader or van hauls his wind; the rest stand on large, as they must necessarily find themselves upon the changing of the wind; and as they arrive in the wake of their leaders, they haul up. This evolution, which is very simple, is advantageous to a fleet to leeward, and wishing to engage, or come nearer to the enemy: it may even sometimes gain the wind, by all the ships carrying sail as they luff to.

If the wind changes sixteen points.—All the ships heave round on the other tack immediately, by which means the fleet will be sailing four points free; then the ships tacking or wearing together, the order of battle will be re-formed on the same tack as they were before the shift of wind. This evolution is advantageous, both because it is quickly executed, and also keeps the fleet as much to windward as possible. But, if keeping to windward be not an object, the whole fleet shift the tack, brace about, and stand on; the leading ship hauls close to the wind, and the rest follow in succession.

TO CHANGE FROM THE LINE OF BATTLE TO THE ORDER OF RETREAT,
THE WIND COMING FORWARD.

This may be done, whether the wind comes forward or aft, by first re-forming the line of battle, and then changing from that to the order of retreat. This is the most certain, but not the shortest method. It has, however, this advantage,—that it does not so quickly communicate the intention to the enemy. But, as this double manœuvre would require some considerable time, and circumstances will not always permit it, this evolution may be executed as Fig. 101.

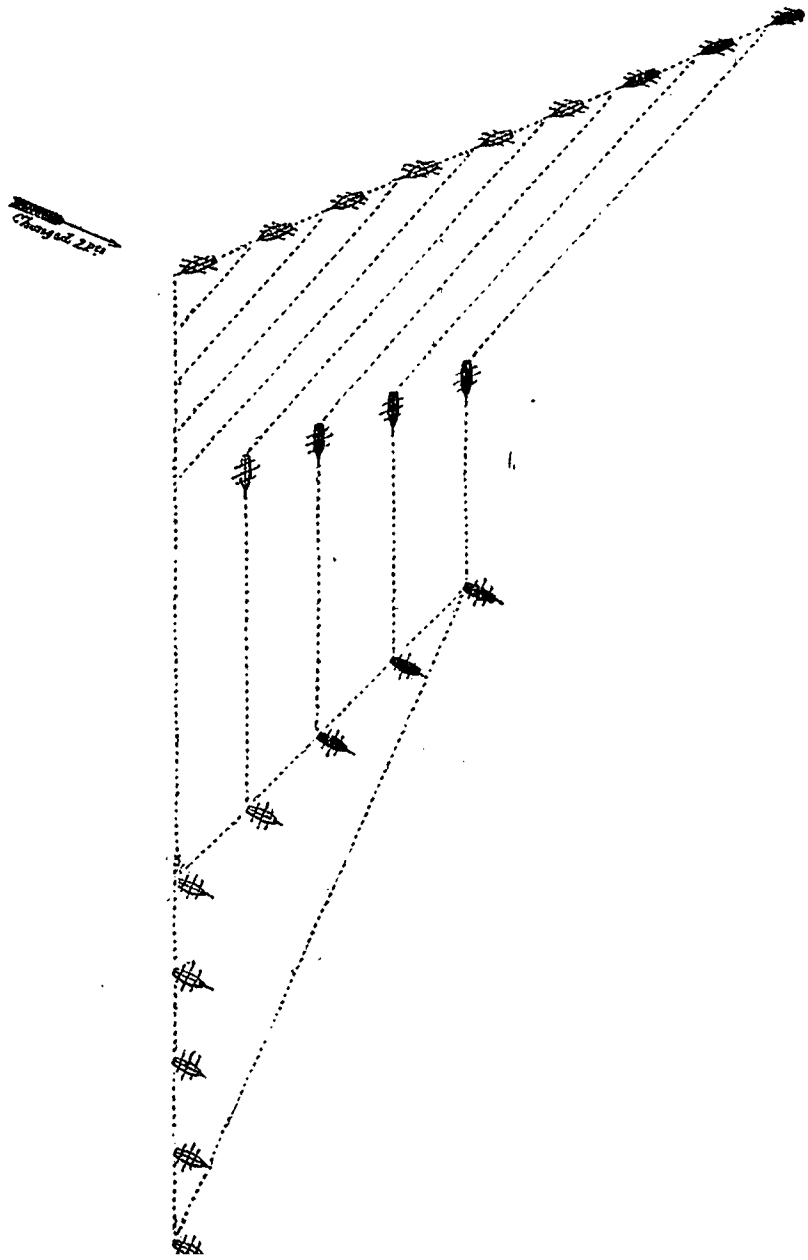


FIG. 101.

EXPLANATION OF FIG. 101.

The fleet in line having fallen off (Fig. 101), the leader of the van goes four points free; the rest stand on, close hauled, in order to gain the wake of the leader, and each other respectively. When the centre ship has arrived at the angular point, (that is, in the wake of his second ahead,) that wing is formed. The rear wing will be easily formed, by keeping away two points until abreast of the leading wing; when they steer a parallel course to them, to form the rear wing. The ships in forming must adapt the necessary sail to gain their proper positions.

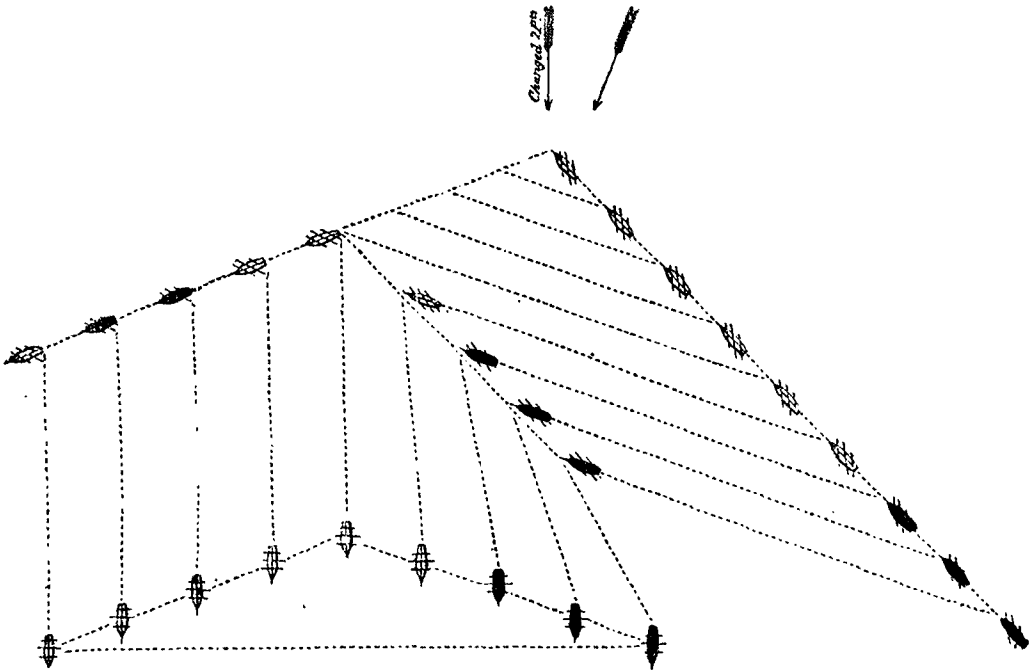


FIG. 102.

If the admiral should wish to steer a course when the angular ship has arrived at her station (Fig. 102), the rear wing will not have time to form with regularity, as recommended in the preceding (Fig. 101); but it must be effected by adapting the necessary sail in running for their stations.

TO CHANGE FROM THE LINE OF BATTLE TO THE ORDER OF RETREAT,
THE WIND COMING AFT.

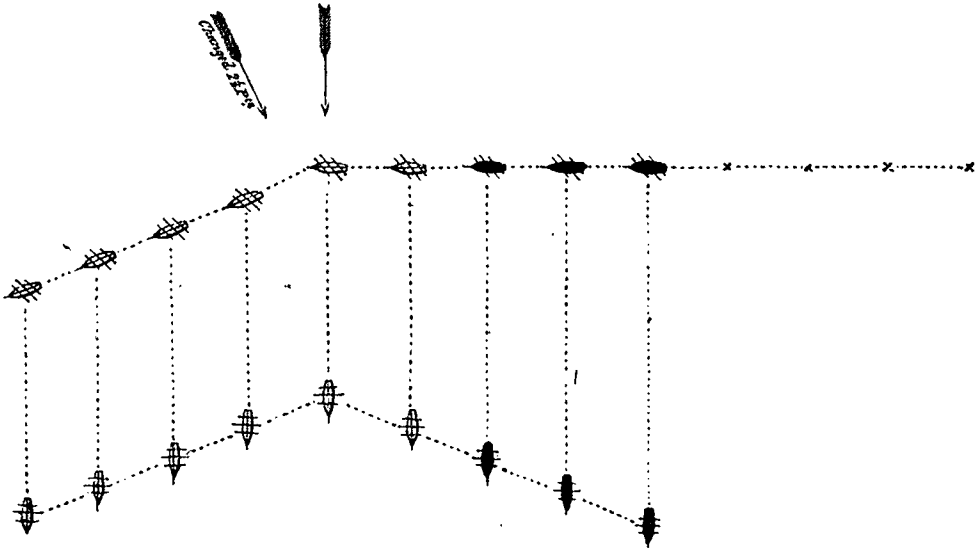


FIG. 103.

If the wind comes aft from one to four points.—The leader of the van goes four points free, and the ships which are to compose his wing, follow in each other's wake. The rest of the line (to the sternmost) continue on a wind; but as soon as the centre ship is in her position, they go free together as many points as the change of wind requires, observing to carry sail in proportion to the angular ship, until in the bearing for the order of retreat (Fig. 103).

If the wind should come aft more than four points.—The evolution may be performed by all the line keeping before the wind, arranging themselves in the second order of sailing, on the line perpendicular to the direction of the wind, from which the order of retreat is to be formed.

TO RE-FORM THE ORDER OF RETREAT, THE WIND CHANGING.



If the wind changes but little.—The order is easily recovered, if the ships of both wings keep reciprocally abreast of each other on a line perpendicular to the direction of the wind, and in line of bearing with the angular ship.

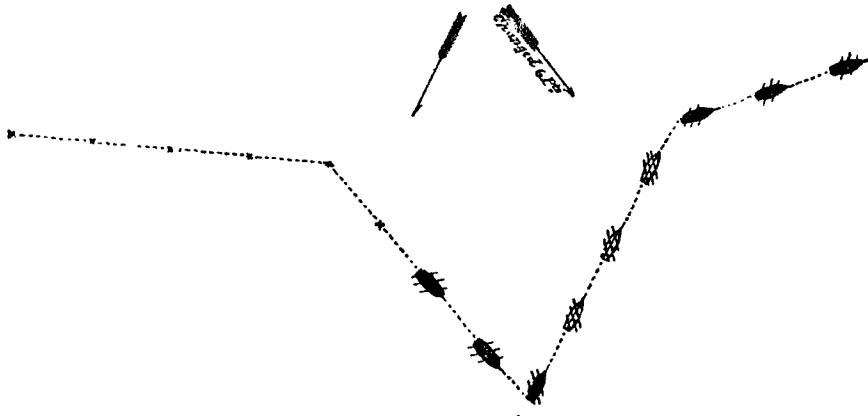


FIG. 104.

If the wind changes much, but without blowing within the angle formed by this order (Fig. 104).—The leader of the lee wing hauls his wind, and is followed in succession by the ships of that wing. The ships of the weather wing stand on for the angular ship; and as they successively arrive at the angular point, will bear away after the lee wing, and haul to the wind in succession at the point where the lee wing began the evolution. When the leader observes that the centre ship is right astern, he keeps away four points, and is followed in succession by his wing; and when the centre ship has arrived at the angular point of the new lines of bearing, the evolution is completed. This evolution, as well as the next, is performed merely by the whole following the leading ship, and the whole stopping on the arrival of the centre ship at the angular point.

TO RE-FORM THE ORDER OF RETREAT, THE WIND CHANGING.

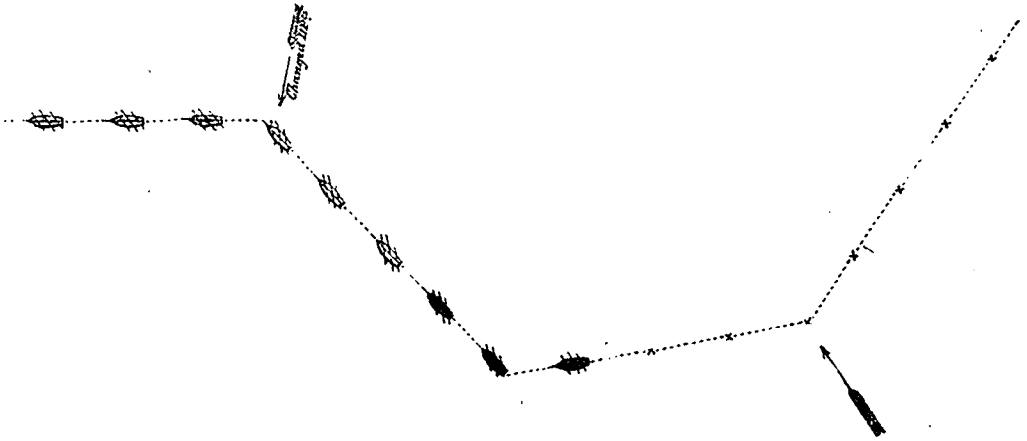


FIG. 105.

If the wind changes so considerably as to blow within the angle formed by this order (Fig. 105.)—The leader hauls his wind on the tack which he can take quickest; and the fleet, standing on their respective lines of bearing, move in the wake of the lee leader. When the leader perceives that the centre ship has gained the line right astern of him, he keeps away four points, and is followed by his wing. When the centre ship has arrived at the angular point of the new lines of bearing, the evolution is completed, and the proper course may be directly steered.

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 End of the Fifth Part.  
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NAVAL TACTICS.

PART VI.

EXPLANATORY REMARKS ON DIFFERENT SUBJECTS

CONNECTED WITH

A FLEET OR SQUADRON.

NOTE.—The lines in the diagrams refer only to the change of position, and do not indicate the exact course to be steered in performing the evolution.

EXPLANATORY REMARKS,

&c. &c.

IN WHAT THE FORCE OF A FLEET CONSISTS.

The principal strength of a fleet consists in good order and discipline; thence result an exact observance of signals, and a prompt execution of manœuvres.

A line of battle is strong in proportion to its close order, provided a proper regard is paid to the leaving of sufficient room for working the ships. If the ships of a line are not so close as that of the enemy, many of them must have to sustain the fire of more than one ship.

Advantages result from large ships and heavy metal. First:—In boarding, large ships possess a manifest superiority from their height, which facilitates to them the execution of this manœuvre, while it impedes the execution of it by a smaller ship upon a larger. Secondly:—In bad weather the large ships can, with greater safety, use their lower deck guns; and if the roughness of the weather should compel the ships to keep their lower ports close, the three-decked ships, for instance, will have the advantage of two decks to one; and in case of the upper deck being encumbered by shattered rigging, &c., they are only deprived of the use of a few guns. Large ships have greater solidity, resisting better an engagement; and, in strong breezes, sail equal, and often superior, to small ones; and in gales, with much sea, they have obviously the advantage.

