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Read and Nickoll's Patent Indicating Day and Night Helm Signals for Preventing Collisions at Sea

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Evening Meeting.

Monday, July 8th, 1872.

CAPTAIN JASPER SELWYN, R.N., in the Chair.

NAMES OF MEMBERS who joined the Institution between the 2nd and 8th July, 1872.

LIFE.

Gordon, W. E. A., C.B., Captain R.N.
Hart, Horatio H., Lieut. R.E.
Fitzherbert, W. H. M., Lieut. Rifle Brigade.
Kenyon-Slaney, Walter R., Lieut. Rifle Brigade.

ANNUAL.

Elliot, A. F., M.D., Staff-Surgeon.

READ AND NICKOLL'S PATENT INDICATING DAY AND NIGHT HELM SIGNALS FOR PREVENTING COLLISIONS AT SEA.

By Mr. GEORGE READ, R.N.

I HAVE the honour to bring before you this evening an invention for the prevention of "Collisions at Sea."

It is a subject which must enlist the attention and sympathy of every class of the community, whether it be the shipowner, the ship insurer, the merchant, the traveller, and last but not least, "poor Jack" himself, as all have a vital interest in this most important question.

The traffic on the ocean has become so great, the value of the merchandise so immense, the sailors employed, and the public who travel by sea so numerous, that every nation is not only interested, but is in duty bound to adopt such measures as may tend to lessen the loss of life and property by those fearful collisions, which are continually occurring, and to render voyages as free from danger as possible.

In order to convey an idea of the magnitude of the subject, I beg to call your attention to the last published returns of the Board of Trade, by which it will be seen that the total number of British vessels entered inwards in 1866, amounted to 33,393, equal to 10,692,102

tons; and in 1870, to 35,182, equal to 12,350,390 tons, showing an increase of 1,789 vessels, and an increase of 1,688,288 tons.

During the same years there were cleared outwards, viz., in 1866, 32,203 vessels equal to 10,563,624 tons, and in 1870, 35,405 vessels, equal to 12,691,790 tons, showing an increase of 3,202 vessels, and of 2,128,166 tons; so that in four years, viz., from 1866 to 1870, there was an increase of 4,991 vessels, equal to 3,816,454 tons.

With regard to foreign vessels there were cleared outwards in 1866, 24,575, equal to 5,086,656 tons, and in 1870, 24,751, equal to 5,835,028 tons, showing an increase of 176 vessels, and an increase of 748,372 tons.

Thus the total number of vessels, both British and foreign, cleared outwards in 1870, was 60,156, the total number of tons amounting to 18,526,818.

To navigate and man these vessels, it may be estimated that there are not less than half a million of men employed. As the number and speed of the vessels increase, so unfortunately do collisions become more frequent.

I have made out an estimate of the loss of property by collisions, and it is something like one hundred millions per annum. Whilst in 1869 the collisions amounted to 2,185, of which 157 vessels were totally destroyed, in 1871 they amounted to 2,561, of which 176 were entirely lost.

That steamers are rapidly supplanting sailing vessels is shown by the Board of Trade returns. In 1870 the tonnage of steam vessels built in the United Kingdom was 225,665, and of sailing vessels 117,032; making a difference of 108,634 tons in favour of steam.

In a very able article in the "English Encyclopædia," on Collisions at Sea, written by the well-known Mr. Saxby, R.N., it says, referring to the question of lights, "and committees and others who have approached the question of Collisions at Sea, all seem to have neglected to give due prominence to the want of attention to that which is the *root of the evil*, namely, that when ships are approaching in opposite or oblique directions, no collision would be likely to take place, if one Commander knew what the other was about to do with his helm,—positive safety hinges on this." Again, the same author says, "without the aid therefore of some further legislation, can we hope to prevent collisions. It may, however, be remarked, that if two persons are meeting carelessly on a pavement collision is only avoided by one of the two knowing in proper time what the other is about to do. The same remark applies to shipping; a ready means of knowing in time the intended motions of an opponent seems indispensable to safety."