From these facts, therefore, we may conclude that a fleet composed of a greater number of large ships will be found to prove more effective than a more numerous fleet of smaller ones.

ADVANTAGES AND DISADVANTAGES OF FLEETS TO WINDWARD AND TO
LEEWARD.

As fleets invariably engage in lines close to the wind, one of the lines must be to windward of the other. Each of these situations possess advantages and disadvantages.

The advantages of the fleet to windward.—The fleet to windward has the advantage of determining the time and distance of the action. They may board if they think proper, or follow the enemy close whenever he gives way; they may traverse the enemy's line, send steamers to annoy the van or the rear of the fleet; and they are not annoyed by the smoke, as the wind drives it to leeward to the enemy.

The disadvantages of the fleet to windward.—Is inability to quit the fight when once engaged, without being obliged to pass through the enemy's line; and being, perhaps, already much injured, they must expect to be still more so in passing through the enemy; and they have it not in their power to form the order of retreat. If they tack together to try to get off, the lee line could rake them whilst in stays, as Fig. 107, then tack together immediately, to follow them.

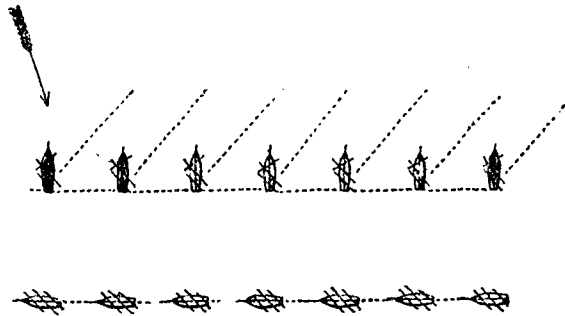


FIG. 107.

If it blows fresh, the weather ships, by heeling over considerably, may have their guns often run out again after firing, which very much retards their service, as they are obliged to be run in again for loading; and sometimes they cannot use the guns on the lower deck.

Another disadvantage is, that the disabled ships wishing to quit the line, cannot easily do it; because, in wearing, for want of being able to tack, they fall between the two lines, where they are raked; and even if they are fortunate enough to finish the evolution, it is very difficult for them, disabled as they are, to get to windward of their line: in which case, they would have to pass between it and the enemy, as Fig. 108.

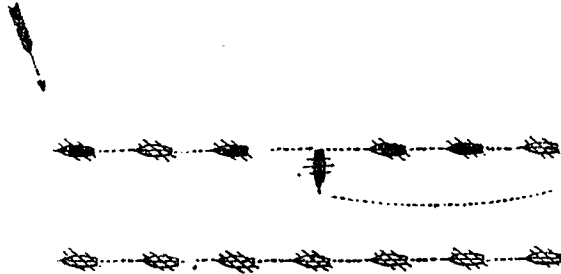


FIG. 108.

But these occurrences may be partly prevented, by having the disabled ships towed out of the line, to windward, by steamers or boats. The boats should always be hoisted out when weather permits, previous to an engagement, and placed the opposite side to the enemy, to avoid injury, and for service.

If the ships in the weather line are able to see the disabled vessel, they should, all together, bear up a little, keeping closer order, to cover the disabled vessel, and thereby approach nearer the enemy, taking care to preserve the line.

The advantages of the fleet to leeward.—The fleet to leeward has the advantage of using, with facility, their lower deck guns in any weather proper for fleets to come to action: they can quit the engagement at pleasure; their disabled ships are at liberty to leave their stations, without difficulty, if necessity requires it:—thus they find themselves wearing under cover of the rest, where they may soon be assisted by the steamers or boats. In this position they can form the order of retreat, or continue the action as long as convenient. The lee fleet can also, if superior in numbers, double the enemy, by making some of the van ships tack in succession: thereby passing through the weather line, and placing its extremity between two fires, as Fig. 109; for although the fleets are advancing on the line, yet there is every chance of cutting off some of the sternmost of the weather fleet.

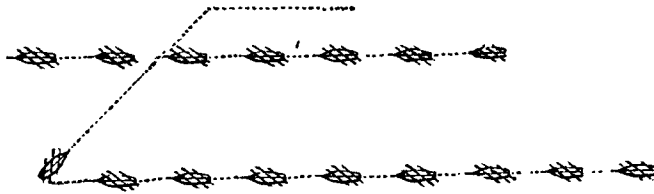


FIG. 109.

The disadvantages of the fleet to leeward.—Its disadvantages are, being enveloped in smoke, and the burning wads falling on board, which, if not attended to, may be productive of serious accidents. The fleet to leeward can hardly do more than accept the battle, without being able to determine either time or distance. It is but with difficulty they can avoid being boarded; or prevent their line being broken, if the weather ships are determined on doing it.

A general rule for the adoption of either the weather or lee gage cannot be laid down. Accident often ends our choice; but the strength of the fleet, the object of the enterprise, the state of the weather, and various other circumstances, will regulate the conduct of a commander-in-chief in his preference to one or to the other.

TO DISPUTE THE WEATHER GAGE.

Being in line of battle to leeward of a fleet of which you want the weather gage.—Your fleet should not extend ahead of the enemy; because, by keeping in that position, they would require to keep so much away, should they be inclined quickly to engage; and you may, by preserving that position, benefit by a change of wind.

Being in line of battle to leeward of a fleet, and the wind draws ahead.—The fleet should tack in succession, in the wake of each other, to restore the order; by which they would get a good deal to windward, and, if the wind shifts many points, may be the means of weathering the enemy.

If, however, your vessels are superior sailers to the enemy (which is seldom the case), you should go on the opposite tack, or pursue them, according to the principles of chasing, by tacking together when the centre ship brings the centre of the enemy exactly on her beam, preserving the line of bearing (Fig. 110).

TO DISPUTE THE WEATHER GAGE.

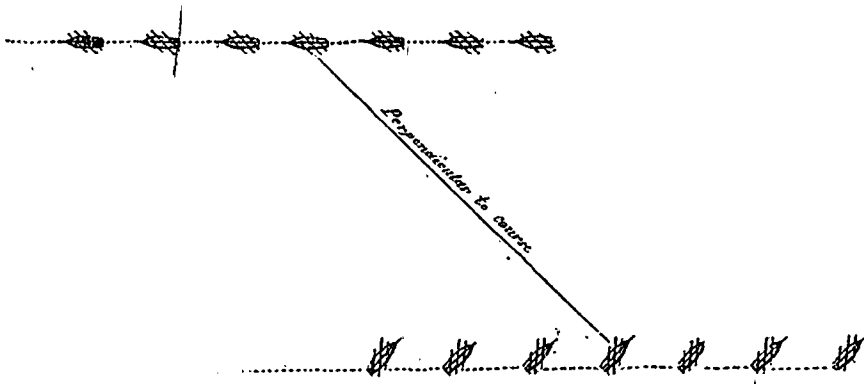


FIG. 110.

If the enemy persists in keeping the wind, and not coming to action, they must keep on the same tack with you, to prevent your getting into the wake, or doubling them, by passing ahead or astern, and weathering them.

TO DISPUTE THE WEATHER GAGE.

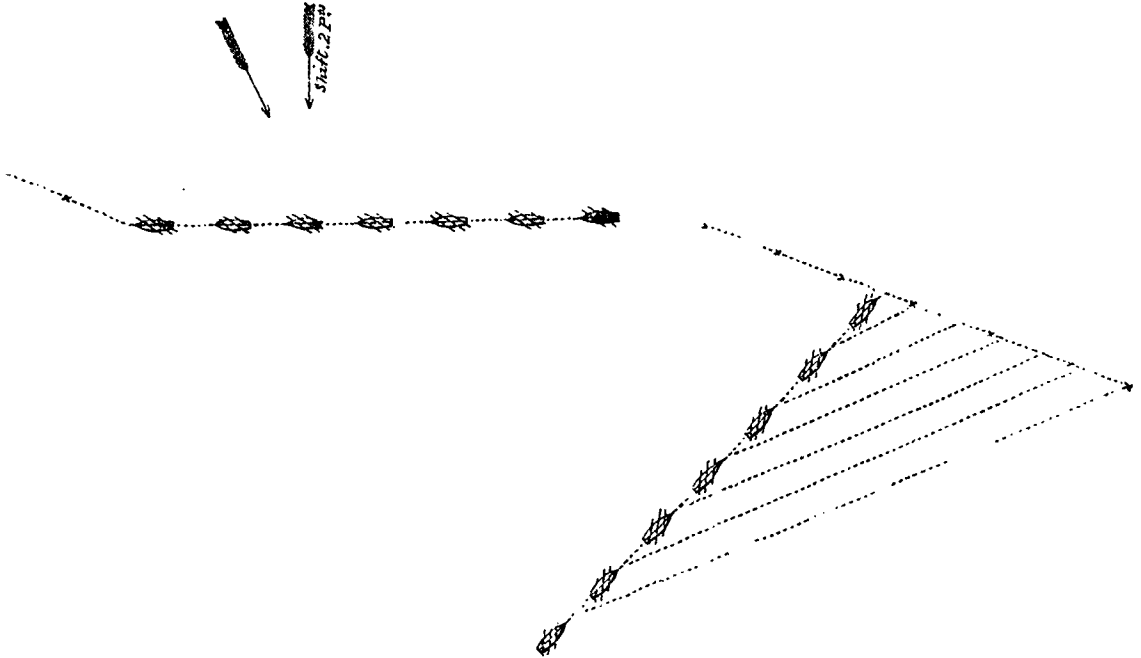


FIG. 111.

If the lee fleet be astern, and the wind shifts aft while they are on the contrary tack with the enemy.—The lee leading ship should tack immediately, and the rest of the fleet should stand on until they come into the wake of their leading ship in succession, when they tack, thereby forming the line; by which means they may even gain the wind, if the shift is great, as Fig. 111; for the only means the weather fleet has of restoring the line of battle is, by the van ship hauling to the wind, and the rest following her wake in succession.

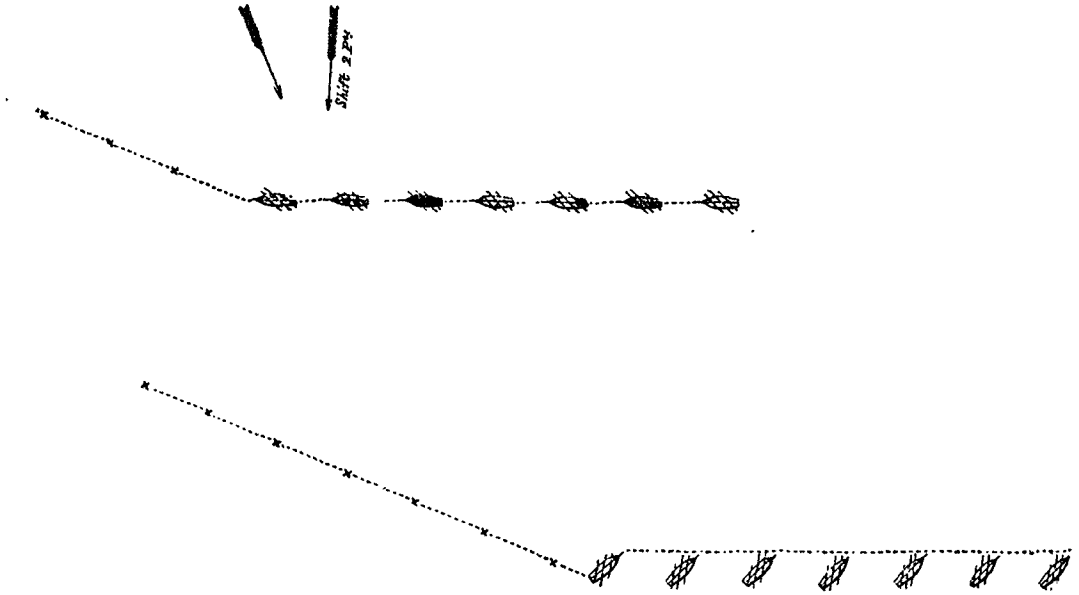


FIG. 112.

If the lee fleet be astern, and the wind shifts aft while they are on the contrary tack, sailing in line of bearing.—The leading ship tacks, and hauls to the wind. The rest of the fleet tack or wear together, when they run into the wake of the leading ship, and haul to the wind, thereby forming the order of battle (Fig. 112).

TO AVOID AN ENGAGEMENT.

When to windward.—The fleet, unless the wind changes, can but with difficulty be forced to action; because they may always keep on the tack which they most recede from the enemy, whether in line of battle, or in order of sailing: while the fleet to leeward must stand on, if it pursues by the rule of chasing, until it brings the centre ship of the weather fleet to bear perpendicular to the course

from the centre ship of the lee fleet, on either tack, which is the only way to close them with any chance, as Fig. 110. For if the lee fleet were to stand on one tack until they could weather the retreating, or weather fleet, they might be out of sight.

If the lee fleet is much superior to the weather, they may risk detaching a few of the fastest sailers, to try and come up with the rear of the weather fleet, and cut them off, or harrass them in their manœuvres; in which case, the weather fleet may abandon them.

The services of steam-vessels in moderate weather, towing, will in future be of great importance,—and more so, vessels having the screw propeller; by which means they can always take up any determined position.

If the constancy of the wind could be depended on, the weather fleet might, with impunity, preserve their advantage in presence of the enemy, were he not sufficiently strong to detach a squadron of superior sailers. But, as nothing is more frequent or common than the change of wind, it is best to keep as far as possible out of sight of a powerful adversary, when you do not find yourself absolutely in a situation to fight; and, on the contrary, the fleet inclined to come to action, ought to keep in sight, and as near as possible, keeping on the same tack as the enemy, in order to catch the opportunity of the first shift of wind, to bring him to battle.

When to leeward.—The fleet which is wishing to avoid an engagement, ought to form the order of retreat, to run from the enemy; and if in view of him, run on the same tack as the chasing enemy.

There are circumstances when the lee fleet may run with the wind aft, without assuming the order of retreat; as, for example, when they wish to gain time, or come to action, upon the enemy persisting obstinately in his pursuit of them.

These extraordinary cases excepted, a fleet never ought to run from the enemy without being in the order of retreat; as the rear is then in the best situation to extricate themselves in case of accident.

BEARING UP, TO ENGAGE THE ENEMY.

If the lee fleet keep close to the wind in order of battle, with the idea of bringing the weather fleet to action, the fleet to windward should, all together, if abreast of them, keep a little away, and steer exactly so as to keep their respective opponents (in the adverse line) on the same point of the compass from them. Thus, the fleet will soon be near enough to commence action; when all the fleet should haul to the wind together the moment preceding the commencement, as Fig. 113.

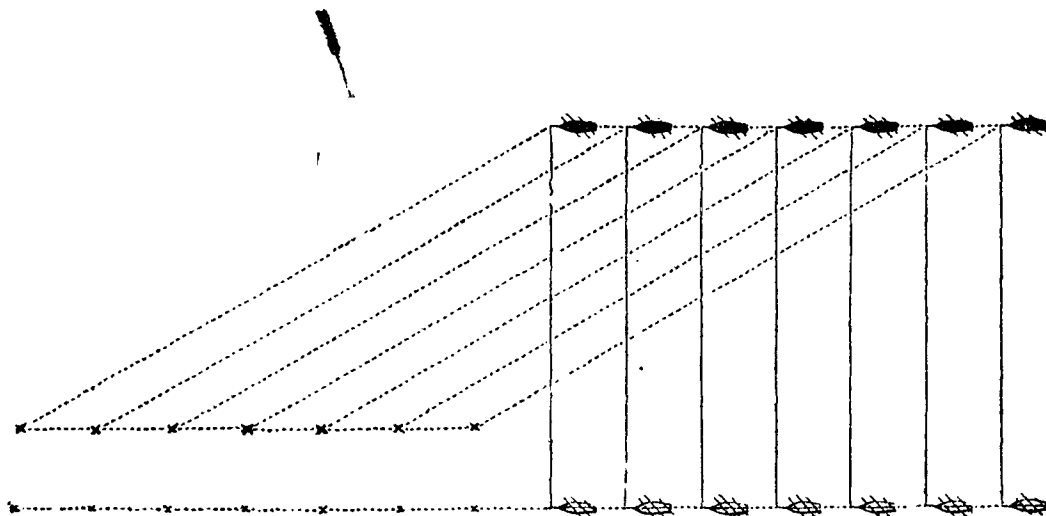


FIG. 113.

It is necessary that the weather fleet should be abreast (if not very distant) before they bear away, to come within the requisite distance for action; in order that the van ship of the weather fleet should always keep to windward of the leading ship of the lee fleet, to guard against a shift of wind, which may come ahead, whereby the lee fleet would double them to windward, by tacking in succession.

Another reason for the weather fleet, when not distant, being right abreast of the lee fleet, and for every ship steering on the same point in approaching her opponent is, that the fleets may be placed exactly parallel to each other; for, as the weather fleet must not be astern, neither must they be ahead of the lee one, lest the wind should come more aft; for then, the lee fleet keeping close by the wind, in the wake of their leading ship, might, by the shift, be as far to windward as the opposing fleet, or even get the weather gage of them.

But if the weather fleet keep exactly abreast of the other, they will always be in a situation to preserve their advantage. It is, notwithstanding, certain that those ships keeping more away than the line to leeward, will find themselves, when within range, in a difficult situation with respect to the enemy's ships; which will have it then in their power to fire their whole broadsides whilst they bear down, and cannot bring all their guns to bear; consequently no time should be lost in arriving at the proper position when once determined on.

The fleet to leeward, if disposed to engage, should merely keep sufficient sail for steerage-way, as, by that means, the weather fleet will require to keep more away to close them, whereby the weather fleet are liable to be raked diagonally; the lee fleet should, however, have sufficient way, that in the event of injury, they may be able to run to leeward under cover of their fleet.

Another plan, which may be useful to describe, is, that of detaching a few of the rear ships of the weather fleet by a circuitous route; then coming upon the rear of the lee fleet, as Fig. 114; by which means they may engage, or disable some of them; when the leading ships of the lee fleet would be obliged either to go to their assistance or abandon them: in which case, the remaining ships of the weather fleet which have preserved their line, have only to bear up and run down towards the enemy, engaging when convenient.

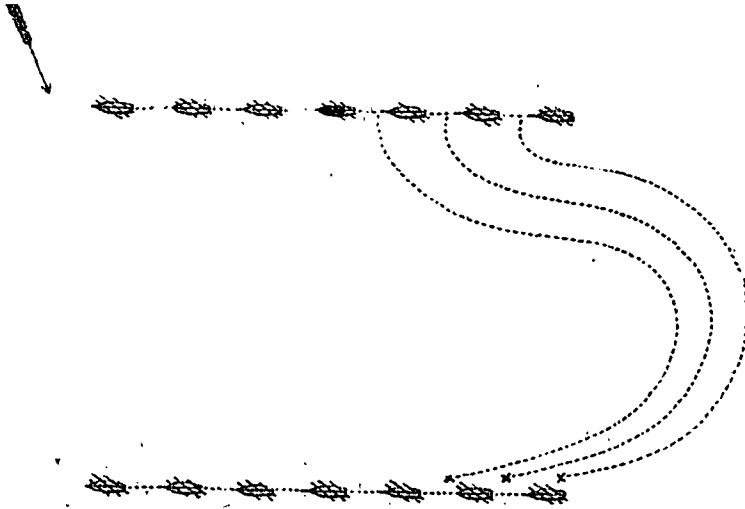


FIG. 114.

If the lee fleet is not disposed to engage, and bears away four points, to move the order of battle on the other tack, and avoid the action, filing off in succession in the wake of the van ship, the weather line, by bearing away at once eight points, cannot fail (both fleets sailing equal,) to pass through the middle of the line, and force them to fight with disadvantage, if their extent be double the distance between the two fleets, as Fig. 115.

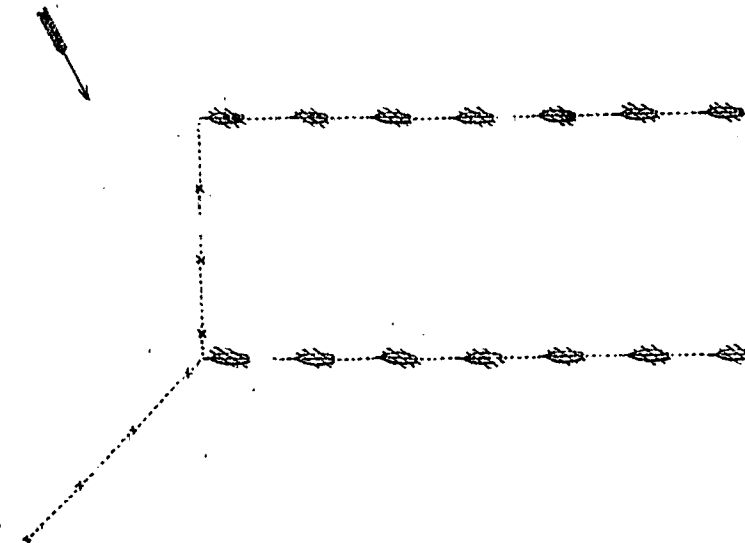


FIG. 115.

If the lee fleet bears away four points, all together, being of equal extent with the line to windward, and their distance from each other equal to half the length of one of the lines; should the weather fleet bear away at the same time eight points, they will approach very near, it is true, the sternmost of the retreating fleet; but they will not have it in their power to cut any of that fleet off, even with an equality of sailing: so that the only advantage gained by this manœuvre will be a chance of attacking the rear, and bringing it to action.

If the weather fleet sailed fast enough to enable their van ship to keep the centre ship of the lee fleet on the same point of bearing, the leading ship may break through the enemy's line near that ship; for, suppose, the fleets in order of battle on the starboard tack, lying West, wind N.N.W., being one mile distant from each other, both the fleets two miles in extent; the lee fleet bears away together four points, will run S.W.; while that to windward bears away, all together, eight points, will steer south; the van ship of which will keep the centre ship of the lee fleet on the point of bearing S.E.; and, supposing her to preserve that bearing, it follows that the van of the weather fleet must close the centre of the retreating fleet, after running two miles, as Fig. 116.

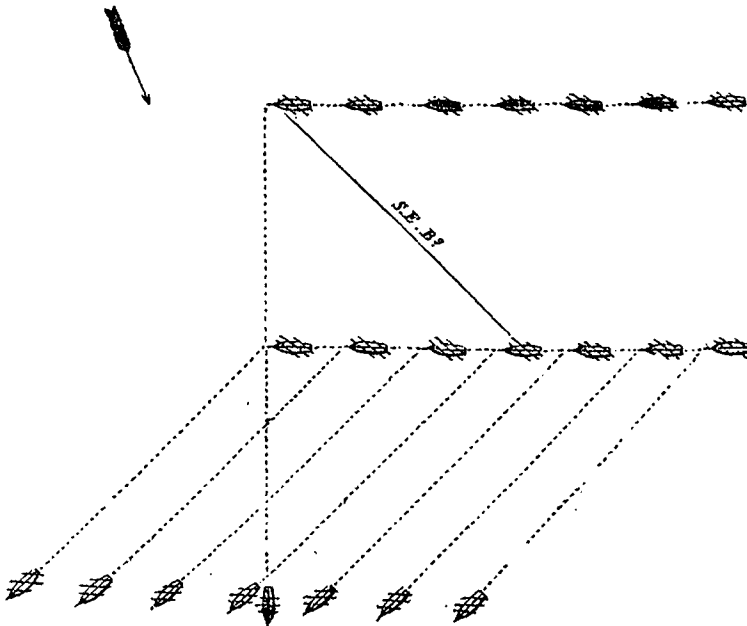


FIG. 116.

The time and distance necessary to cut off a retreating fleet, may be known from the preceding proposition; because the bearing and distance from the van ship to the centre being always obtainable, forms the base of a triangle, which will be completed by the two courses steered by these two ships; and in which two angles and one side will always be known, which is sufficient to find the rest.

The weather fleet can always force the lee one to action, whatever movements they make: for if they run with the wind right aft, in order of battle, they cannot (if equal sailers) avoid being closed; or broken, nearly about the centre, by the weather line, which has only to steer two points on each tack nearer the wind than the retreating fleet, so that the rear of the weather fleet, having borne away no more than eight points, will find, at the end of a certain time, to have approached extremely near the centre of the retreating fleet; and, in a short time more, will be able to bring their rear to action.

The weather fleet has another advantage, because the ships, having the wind on the quarter, sail, most likely, faster than the lee fleet, which run with the wind right aft. The lee fleet having absolutely determined to fly, has, therefore, no other expedient left to prolong time, but to combat in the order of retreat, right before the wind; or on the same course as the pursuing fleet, for other advantages are not to be relied on.

If, from all that has been said, it results that it is not possible for a fleet of equal force to avoid an action, how then must it be with one much inferior? The more numerous has nothing to do but to form a detachment of fast sailers, which will chase before them, and begin the action, while others approach to finish it. From which we may conclude, that when in presence of too powerful an enemy, it will never be possible to avoid an action, if he is determined to come to one.

FORCING THE ENEMY TO AN ENGAGEMENT WHEN YOU ARE TO LEEWARD.

It has already been made evidently to appear, that when you are in presence of the enemy, an engagement is almost unavoidable, if the fleets sail equal.

The lee fleet, which is wishing to come, at any rate, to action, has, therefore, in that case, need of nothing but patience; for in keeping always on the same tack

with the weather fleet, and taking care to have them so exactly abreast, as to prevent the least danger of losing sight of them, you are ready to take advantage of the first favourable shift of wind to make the attack.

Night is certainly the time when an alteration of course may best be attempted; but the lee fleet having steamers, &c. on the look-out, which, by signals, will constantly give notice of the manœuvre and course of the retreating fleet to windward; and, by these means, is always exposed to be pursued without being able to get off unseen; and must, sooner or later, be compelled to come to action, unless they can get into some port, or a gale of wind should rescue them, by dispersing both fleets, and thus furnish the means of retreating in a gale.

TO DOUBLE THE ENEMY WHEN SUPERIOR TO HIM, AND TO LEEWARD OF HIM.

The lee fleet, having the superiority in numbers, ought to range parallel to the weather line; so that the van may extend beyond their line, in order to over-reach them, by tacking in succession, to double to windward their van or rear, and bring them between two fires, as Fig. 109.

If this manœuvre be properly executed, it will be impossible for the ships in the weather line to continue long in their positions; for there is no vessel, closely attacked by two others of equal force, which can long resist being overcome; since it is always in the power of one of them to get into such a position as to rake without much damage on her side.

But whether the most advantageous evolution is to double the van or the rear, is necessary to be considered; the former, being a dangerous manœuvre, perhaps, ought not to be attempted, without the certainty of the ships passing ahead.

If the van of the weather fleet is to be doubled, the ships being abreast should carry all sail, as well as those coming up, keeping up a brisk fire; advancing until the leading ship brings the van of the weather fleet on the bearing perpendicular to the direction to the wind; then tack, being followed in succession by the vessels ordered on that service, by which they may gain the wind of the leading ship: thus keeping them to leeward; and when they have passed sufficiently to windward, they may go about, to keep the headmost ships of the enemy's line under their fire,

as Fig. 117, edging down on the van of the weather fleet, keeping themselves a little to windward of it; and as that van guard is already engaged by the ships abreast on the other side, they must necessarily be soon disabled. Should they bear away, they will near the line with which they are engaged to leeward. while the ships to windward would continue to close them. If they attempt going about in order to attack the ships to windward, they will be raked while in stays by their opponents to leeward and to windward, who, pouring into them whole broadsides, which they cannot effectively return, must complete their disorder.

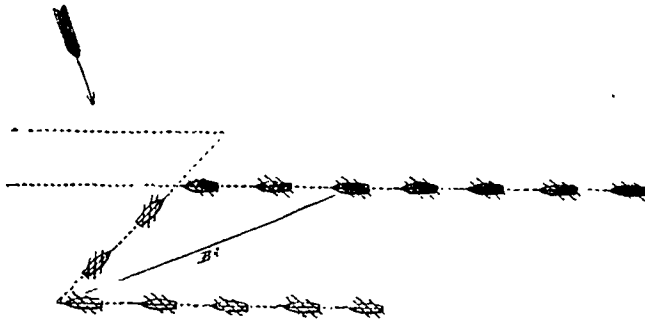


FIG. 117.

If they make sail in order to frustrate the design of the ships inclined to double, those with which they are engaged abreast to leeward have only to make sail also, to keep them within range of their fire.

The ships sent to double the enemy, ought not to be ordered upon that expedition but in weather when there is a commanding breeze; and none but the best sailers, or screw propellers.

If any of the ships in the van of the weather line happen to be disabled in their masts or yards, as will probably be the case after having been between two fires, they will drop astern, and perhaps get foul of the next ship which follows, and these again of the subsequent ships; whereby disorder will become prevalent by ships running foul of each other, or manœuvring to avoid that accident, so that the order of battle will likely be broken; while on the other hand, the line to leeward is preserved with all the advantage. The ships which have gained the wind of the enemy will, by continuing this manœuvre, augment the confusion, engaging, however, no more than they like; but if, by chance or misfortune, they should be

crippled, it will be with difficulty that they extricate themselves: they may tack, and drop astern to windward of the enemy's line, or, if positively necessary, they must wear.