The present system of lights has proved inadequate for the prevention of collisions.

Our invention, if adopted, would render collisions next to impossible; as it would supply the one thing needed, as mentioned by Mr. Saxby, viz., enable one Commander to know what the other was about to do with his helm.

It is true that the 13th article, of the "sailing rules," attempts to pro-

vide for the emergency of two ships meeting, but it often happens that other vessels are so much in the way, and in such positions that their regulation lights do not show, and for other reasons it is frequently impossible to obey this rule; it is thus left entirely to the judgment of the person in charge of the ship, which way he will put his helm, and should each vessel be steaming at the rate of 12 knots per hour, they would be actually rushing at each other at the rate of 24 knots an hour; there is thus no time to deliberate. A may imagine that B will put his helm to port, whilst B with equal justice may suppose that A will put his helm to starboard, the consequence is, that although each may have used his best judgment, for want of knowing with certainty, which way the other will steer, a collision ensues with probably great loss of life and property.

With the *side-lights* now in use, it is impossible at night to know when a vessel is approaching end-on, or nearly end-on, whether she sees you, and intends to alter her course, and, if she does, whether she will pass on the port or starboard side, hence arises, immediate danger to both vessels. It is often a source of anxiety to those in charge of a sailing vessel sailing by the wind "close hauled" "which side a steamer will pass, when she is coming on to the sailing vessel in a position abaft the beam where the regulation lights do not show to the steamer.

The adoption of our signals will not in any way interfere with the sailing rules or lights at present in use; it might almost be said they would not be additional lights, but simply, so to speak, a reflection of the existing ones, with the great additional advantage, that they would infallibly show, not only which way a ship is steering, but which way she is going to steer; in fact, reveal the mind of the person in charge of the ship.

There are other purposes to which these signals may be applied with great advantage, as for instance,—in piloting vessels into tidal harbours. The harbour-master could indicate the course a vessel coming into the harbour should steer, and at the same time, the vessel would show by the movement of her lights, whether she understood the directions, and is following them.

Again, in taking up a berth in a crowded roadstead or river, the "helm light" would show what sheer a vessel at anchor had; for example, a vessel's helm is lashed to port, the red light shows at once that is the position of the helm, and the cable will be leading on the port-bow; and if she is riding with starboard-helm, the light will be green, and the cable will be had from the starboard-bow, so that a ship coming in to anchor will know on which side to drop hers, and thus avoid taking up what is called a "foul berth."

I do not attempt to introduce a system that has not been fully tested. The "helm-signals" have already been exhibited and worked at sea in the presence of a Committee of Lloyds, and Lloyds' Salvage Association, and many other gentlemen, all of whom have expressed their entire approbation of them, and consider they should come into general use. I have also exhibited these signals at Liverpool with similar results, and particularly before the Mercantile Marine

Service Association. With your permission I will read two or three testimonials which I have received with many others. (See Appendix.) I may state that I have also had the honour of exhibiting our signals before Earl Granville, off Walmer Castle, from the "Palmerston" tug of Dover: she was sent out expressly in a gale of wind, in order that his Lordship should see the working of the lights at sea.

The apparatus (see Plate)* is so adjusted that it may be hoisted and lowered for the purpose of lighting or trimming the lamp, without the least trouble, thus avoiding the necessity for a man going aloft. It can be treated as the common steam-ship-light now in use, and is self-regulating, any cabin-boy can rig it, and being perforated at the back, the Officer of the watch can see which way the man at the wheel is steering, whether he is doing his duty, and obeying orders. He can also see whether the light is well trimmed and burning. If the man at the wheel should happen to fall asleep or to put the helm the wrong way, the officer of the watch can see it by looking up at the mast-head. At present it is impossible to know what the man is doing with the wheel except by standing at the wheel; you do not know whether he is giving one or two turns, but by looking at the indicator, which is very sensitive, it is impossible to mistake.

The whole apparatus is very inexpensive, and the mechanism so simple that it cannot get out of order.