If the rear of the weather fleet is to be doubled, the lee fleet should extend ahead, or close up, so that the rear of the lee fleet be in advance of the rear of the weather fleet; then the headmost ship of those appointed for the service is to tack, followed in succession; engaging the enemy, passing through the line, and tacking again to windward of them, thereby placing the enemy's ships that are cut off, between two fires, as Fig. 118; and should they have the good fortune to oblige them to bear up, they must go on successively as long as they find they succeed in forcing them to give way.

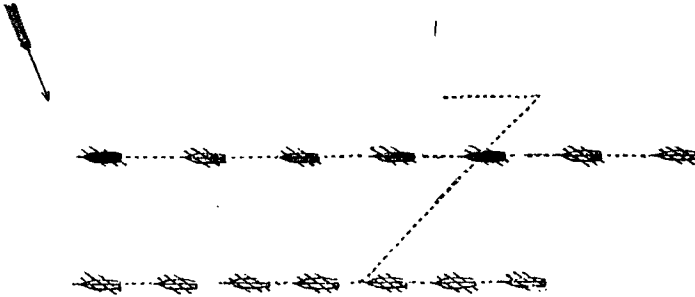


FIG. 118.

Ships dismasted, or even deprived of the use of their sails, in the weather line, cannot, without great risk, retire from the order of battle, (when under necessity to do so,) or pass to windward of their rear, in order to re-fit; for vessels so circumstanced can seldom stay, and even if they could, they would be exposed to be raked by the enemy, who, in that position, would soon render them unmanageable.

If such ships wear, as Fig. 108, that manœuvre making them approach nearer the enemy, they cannot avoid presenting their head to the opponent, a situation so dangerous, that little more is wanting to complete their total destruction; *but supposing them able to finish this evolution*, they will not have it in their power to pass to windward of their second astern without running foul of her; for the distance of close order for action between the ships is not sufficient to give a disabled vessel, which has dropped to leeward, sufficient space to gain to windward the distance necessary to pass ahead of the ship which immediately follows. Nothing but steamers or boats can therefore assist her, by towing her

to windward, under cover of the fleet; and that will not be executed without great risk of a heavy fire from the enemy.

If it be a van ship which is disabled, being doubled to windward by one or two of the lee line, it will be impossible for her to disengage herself; for the two ships which have gained the wind of her will not suffer her to receive assistance from the boats or vessels that may be sent to her relief; and should the fleet she belongs to bear away and pass to leeward of her, which is the only manœuvre they have to execute in these circumstances, the disabled ship will likely be sacrificed, they being unable, without great difficulty, to give her the smallest assistance; for every ship is engaged by the opponent which is abreast of her: and the least remission of their fire, by fighting on the other side to assist, as they pass, the disabled ship, would give the lee enemy a decided advantage.

TO DOUBLE THE ENEMY WHEN TO WINDWARD OF HIM.

To double the van, the ships of the weather fleet should extend ahead of the lee fleet; and when they have gained the necessary distance, the van ship is to keep gradually away, being followed in succession by those noted for that service; but if it is intended to double the rear of the fleet, the ships destined for that service are to follow their leading ship in succession when she keeps away, to pass through the line, as Fig. 119.

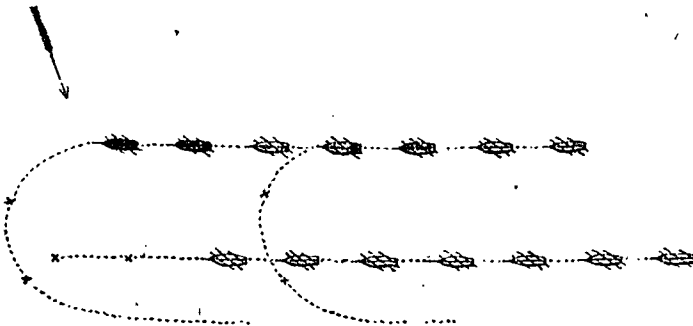


FIG. 119.

There cannot, however, result so much advantage from this manœuvre, as when doubling a fleet to windward; for if the ships which have doubled the van of the lee fleet be disabled, they will be obliged to pass along the lee line, when they cannot escape being totally destroyed, if not out of range.

Should the sternmost ships of the weather fleet be disabled in doubling the enemy's rear, they have only, if they want to extricate themselves, to drop astern, and let the two fleets advance ahead.

It has been proposed, to avoid being doubled by a fleet superior in numbers, to leave spaces in the line, or to place the ships at such a distance from each other as to render the length of the inferior line equal to that of the superior; but neither of these manœuvres, nor any other contrived on this subject, will scarcely be of service, if the opponents possess skill and ability; for these will always dispose their ships in such a manner, that several ships of the inferior fleet will receive the fire of many at once, and will consequently be obliged soon to give way.



FORCING THE ENEMY'S LINE WHEN TO LEEWARD OF HIM.



This is performed by the van ship of the lee fleet advancing ahead, tacking when she has the van ship of the weather line bearing perpendicular to the direction of the wind, (if she can get to that position,) then the lee fleet tacks in succession; and thus may pass through near the centre of the enemy's line, or perhaps a little more towards the van, and go about again in succession to windward of him. But as he will not be long, without doubt, before he performs the same manœuvre, he will thus be able to regain the wind, if you do not force him to give way under your fire before his evolution is finished. He may even cause his van ship to tack, as well as the rest to follow in succession as soon as the leading ship of the lee fleet shall have passed through his line, by which means he will bring them between two fires.

This manœuvre well executed, might, perhaps, cut off the ships attempting to force the line, as Fig. 120.

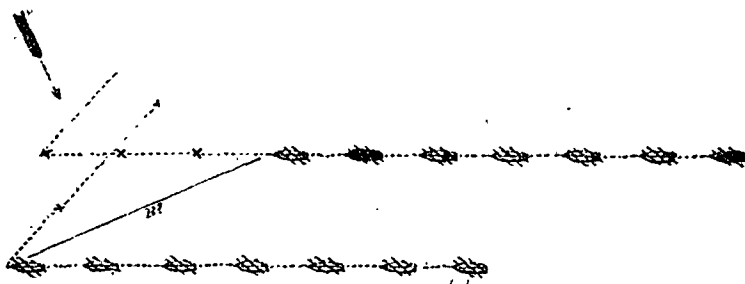


FIG. 120.

TO PREVENT THE LINE BEING FORCED BY THE LEE FLEET.

When the van of the lee fleet goes about, in order to force the enemy, the weather fleet is to tack together, to get upon the same tack with them, who will then be neither able to join nor force them, if equal sailers.

To perform this evolution with advantage, you may let some of the van ships of the traversing fleet pass to windward, if you can get an equal number to pass the lee fleet; then tack together, in order to put them between two fires: thus you may succeed in destroying those that have passed the line, without their own fleet being able to give them any effectual assistance, as Fig. 121.

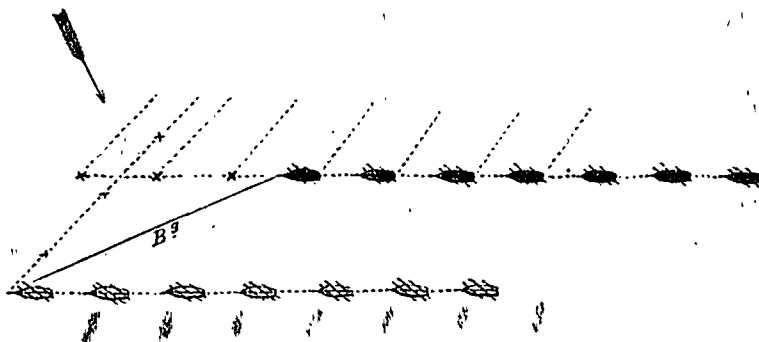


FIG. 121.

You may perceive, from what has been said, that such a manœuvre may prove more prejudicial than advantageous to those who perform it; nevertheless, it may and ought to be put in practice when the weather fleet leaves such vacancies between their divisions, as to allow some ships of the lee fleet to be inactive.

ANCHORING A FLEET.

If the fleet is not too numerous for the anchorage, it is best to anchor in line, keeping the van ship on the same bearing she was when you were in line, preserving your distance; by which means, if the wind remains steady, you are clear of each other's hawse. The fleet may also anchor astern of the leading ship, bringing her to bear in the direction of the wind, if necessary.

But if the fleet is large, or the anchorage does not permit of being in one line; they may anchor in two or three columns, the ships keeping about one hundred and fifty fathoms apart, preserving their bearing from their leading ship as when in column; and the leading ships of columns should bear from each other in the direction of the wind, that the fleet may get under way, and form the order of sailing or battle quickly, as Fig. 122.

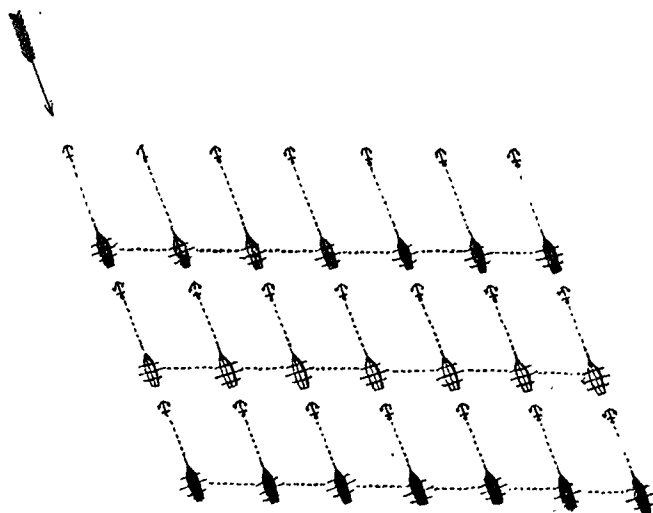


FIG. 122.

As the preceding evolution is only to be performed in moderate weather, the fleet being in order of three columns, they are all, *at the same time*, to bring their ships head to wind under their topsails, jib, and spanker, and let go their anchors together, shortening sail with all dispatch; then veering away an equal quantity of cable, to preserve their distances.

If blowing fresh, a greater distance would be preserved between the ships.

WEIGHING WITH A FLEET.

When the fleet is at anchor in line of bearing from the leading ship, as in line of battle, they may all weigh together, casting and filling on the same tack, and forming the line of battle at once; but if it be anchored in line, head to wind from each other, the rear ship should weigh first, and haul to the wind, and so on from rear to van, forming the line ahead of the rear ship. They may, however, weigh all at the same time, and cast on the same tack.

If the fleet is anchored in three columns, they heave short when the lee column weighs and brings to; the centre column performs the same manœuvre; when they have both brought to, the weather column weighs.

The three columns may be got under way together; but to execute this, the fleet must act, *with very great certainty*, together, and the weather column must not, on any account, weigh before the lee ones.

If it be necessary to form the order of battle immediately, the weather and centre columns will at once bear up, forming ahead of the rear column.

ANCHORING A FLEET IN THE POSITION OF DEFENCE IN A ROADSTEAD.

When a roadstead is sufficiently spacious, the ships are to be moored with springs, in one or two parallel lines, (and if sufficient numbers,) from the entrance to the bottom of the bay; the van ship so near the land, that it would be impossible for the enemy to pass between them and the shore, and he may be obliged to pass between the lines, (*if two,*) the van and rear ships should be supported by batteries on shore, at the two extremities, if practicable; besides this, there should be steamers and gun-boats to annoy the enemy immediately on its appearance. If there are fire-ships in the fleet, they should be moored within the points, that they may be of use in opposing the enemy, should they have been able to force their entrance, as Fig. 123.

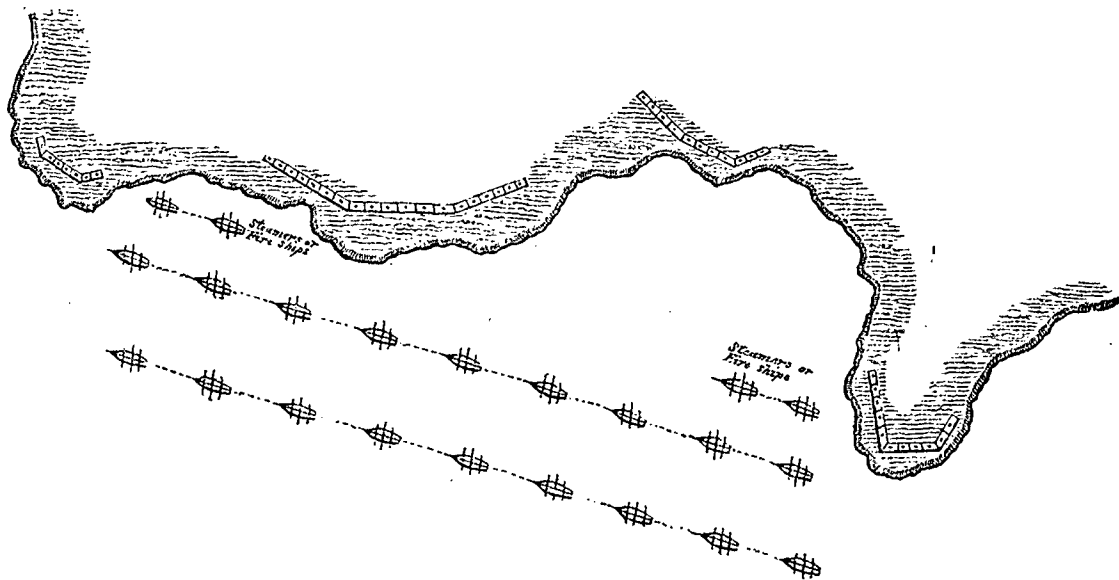


FIG. 123.

ON CHASING.

A vessel that chases another ought to have the advantage in sailing; because, were the ship chased as good a sailer as the chaser, she would never come up with her, if they manœuvred equally well. It is useless, then, to chase a ship over which you have not the superiority in sailing, unless by out-manœuvring.

To know if your ship sails better than your adversary, get on the same tack; then set her bearing, and measure the distance: if you sail better, it will soon be determined by the bearing and distance being again taken.

TO CHASE A SHIP WHICH IS TO WINDWARD.

The chaser should get on the same tack with the chased, until he brings her to bear perpendicular to his course (if he has not, however, already passed that point); then tack, and continue until he brings the chase again perpendicular to the course on which he is standing by the wind, when he must tack again, always continuing the same manœuvre, by tacking every time he brings the chase perpendicular to his course on either board. In this manner the chaser will, if superior in his sailing, join the other by the shortest method.

DEMONSTRATION.

(SAILING AT FIVE POINTS FROM THE WIND.)

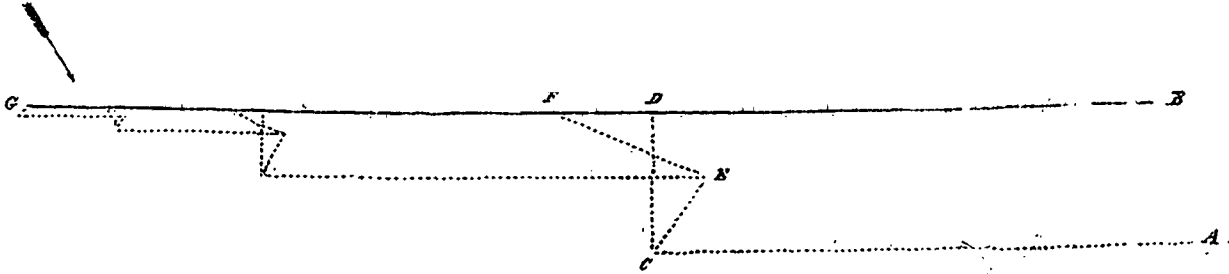


FIG. 124.

When the ship A (Fig. 124) chases the ship B, which is to windward, A having the advantage in sailing, the chaser is not to tack until he reaches the position C,—that is, with the ship B perpendicular to his course at the position D; he then stands on the tack C E until he brings the chase at F perpendicular to the course from his position E. The ship A is to continue working thus every time she brings the vessel B perpendicular to her course, whether the vessel chased continues on the same tack or not; but if the vessel chased continues on the same tack, the chaser will join her as at G.

This mode is preferable to all others, being the shortest, as you press the chase from to leeward, by never passing the point at which the distance between the two vessels, in working to windward, is the shortest possible.

But it should be observed, that a head sea or a swell in any particular direction, may cause experience to deviate from this plan.

Observations for the Ship to windward which is chased.

The chased will always be joined by the chaser, if she does not sail so well as the pursuing vessel, supposing they are manœuvred equally; it is, therefore, to her advantage constantly keeping one course, without losing time to heave about, as tacking cannot be favourable to her.

If the chaser should *mistakingly* stand on a long way on the opposite tack, until in the wake of the chase, the best thing the chased can do is to tack, and pass to windward of him on the other tack, unless he would have the superiority going large.

TO CHASE A SHIP WHICH IS TO LEEWARD.

When to windward of a vessel which you wish to chase, keep away, to cut her off, steering constantly one course, until you come together at the point where the courses run by the two vessels intersect each other; that can be done by calculating the distance of the vessels from each other, and thereby finding the course necessary to steer, at the rate you are going, with reference to each other.

You will observe, if the course you have taken keeps you in the same point of bearing you were in with respect to the vessel pursued at the beginning of the chase: that is to say, if the chaser keeps his wind too close, he will be too much ahead, and consequently prolong the chase; and if he keeps too much away, he will be too far astern: these are the only two considerations to be made for the performance of this manœuvre, which are easily observed and corrected with a compass, altering the course, if necessary, to keep her on the same point of bearing that she originally was; thus, it is evident, you chase by the shortest and most certain method, since you reach the chase on a straight line, as Fig. 125.

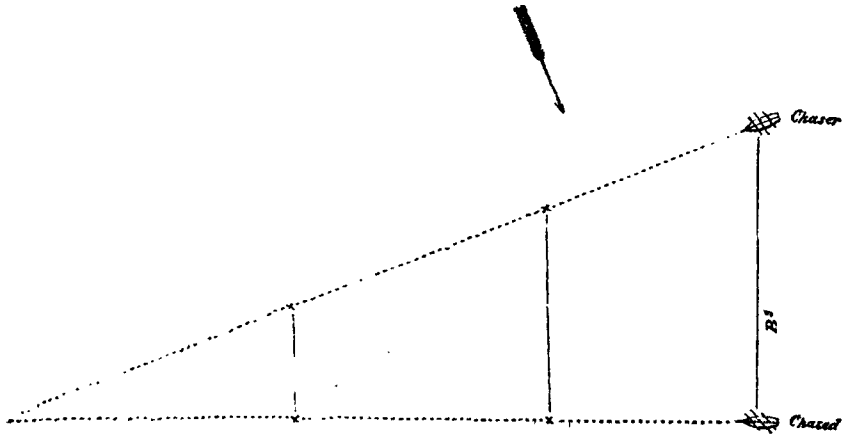


FIG. 125.

Observations for the Ship to leeward which is chased.

She ought to run on the course which will carry her immediately from the chaser. Some vessels have more advantage going large than others; some with the wind right aft; and others again are to be found which sail best close hauled; so that attention should be paid to the known qualities of the ship, in order to effect an escape. It is, however, nearly certain, that if the chased does not sail at least at an equal rate with the chaser, whatever manœuvre she may practice, she will at length be overtaken by a skilful chaser adhering to principle.

ON BOARDING.

The judgment of the captain can be the only guide in the selection of the fitting opportunity for attempting this manœuvre. When ships are in close action, opportunities may frequently occur; but, as a failure would be most injurious, it may be prudent not to attempt to board until the enemy is at least partially disabled.

The following remarks are given as hints, pointing out possible positions of two ships in action; and the evolution which, if performed at the right instant, may bring them in contact, so as to enable a body of men to be thrown on board the enemy.

To board to windward, or to avoid being boarded.—If it be desired to board a ship which keeps her wind under easy sail, or that does not shorten sail, but over

which the boarding vessel has the advantage of sailing, she must get a little on the weather quarter of the ship she means to board; and when close to, as Position 1, Fig. 126, commence the action, to cover her manœuvre by the smoke; continuing to carry sail until alongside, which should be done in the best possible manner, to avoid the raking fire of the enemy. In this situation the boarded vessel has but one doubtful expedient to try, and which even will be of no service if the boarder observes her well: that is, to brace aback her head yards, to cause the ship to fall off, and square the after yards, to give her stern-way. The boarder has only to perform quickly the same manœuvre, and they will be as near for boarding as before, provided the boarding ship feels as quickly the impulse of her sails and helm as the other vessel. The helm ought to be put a-weather, and kept so until the ship's head-way ceases, when it is to be put a-lee, to assist her in falling off, by manœuvring, as in box-hauling, in order to board the enemy to leeward; for the boarder ought to be on the lee quarter of the other, as Position 2, Fig. 126. If, however, the circular motion is kept up by both vessels, which at first caused them to fall off, they will appear as Position 3, Fig. 126; and should they haul to the wind on the opposite tack, *the vessel being boarded* would be to leeward: by which the boarder would be able to close her before she can range to the wind. The ship expecting to be boarded, being thus closely pressed, could make no other attempt than to throw her sails aback, to get stern-way; and as soon as her head-way ceases, then put the helm a-weather, to keep her as much as possible to the wind, as Position 4, Fig. 126; observing that, she being then to windward, the manœuvre may cause her to drive astern with sufficient velocity to let the boarder pass ahead, filling again under his stern and raking him, if he is not as quick as the other to foresee this manœuvre, and in manœuvring in the same manner as the enemy's ship; because the great velocity with which he comes to the wind and goes ahead, (his sails being still full,) puts him in this bad situation, which may prevent his persisting in the inclination of boarding. It is, however, very clear, that the boarder will attain his purpose, if he takes care to throw all his sails aback as soon as possible after the ship to windward; because the attacked ship, dropping to leeward and having stern-way, first closes the boarder. It must be further observed, that when the two ships are before the wind, if the vessel which fears boarding comes to the wind sooner than the one which attacks, she may avoid it, as the retreating ship will be to the wind before the other, and able to get ahead, or heave about; but it must be considered, that this last movement is disadvantageous; as by so doing, it will present the stern to the ship, which would no doubt rake her.



FIG. 126.

If the boarder be at a distance on the weather quarter, sufficient for the ship wishing to avoid boarding to pass to windward of him, he should tack, and cross him, each passing in opposite directions.

To board to leeward when close to the wind, or to avoid being boarded.—In order to execute this manœuvre, the boarder should come close in the wake, as Position 1, Fig. 127, then edge away a little, and range up on the lee quarter; when sufficiently ahead, luff the ship to, (easing the head sheets, if necessary,) when you close the vessels side by side, as Position 2, Fig. 127. This manœuvre is infallible when you have the advantage of sailing; but great attention is necessary to your own as well as your adversary's manœuvres, as the ship being boarded may wear short round when the boarder is about his length astern; thereby raking him, as Position 3, Fig. 127; and if he does not manœuvre in the same manner quickly, may, before he can wear, engage his bowsprit in the rigging of the enemy. It is, therefore, of the greatest importance to pay strict attention to the enemy's manœuvres as well as your own, to avoid being raked.



FIG. 127.

BOARDING WITH THE WIND LARGE.

If two ships are about to engage with the wind large, the boarding vessel should keep as close as possible on the lee quarter of the ship she means to attack, that she may execute her design by coming rapidly to the wind, and being careful not to pass ahead of her opponent.

When two vessels are engaging with the wind right aft, the ship attempting to board ought to run up alongside; and when she closes her adversary, as Position 1, Fig. 128, the adversary should endeavour to haul rapidly to the wind on the other tack, as soon as the bowsprit of the boarder is abreast of her stern, in order to be in a situation to extricate herself more easily by a further manœuvre, as Position 2, Fig. 128.

The boarding vessel should be permitted to come abreast of the stern of her adversary before she hauls her wind; because, if she was to do this sooner, the ship astern, at a small distance, would board her perfectly well, even if they sail equal; since the boarder would be to windward, and run large longer than the other, and continue to run ahead of the flying ship.

If, by coming too fast to the wind, the boarder chose to abandon his design, he might keep away a few points, and shorten sail, so that the retreating ship will show her stern ; the boarder can thus rake her, by passing astern, as Position 3, Fig. 128.

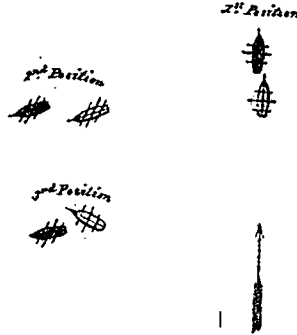


FIG. 128.

When you attack a ship closely to leeward, as Position 1, Fig. 129, you may keep away a little when abreast of her, as if disposed to yield under her fire. If this should induce the opposing ship to wear, in order to keep more guns upon you, as Position 2, Fig. 129, it is only to haul rapidly to the wind, suppressing the effect of the head sails the instant you perceive the enemy attempt to wear. The quickness of this manœuvre will close the two ships ; and if the distance is well measured, it may happen that your bowsprit will be between the fore and main, or main and mizen rigging, as Position 3, Fig, 129, which would be a most advantageous opportunity to board.

FIG. 129.

But much confidence must not be placed in this manœuvre, as you do not frequently meet with persons so easily duped. It may even happen that you will no longer be able to attempt the boarding, if the weather ship, instead of keeping away, keeps her wind; for this first manœuvre may take you too far off to leeward of your adversary.

If you should happen to be a ship's length to leeward, and about the same distance ahead of the vessel with which you are engaged, as Position 1, Fig. 130, you may, under cover of a heavy fire, heave in stays; by this manœuvre you come right athwart the enemy's hawse. Rake him fore and aft, and board him, his bowsprit being right over your gangway, as Position 2, Fig. 130; nor can he possibly avoid your broadside: for if he heave all aback, and make a stern board, which is his only resource, he may avoid being boarded, but will always be in a very bad situation.

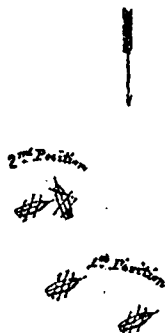


FIG. 130.

BOARDING AT AN ANCHOR.

It is comparatively easy to run alongside a vessel at anchor, when the wind will allow you to approach her under sail; but you should steer to get the ship at anchor on your bow; then, ranging up alongside, throw grapnels aboard, passing as many lashings of rope and chain as time and opportunity will permit, whilst boarding.

It would be well to let go an anchor as soon as alongside; so that, in the event of the ship at anchor cutting her cables to drift on shore, you avoid her doing so.

The ship at anchor should never wait for the enemy in that situation, which is always disadvantageous; for there is always much greater probability of getting clear when under way: but if, from particular cause, you continue at anchor, you should take advantage of the moment when the ship which attacks comes near, to cut or slip the cable by which you ride; for which every preparation should be made by unshackling the cable abaft the bits: by this manœuvre you may rake your adversary, and avoid being boarded. If time will admit before the attack, and you are determined to remain at anchor, you should get two springs, one on each side, to the cable by which the vessel rides, (if you have not had time to lay out two anchors,) in case the ship which attacks has it in her power to pass on either side of you, so that when you perceive for which side she is determined, you heave on the spring, to bring the assailant right abreast of you; then you may rake him, and, perhaps, do him so much injury that he will give up the attempt. But boarding at an anchor is generally executed by boats at night, pulling up to different parts of the vessel at one instant, by which means the attacked party are thrown off their guard, and success, by that means, may attend the expedition.

Steamers will, no doubt, be used in cutting out, or boarding expeditions, with great success.

GENERAL RULES TO BE OBSERVED BY FLEETS OR VESSELS MANŒUVRING.



1. *Ships crossing near each other.*—When ships must cross near each other on different tacks, the ship on the starboard tack is to keep the wind, and the ship on the port tack is to give way.

2. *When not to regard the seniority and rank of senior officer.*—Ships of war are to bear up, shorten sail, &c. for each other, in such manner as necessary, to prevent the falling on board each other, without regard to seniority.

3. *Accommodating ships under particular orders.*—When any ships are going to execute particular orders, (such as chasing, taking station, &c.,) every ship is to accommodate as much as possible, without leaving their own stations, except by bearing up or keeping their wind, so as to enable the ships to perform the duty required.

4. *The line of bearing.*—The fleet will generally steer one point off the wind. This judicious regulation is to enable leewardly ships to keep their appointed stations. Hence it follows, that the line of bearing, for either tack, will be six points from the direction of the wind, instead of, as vessels lay, about five. This line of bearing is always to be preferred, (as in the instances of tacking or wearing together,) whatever changes may be made in the course by the fleet together; but if the course be altered in succession, then the former line of bearing becomes changed, as in the instances of wearing or tacking in succession: thus, therefore, the last line of bearing is to be kept when the course is altered together.

5. *Ships out of their stations.*—Ships in order of sailing are to be kept in the wake of the leading ships of their respective columns, without regard to their second ahead; and, therefore, ships that are to leeward of their respective leaders, as well as those that are too far astern, are deemed out of their station. It is necessary to observe, that whatever ship is actually at the head of the line of a

squadron or division, is to be considered, in all respects for the time, as the leading ship, when the regular leading ship may have been detached upon any particular service.

6. *Precautions for successive movements.*—When the fleet is to execute any evolution in succession, such as tacking, wearing, going large, or hauling up, particular attention must be paid to preserve the appointed distance between ship and ship: for when a ship tacks, or hauls closer, it is evident that she will need more sail to preserve the requisite distance from her second astern; but, on the contrary, when a ship is to keep away, it may be necessary to shorten sail as she increases her speed. When hauling closer, it may even be sometimes necessary for the seconds astern respectively to bear up a little, while their seconds ahead haul to the wind; by which the stated distance may be better preserved, the movements of the seconds ahead facilitated, and the ships form more readily into each other's wake when to the wind. But the necessity and extent in this precaution will depend on the number of points which the new course differs from the former one. When the requisite distance between ship and ship is, for any length of time, materially exceeded by any ship; or in case of missing stays, or not staying in due time, the ship next in succession is to take and occupy the vacant place, till the first may be able to resume her proper station.

7. *The Course.*—In order of sailing, the course (if not otherwise directed,) is taken from the example of the admiral or senior officer, and the ships of the squadron, their respective leaders; but if the fleet be in order of battle, the course is taken from the ship leading the van of the fleet.

8. *Positions of squadrons and ships changed.*—When, in consequence of any evolution, the position of either squadrons or ships be changed, (as the van becoming the rear, a leading ship becoming the sternmost, &c.,) such squadrons and ships are, until further orders or change, to perform all services incident to their new station.

9. *Drawing into closer order.*—This is done by the ships closing the centre, or ship of the senior officer, in the line or squadron. If the ships, when the signal is made, are at four cables, they close to three; if at three cables, to two or one and a half; if at one and a half, they close to one; if at one, they close to half a cable.

If the fleet be in line of battle, and the leading squadron draws ahead of the centre squadron, thus materially opening the prescribed distance between ship and ship, the last ship of such leading squadron is to close back to her proper distance from the leading ship of the next squadron; and thus the seconds ahead (in the van squadron) are respectively, and in turn, to close back until the proper distance is regained.

This rule equally applies to the divisions of squadrons that draw ahead of their respective succeeding divisions.

10. *Forming into more open order.*—If the ships, upon signal made, are one cable and a half apart, they are to open to two cables; if at two cables, to open to three; if at three, to open to four; increasing each time the signal is made, about one cable's length.

When in line of battle, and the rear squadrons press upon either of those leading them, the order is to be opened forward in succession by the ships of the squadron ahead.

REMARKS ON THE CONVOY OF MERCHANT SHIPS BY MEN-OF-WAR.

To take care of a large convoy, there should be a number of steamers or fast-sailing vessels to be distributed ahead, astern, and on the beam of the convoy, which is always to be kept, if possible, in column, according to its number; some other steamers or fast-sailing vessels should be on the look-out, to give information on the approach of a stranger or enemy.

If the vessels sent to look out discover a stranger or enemy, they communicate by signal; and, perhaps, it may be thought advisable to steer a different course from that of the convoy, in order to deceive any hostile ship or force.

The men-of-war are to keep themselves in order, a little ahead and to windward of the convoy; because in that position they will be able, with promptitude, to attend wherever their presence may be necessary. The look-out vessels will repeat the signals with celerity and exactness, that their purport may, with all possible expedition, be made known to the commanding officer; who, on the other

hand, will have all suspicious and neutral ships chased, and even stopped, by the look-out vessels, and which are to be supported by line of battle ships, according to the exigency of the circumstances.

The degree of progress which the whole fleet makes, will be regulated by that of the slowest ships; which, however, should be taken in tow by the fast sailers, and abandoned when found to cause too great a loss of time; for sometimes it is better to risk a small loss than to expose the whole by delay.

There should be placed between the columns some vessels to keep order, and keep the convoy in their stations. Their particular business will be to get the tardy ships to make sail, and to oblige those out of station to resume it; and report those which have not well manœuvred.

During the night the same order will be maintained, except with respect to the look-out vessels, which are to be called nearer the fleet. The carrying of lights by the look-out vessels will be directed by the commanding officer. They are to be particularly careful to oblige all straggling vessels to return to the convoy; and on the appearance of any strange vessel, they are immediately to make the necessary signal.

End of the Sixth Part.

NAVAL TACTICS.

PART VII.

TRIALS OF SAILING.

TABLE OF THE HEIGHTS OF MASTS IN DIFFERENT CLASSES
OF VESSELS.

ALSO A

Table for ascertaining the Distance by Angles.

NOTE.—The protractor will be found of the greatest use in laying of bearings and courses;
and should, in the latter case, be always resorted to in preference to the parallel rulers.

TRIALS OF SAILING.

IN trials of sailing it is always difficult to obtain positive results, from the feeling of every one thinking his vessel superior. To obviate which, a person *unconnected with the vessels* should be appointed, for the purpose of taking and noting the bearings and distances at the necessary periods, from which the result is readily determined.

REMARKS ON STARTING FOR TRIAL BY THE WIND.

The vessels should be arranged on the line perpendicular to the wind when about to start on a wind, as will here be proved.

Suppose the wind N.E. by E., the vessels would be formed on the line S.E. by S. and N.W. by N. of each other, as A B C D E, (Fig. 131,) without regard to distance, that being of no importance, except that at a considerable distance there may be a different wind; then, if A B C fill on the port tack, and D E on the starboard tack, *considering* them to sail equally well, A and E would meet at the

position F; B and E would meet at G; C and D would meet at H; and all equally to windward in the same time: which would apply in all cases when the line perpendicular to the wind is preserved at starting, without reference to distance.

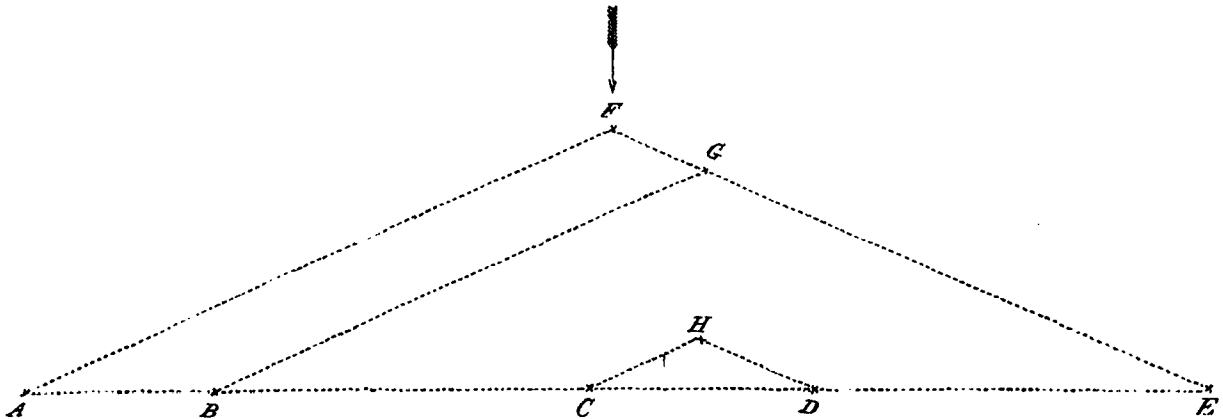


FIG. 131.

REMARKS ON TRIALS OF SAILING BY THE WIND, WHEN THE LINE PERPENDICULAR TO THE WIND IS PRESERVED AT STARTING.

For example,—suppose two vessels, A and B, to start on a wind, which is N.E. by E., from the line perpendicular to the wind, S.E. by S. and N.W. by N. without regard to distance, they are noted as follows:—

TRIAL OF SAILING (STARTING) BY THE WIND DAY OF 1850, OBSERVED FROM B.							
Name of Vessel.	Time started.	Rate in Knots.	Wind.	Sail carried.	Bearing corrected for Deviation.	Distance in Yards.	Difference, if not in line perpendicular to the wind.
A.	} A. M. } } 9.30 }	} ... }	N.E. by E.	{ All sail on a wind ...	N. 33° 45' W,	... }	{ In line perpendicular to wind.
B.				{ Ditto, except royals ...			

If there were more vessels starting, they should be noted, commencing the bearing from right to left, to avoid mistakes. Having run any distance, they are made to tack together; assuming the wind to remain steady, they are continued tacking together until the end of the trial, when the result is determined as follows:—

TRIAL OF SAILING (ENDING) BY THE WIND DAY OF 1850, OBSERVED FROM B.							
Name of Vessel.	Time ended.	Rate in Knots.	Wind.	Sail carried.	Bearing corrected for Deviation.	Distance in Yards.	Result of Trial.
A.	} P. M. } 2.15	} 7 to } 9	} N.E. by E.	{ All sail	N. 50° 45' W.	835	... ..
B.				{ Ditto, royals in occasionally				... ..	... ..	Beat A 244 yards.

It now becomes necessary to determine which vessel beat, and its distance.

First.—By inspection, the wind is N.E. by E., consequently the line perpendicular to it is N.W. by N. and S.E. by S.; then

A bears from B,.....N. 50° 45' W.
 Line perpendicular to wind N.W. by N.....N. 33° 45' W.
 Angle of difference showing A to leeward... 17° 0'

Which 17° taken as a course in the traverse table, and the distance, 835 yards, in its column, will give 244 in the departure column, of the same denomination as the distance was measured in—namely, yards.

Secondly.—By construction, lay off the position of the vessels, in bearing and distance, A from B, N. 50° 45' W., 835 yards (Fig. 132); then draw the direction of the wind from the leeward vessel A, and from the weather vessel B, a line perpendicular to the direction of the wind, which will intersect at C, showing the distance A to C, is what B is to windward of A—namely, 244 yards.

Thirdly.—It may also be determined by calculation, having the side B A 835 yards; the angle between the wind and bearing A 73°, and its opposite angle B 17°.

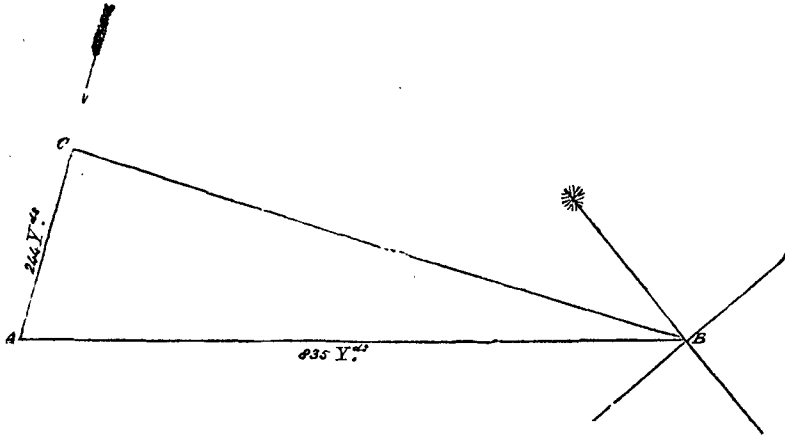


FIG. 132.

REMARKS ON TRIALS OF SAILING BY THE WIND, WHEN THE LINE PERPENDICULAR TO THE WIND IS NOT PRESERVED AT STARTING.

Occasions may occur that vessels are not able to form in the line perpendicular to the wind at starting; we will, therefore, suppose the vessels A and B continue in positions as at the end of first trial, but the wind changed to E.S.E., consequently not in line perpendicular to the wind.

TRIAL OF SAILING (STARTING) BY THE WIND DAY OF 1850, OBSERVED FROM B.								
Name of Vessel.	Time started.	Rate in Knots.	Wind.	Sail carried.	Bearing corrected for Deviation.	Distance in Yards.	Difference, if not in line perpendicular to the wind.	
A.	} P. M. } 3.0	} ...	} E.S.E.	{ Double reefs, jib, and spanker	N. 50° 45' W.	835	... ..
B.				{ Ditto, occasionally top-gal. sails	... ..	...	{ To windward of A 818 yards.	

To determine the relative positions by construction, *with reference to the E.S.E. wind*, lay off the positions of the vessels, in bearing and distance, A from B, N. 50° 45' W., 835 yards (Fig. 133); then draw the direction of the wind from the leeward vessel A, and from the weather vessel B, a line perpendicular to the wind, which will intersect at C; showing the distance from A to C, is what B is to windward of A—namely, 818 yards.

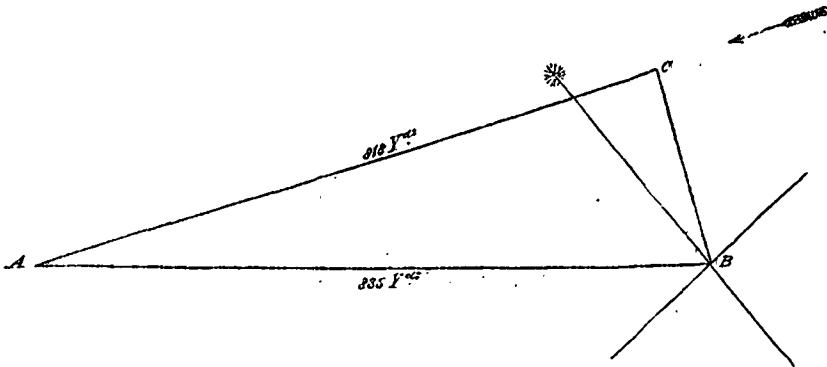


Fig. 133.

The relative positions being determined, the vessels are started on the second trial, and continue tacking together until the trial ends, when they are noted as follows:—

TRIAL OF SAILING (ENDING) BY THE WIND DAY OF 1850, OBSERVED FROM B.							
Name of Vessel.	Time ended.	Rate in Knots.	Wind.	Sail carried.	Bearing corrected for Deviation.	Distance in Yards.	Result of Trial.
A.	} P. M. 5.40	} 5 to 6	} E.S.E.	} Top-gal. sails and first reefs in top-sails. Ditto	N. 19° 45' W.	840	Beat B 253 yards.
B.					... ..	... ..	... ..

By construction, lay off the position of the vessels, in bearing and distance, A from B, N. 19° 45' W., 840 yards (Fig. 134); then draw the direction of the wind from the leeward vessel A, and from the weather vessel B a line perpendicular to the direction of the wind, which will intersect at C; showing the distance A to C, is what B is to windward of A—namely, 565 yards; but on starting, B was to windward of A 818 yards: consequently A has beat B the difference, 253 yards.

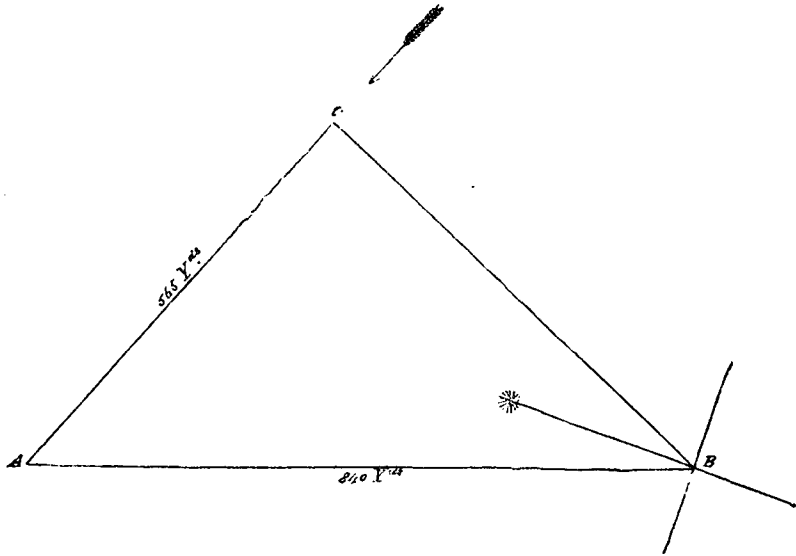


FIG. 134.

EXPLAINING THE FOREGOING REMARKS ON TRIALS OF SAILING BY THE WIND.

To simplify the foregoing by construction, we have drawn Fig. 135, representing two vessels, A and B, which are supposed to have started on a line perpendicular to the wind, (North), and having made several tacks together, the wind remaining steady; at the end of the trial, they had arrived in the positions as follows:—

TRIAL OF SAILING (ENDING) BY THE WIND DAY OF 1850, OBSERVED FROM B.							
Name of Vessel.	Time ended.	Rate in Knots.	Wind.	Sail carried.	Bearing corrected for Deviation.	Distance in Yards.	Result of Trial.
A.	} North.	... ..	N. 40° W.	1600	Beat B 1226 yards.
B.

Lay off the positions of the vessels, in bearing and distance, A from B, N. 40° W., 1600 yards (Fig. 135), the wind being north, it is at once observed that A is to windward of B, we must conceive A to tack without loss, and standing on the port tack, while B continues on the starboard tack; A would arrive at the position C, while B would arrive at D, and C D being the line of wind, proves A to windward of B the distance C D 1226 yards; *and also*, that a line drawn perpendicular to the wind from the windward vessel A, intersected by the line of wind from the leeward vessel B, at E, shows at once the distance A beat B, as B E and C D are both equal.

NOTE.—This diagram is drawn supposing the vessels to lay in five points.

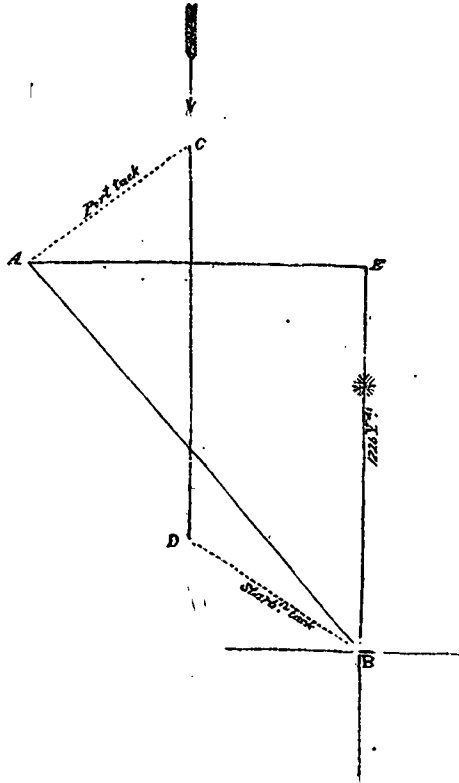


FIG. 135.

TRIAL OF SAILING BY THE WIND.



This diagram (Fig. 136) represents a trial of sailing by the wind, on the 27th of August, 1846, under Vice-Admiral Sir WILLIAM PARKER, Bart., G.C. B., Commander-in-Chief, in Her Majesty's Ship *Hibernia*; Commodore Sir FRANCIS A. COLLIER, C. B., G.C.H., second in command, in Her Majesty's Ship *St. Vincent*; and ten more ships.

The ships started at 1 P.M., with a N. by E. wind and smooth water, which continued until 4 P.M., when the positions were again taken; soon after which, the wind changed. The result is given in page 161.

NOTE. *To lay off a diagram of trial by the wind.*—Take a position for the vessel observed from (as *St. Vincent*); draw a line through it, representing north and south, magnetic; then lay the hole of the protractor on that position, and its centre line on the north or south, *as necessary*, to lay off the bearings of the different vessels, from the report, taking the distance from the scale determined on, which at once fixes their positions.

Draw the line of wind through the position of the vessel observed from, and the line perpendicular to it. Then, to ascertain the result, draw the line of wind from each vessel's position to the line already drawn *perpendicular to the wind* through the vessel observed from, and that distance will be (on the same scale) what they are respectively to windward or to leeward.

To determine it by calculation, refer to page 155.

END OF TRIAL

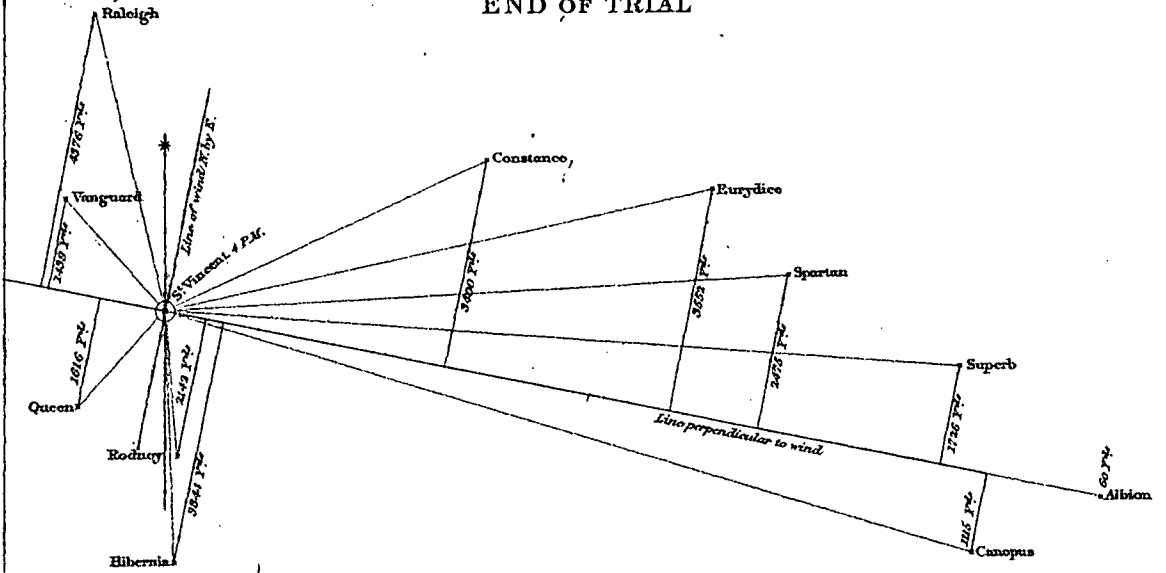
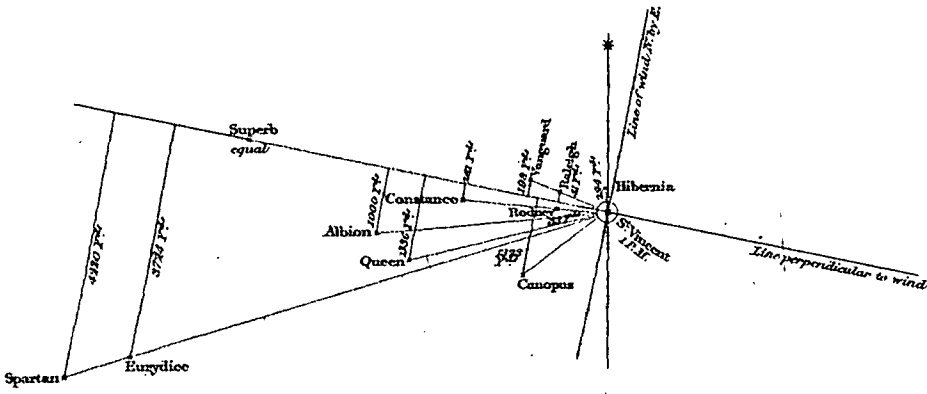
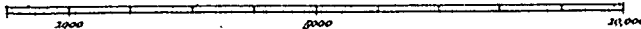


Fig. 136

COMMENCEMENT OF TRIAL



Scale of Yards.



REPORT OF A TRIAL OF SAILING BY THE WIND.

A Trial of Sailing by the Wind, the 27th of August, 1846, observed from "St. Vincent."										
NAMES.	Time started.	Rate per hour, in knots.	Wind.	Course.	Sail carried.	Bearing corrected for Deviation.	Distance.	Position, not being in line perpendicular to the wind.		Remarks on Inclination.
								To windward of St. Vincent.	To leeward of St. Vincent.	
NAMES.	Time ended.									
ST. VINCENT.							YARDS.	YARDS.		
HIBERNIA						North	300	294		
VANGUARD						N. 70° W.	1,300	198		
RALEIGH						N. 76° W.	850	41		
SUPERB						N. 78° 45' W.	5,840	Equal		
RODNEY						N. 85° W.	760	83		
CONSTANCE	{ P.M. }	6 to 7	N. by E.		{ All the vessels carried as much sail as possible. }	N. 85° W.	2,400	261		The Canopus did not do so well up to 3 P.M., but afterwards, much better.
ALBION	{ 1 }					S. 86° W.	3,800	1000		
QUEEN						S. 77° W.	3,250	1836		
EURYDICE						S. 73° 30' W.	8,000	8724		
SPARTAN						S. 73° 30' W.	9,060	4220		
CANOPUS						S. 54° W.	1,800	1823		
NAMES.	Time ended.	Positions ending.								
							To windward of St. Vincent.	To leeward of St. Vincent.	Result on St. Vincent.	
					Remarks.		YARDS.	YARDS.	Beat.	Lost.
ST. VINCENT.							YARDS.	YARDS.	YARDS.	YARDS.
HIBERNIA						S. 2° E.	3,950	3844	.....	4188
RODNEY						S. 4° E.	2,220	2142	.....	2059
CANOPUS						S. 74° E.	13,500	1115	.....	208
ALBION						S. 79° E.	15,400	60	.....	1060
SUPERB						S. 86° 30' E.	12,800	1726	.....	1726
SPARTAN						N. 87° E.	10,050	2475	.....	6695
EURYDICE	{ P.M. }	5 to 7	N. by E.			N. 78° E.	9,000	3552	.....	7276
CONSTANCE	{ 4 }					N. 65° E.	5,750	3400	.....	3661
RALEIGH						N. 13° W.	4,800	4376	.....	4835
VANGUARD						N. 41° W.	2,350	1439	.....	1241
QUEEN						S. 43° W.	1,900	1616	.....	280

TRIAL OF SAILING BY THE WIND.

This diagram (Fig. 137) represents a trial of sailing by the wind, the 14th of August, 1847, under Rear-Admiral Sir CHARLES NAPIER, K.C.B., Commander-in-Chief.

The positions are fixed at 11h. 30m. A.M. and 2h. P.M., during which interval the wind remained steady at N.E. by N. The result is in page 163.

NOTE.—To lay off the positions and ascertain the result, refer to page 160.

END OF TRIAL

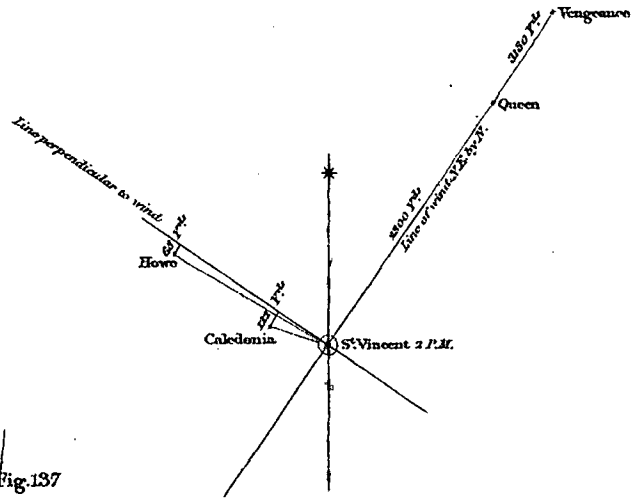
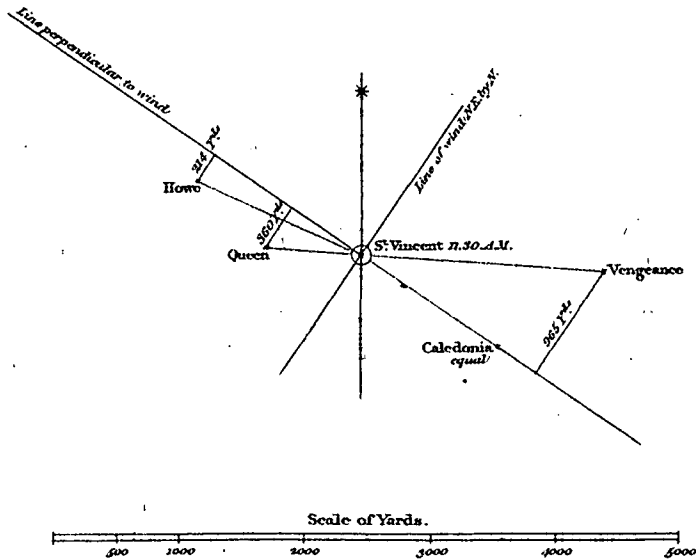


Fig. 137

COMMENCEMENT OF TRIAL



REPORT OF A TRIAL OF SAILING BY THE WIND.

<i>A Trial of Sailing by the Wind, the 14th of August, 1847, observed from "St. Vincent."</i>															
NAMES.	Time started.	Rate per hour, in knots.	Wind.	Course.	Sail carried.	Bearing corrected for Deviation.	Distance.	Position, not being in line perpendicular to the wind.		Remarks on Inclinat.					
								To windward of <i>St. Vincent.</i>	To leeward of <i>St. Vincent.</i>						
ST. VINCENT.							YARDS.	YARDS.							
CALEDONIA						S. 56° 15' E.	1340	Equal							
VENGEANCE	{ 8 } { 4 } { 11 }	6 to 7	N.E. by N.	Tacked occasionally.	All plain sail.	N. 86° E.	1940	965	214						
HOWE											N. 65° W.	1420	
QUEEN											N. 85° W.	750	360	
NAMES.	Time ended.				Remarks.		Positions ending.		Result on <i>St. Vincent.</i>						
ST. VINCENT.							To windward of <i>St. Vincent.</i>	To leeward of <i>St. Vincent.</i>	Beat.	Lost.					
QUEEN						N. 33° 45' E.	2300	.....	YARDS.	YARDS.				
VENGEANCE	{ P. M. } { 2 }	7	N.E. by N.	Tacked occasionally.		N. 83° 45' E.	3180	.....	2660	.....				
HOWE											N. 59° W.	1400	
CALEDONIA											N. 71° W.	480	122	

TRIAL OF SAILING BY THE WIND.



This diagram (Fig. 138) represents a trial of sailing by the wind, the 16th of September, 1847, under Rear-Admiral Sir CHARLES NAPIER, K.C.B., Commander-in-Chief.

The positions are fixed at 11h. A.M. and 2h. P.M., during which interval the wind remained steady at N.E. by N. The result is in page 165.

NOTE.—To lay off the positions and ascertain the result, refer to page 160.

REPORT OF A TRIAL OF SAILING BY THE WIND.

A Trial of Sailing by the Wind, the 16th of September, 1847, observed from "St. Vincent."

NAMES.	Time started.	Rate per hour, in knots.	Wind.	Course.	Sail carried.	Bearing corrected for Deviation.	Distance.	Position, not being in line perpendicular to the wind.		Remarks on Inclinaton.	
								To windward of <i>St. Vincent.</i>	To leeward of <i>St. Vincent.</i>		
ST. VINCENT.							YARDS.				
CANOPUS	} A.M. 11	7	N.E. by N.	Tacked occasionally.	..... { Single reefs, courses, top-gal. } sails, jib, and spanker.	N. 39° E.	3540	3524			
QUEEN							3700	3460			
VENGEANCE							3450	254			
NAMES.	Time ended.				Remarks.			Positions ending.		Result on <i>St. Vincent.</i>	
								To windward of <i>St. Vincent.</i>	To leeward of <i>St. Vincent.</i>	Beats.	Lost.
ST. VINCENT.								YARDS.		YARDS.	
CANOPUS	} P.M. 2	6 to 7	N.E. by N.	Tacked occasionally.	.....	N. 10° E.	8000	7324		8800	
QUEEN							5600	4862		1402	
VENGEANCE							9900	1932		1678	

ON STARTING FOR TRIAL OFF THE WIND.

Fig. 139 represents six vessels (A B C D E and F) arranged in line perpendicular to the course; which should always be the case when sailing off the wind, as there can be no difficulty in so placing them when the wind is free. They may be placed without regard to distance from each other, that being of no importance; but the nearer they are, conveniently, the better, as at a considerable distance there may be a different wind.

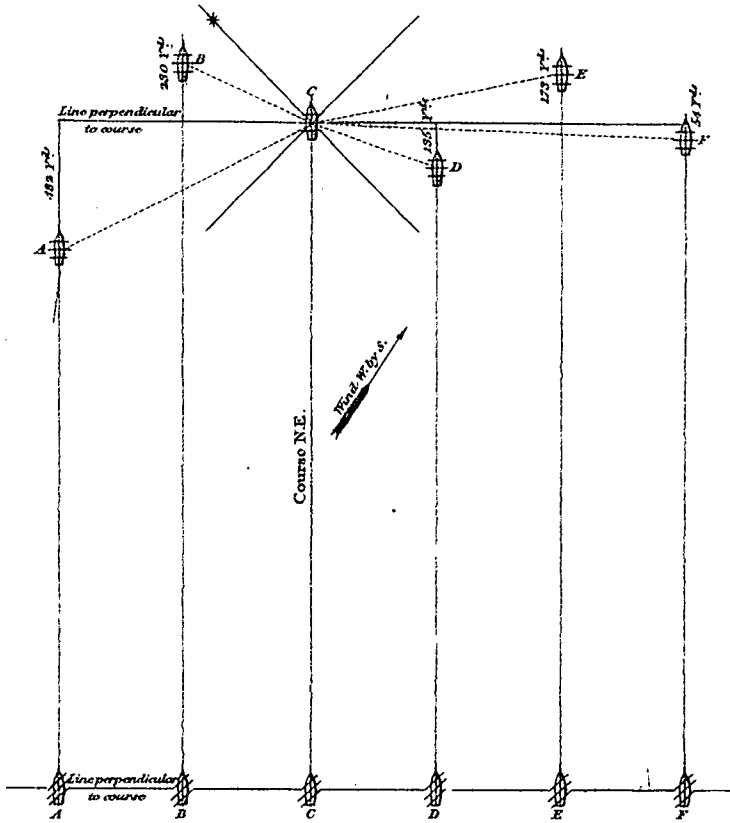
TRIAL OF SAILING OFF THE WIND.

This diagram (Fig. 139) represents the vessels A B C D E and F about to start, in line perpendicular to the course N.E.; consequently the vessels bear from each other N.W. and S.E.

Their positions being noted from any vessel at starting,—as from C; when they proceed on their course. At the end of the trial their bearings and distances are again noted from C, the same vessel, and entered in the report, as follows.

NOTE.—Questions may be raised as to the compasses not agreeing; to avoid which, *at starting*, they should all preserve a course with the centre vessel of those trying, which course they should preserve throughout the trial.

END OF TRIAL

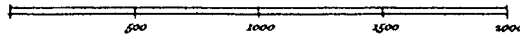


COMMENCEMENT OF TRIAL

[all aback]
or Shivering.

Fig. 139

Scale of Yards.



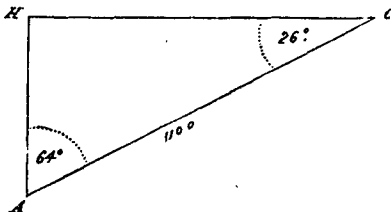
We have now to determine the result.—*First*, by construction, as Fig. 139. The positions are laid off from the report; and at the end of the trial a line is drawn perpendicular to the course through C's position, which at once shows the vessels B and E are ahead of C, and that A D and F are astern of C; then, to determine what distance they are ahead or astern, draw the line of course from each vessel to the line perpendicular to the course already drawn through C, which is the required distance, on the same scale that the original distance was laid off; and as they all started equal, it at once shows the result, namely,—A lost on C 482 yards, D lost on C 135 yards, F lost on C 54 yards; and that B beat C 230 yards, and E beat C 173 yards.

Secondly.—To determine it by inspection, we take, *for instance*, A and C. —First, the course being N.E., the line perpendicular to it is N.W. and S.E.; then,

A bears from C	N. 71° 0' W.
Line perpendicular to course N.W.	N. 45° 0' W.
Angle of difference showing A astern	<u>26° 0'</u>

Which 26° taken as a course in the traverse table, and the distance, 1100 yards, in its column, gives 482 in the departure column, of the same denomination as the distance was measured in—namely, yards.

Thirdly.—By calculation, we take A and C, *for instance*. A bears from C, N. 71° W., and the line perpendicular to the course is N. 45° W., difference 26°, which is the angle at C. Having the angle C, and H being a right angle, we at once have angle A; and the distance A to C (1100) being known, it is readily ascertained thus:—



Angle C	26° 0'
Angle H	90° 0'
	<u>116° 0'</u>
	<u>180° 0'</u>
Gives Angle A	<u>64° 0'</u>

As radius	10,000000
Is to side A C, 1100 yards	3,041393
So is sine of Angle C 26°	9,641842
	<u>12,683235</u>
	<u>10,000000</u>
To the side C, H, 482,2 yards	2,683235

The other vessels may all be determined in a similar manner.

This Table is taken from actual measurement, and will be found useful in determining the Height of Masts in different classes of Vessels.

NAMES.	Height of main truck from hammock-netting.	Height of main top-mast cap to hammock-netting.	Height of main cap to hammock-netting.
	Feet In.	Feet In.	Feet In.
ALBION	174 . 0	134 . 0	82 . 0
QUEEN	173 . 2	129 . 11	75 . 5
CANOPUS	172 . 6	128 . 0	81 . 0
ST. VINCENT.....	169 . 6	127 . 6	77 . 0
BLENHEIM	138 . 0	105 . 0	66 . 11
RALEIGH.....	164 . 3	124 . 0	78 . 0
ORESTES	118 . 10	84 . 10	52 . 4
FROLIC	112 . 9	83 . 9	54 . 6
RATTLER.....	105 . 8	80 . 4	53 . 10
REYNARD	92 . 6	72 . 2	52 . 8
SIDON	132 . 9	96 . 1	63 . 9
DRAGON	135 . 0	118 . 0	74 . 0
ODIN	127 . 0	102 . 0	75 . 0
AVENGER	124 . 7	102 . 0	71 . 7

To determine the Distance of Vessels from each other by an observed Angle from the mast-head to the hammock-netting, or water-line, or to any other place, the distances between which are known.

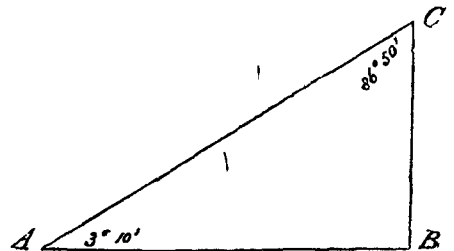


The hammock-netting is the best place to observe to. *First.*—In consequence of a vessel's water-line not being always the same, from difference of immersion, or from heeling over. *Secondly.*—It cannot be so distinctly seen when distant. *Thirdly.*—The observer being generally on the upper deck, a line drawn from his position to the hammock-netting of the vessel to be observed, will be nearer horizontal than one drawn from his position to the water-line; we therefore conclude that the hammock-netting is most correct.

EXAMPLE.

An observer on the quarter-deck took the angle $3^{\circ} 10'$ (corrected for index error) of a vessel's main royal truck to the hammock-netting; the height between them was known to be 190 feet. Required the distance from one vessel to the other?

As sine of Angle A $3^{\circ} 10'$	8,742259
Is to the side B C, 190 feet	<u>2,278754</u>
So is the sine of Angle C $86^{\circ} 50'$	9,999336
	<u>12,278090</u>
	<u>8,742259</u>
To the distance A B, 3434 feet ..	<u><u>3,535831</u></u>



STEAMERS' LIGHTS, TO PREVENT COLLISION.

-
- When under Weigh.* { 1. Bright white light at fore-mast head.
2. Green light on the starboard side.
3. Red light on the port side.

*When at Anchor (steamers and all other vessels).—A common bright light.**

THE FOLLOWING CONDITIONS TO BE OBSERVED, VIZ.—

1. The mast-head light to be visible at a distance of *at least five miles* in a clear dark night, and the lantern to be so constructed as to show a uniform and unbroken light over an arc of the horizon of 20 points of the compass, viz., from right ahead to two points abaft the beam on each side of the ship.

2. The coloured side lights to be visible at a distance of *at least two miles* in a clear dark night, and the lanterns to be so constructed as to show a uniform and unbroken light over an arc of the horizon of 10 points of the compass, viz., from right ahead to two points abaft the beam on their respective sides.

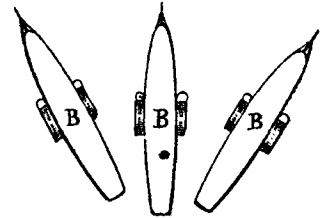
3. The side lights to be moreover fitted with inboard screens, of at least 3 feet long, to prevent them from being seen across the bow. The screens to be placed in a fore-and-aft line with the inner edge of the side lights.

*4. The lantern used when at anchor, to be so constructed, as to show a good light all round the horizon.

The following Diagrams are intended to illustrate the working of the foregoing Plan.

FIRST SITUATION.

In this situation the steamer A will only see the *red light* of the vessel B, in whichever of the three positions the latter may happen to be, because the *green light* will be hid from view. A will be assured that the *larboard* side of B is towards him, and that the latter is therefore crossing the bows of A in *some direction to port*. A will therefore [if so close as to fear collision] *port* his helm with confidence, and pass clear. On the other hand, the vessel B, in either of the three positions, will see the *red, green, and mast-head* lights of A appear in a triangular form, by which the former will know that a steamer is approaching *directly* towards him:— B will act accordingly.



It is scarcely necessary to remark that the *mast-head light* will always be visible in every situation until abaft the beam.

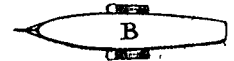
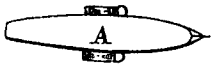
SECOND SITUATION.

Here A will see B's *green light* only, which will clearly indicate to the former that B is crossing to starboard. Again A's *three lights* being visible to B, will apprise the latter that a steamer is steering *directly* towards him.



THIRD SITUATION.

A and B will see each other's *red light* only. The screens preventing the *green lights* being seen. Both vessels are evidently passing to *port*.

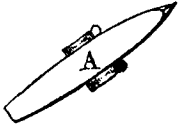


FOURTH SITUATION.

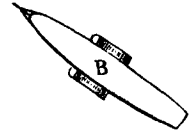
Here a *green light* only will be visible to each: the screens preventing the *red lights* being seen. They are therefore passing to *starboard*.



FIFTH SITUATION.



This is a situation requiring caution :—the *red* light in view to A, and *green* to B, will inform both that they are approaching each other in an oblique direction. A should put his helm to port, according to the standing rule mentioned in the next situation.



SIXTH SITUATION.



Here the two coloured lights, visible to each, will indicate their *direct* approach towards each other. In this situation it ought to be a *standing rule* that both should put their helms to *port*. This rule is already pretty generally adopted; but it would add to safety if it were made *imperative*: for it is evident, that without some rule of this kind, well understood and practised, it will be impossible to guard at all times against accidents in the situation of the two vessels here given.



The *manner* of fixing the coloured lights should be particularly attended to. They would require to be fitted, each, with a *screen* of wood or canvas on the *inboard* side, in order to prevent *both* being seen at the same moment from any direction but that of *right-a-head*.

This is of importance, for without the *screens* (a principle first introduced with this plan) any plan of bow-lights would be ineffective as a means of indicating the *direction of steering*.

This will be readily understood by a reference to the preceding illustrations, where it will appear evident, that in any situation in which two vessels may approach each other in the dark, the coloured lights will instantly indicate to both the *relative course of each*,—that is, each will know whether the other is approaching *directly* or *crossing the bows*, either to *starboard* or to *port*. This intimation is all that is required to enable vessels to pass each other in the darkest night, with almost equal safety as in broad day; and for the want of which so many lamentable accidents have occurred.

It might prove of infinite service, combined with the above plan of lighting steamers, if all *sailing* vessels were provided with a green, and a red lantern, to be shown by hand on the starboard or port bow, according to the side on which a vessel might be approaching.

If at anchor, all vessels, without distinction, to exhibit a common light.

RULES TO BE OBSERVED IN GENERAL NAVIGATION,
TO AVOID COLLISION.

SAILING VESSELS.

1.—Those vessels having the wind fair, shall “give way” to those on a wind.

2.—That when both are going by the wind, the vessel on the starboard tack shall keep her wind, and the one on the port tack bear up; thereby passing each other on the port hand.

3.—That when both vessels have the wind free, large, or abeam, and meet, they shall pass each other in the same way, by putting the helm to port.

4.—Any vessel passing another steering a similar course, must always leave the vessel she is passing, on her port side.

STEAM-VESSELS

are considered in the light of sailing-vessels navigating with a fair wind, and should give way to sailing vessels on a wind, on either tack.

Steam-vessels navigating any river or narrow channel, shall keep, as far as is practicable, to that side of the fair-way, or mid-channel, of such river or channel, which lies on the starboard side of such vessel; due regard being had to the tide, and to the position of each vessel in such tide.

The End.

TO THE
RIGHT HONOURABLE
THE LORDS COMMISSIONERS OF THE ADMIRALTY,

THIS WORK ON
NAVAL TACTICS,
IS, BY THEIR LORDSHIPS' PERMISSION,

Respectfully Dedicated,

BY THEIR MOST OBEDIENT AND HUMBLE SERVANT,

GEORGE BIDDLECOMBE.

PLAN OF LIGHTS FOR STEAM-VESSELS,

AND

REGULATIONS TO AVOID COLLISION.

The accompanying PLAN OF LIGHTS FOR STEAM-VESSELS is that established by the Lords Commissioners of the Admiralty, and generally adopted by steam-vessels of all nations.

The REGULATIONS TO AVOID COLLISION are those established by the Corporation of Trinity House, London.





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