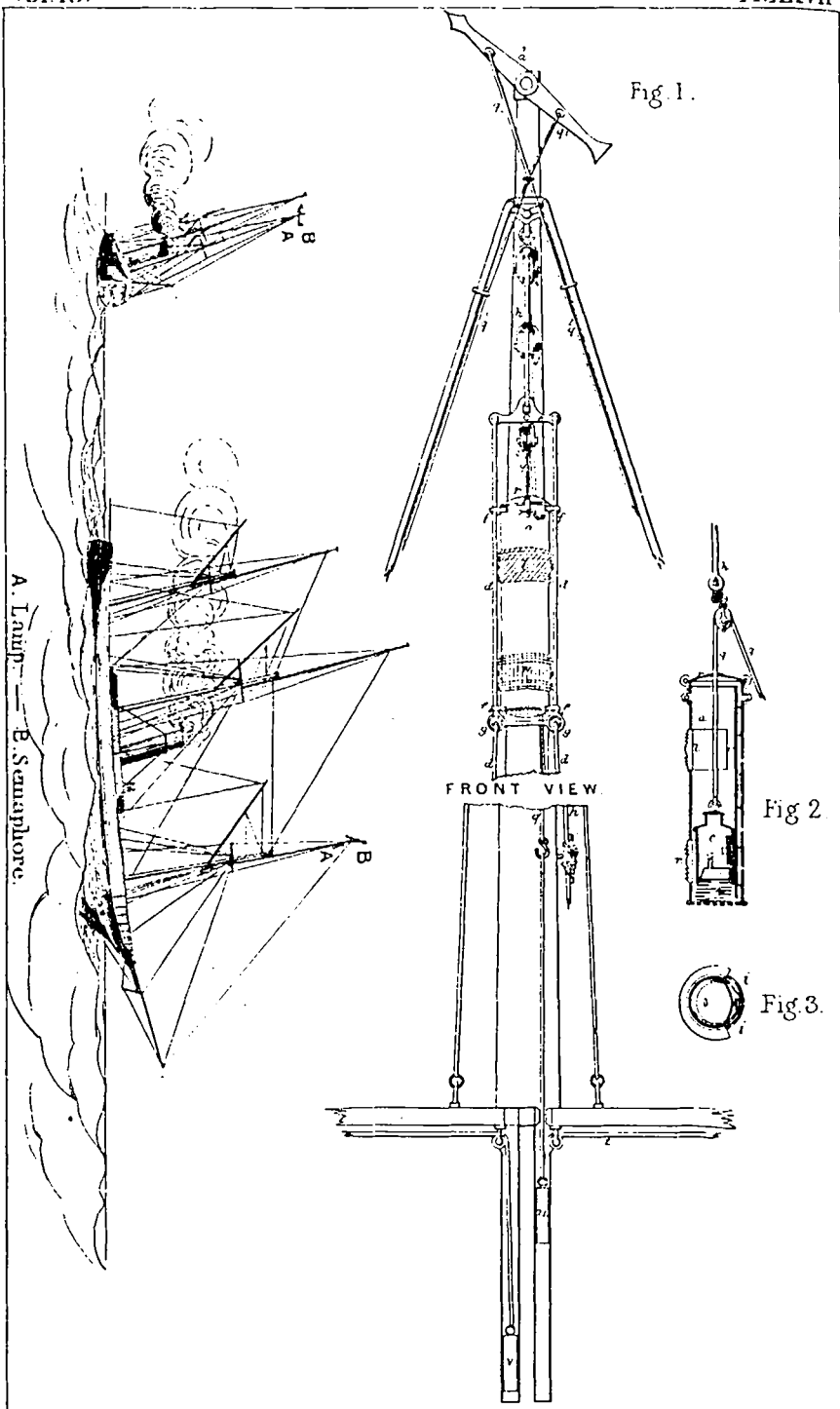
This lanthorn, as you will perceive, is made in the form of an ordinary masthead lanthorn, with a circular burner at the back, which is surrounded by circular glass shades—one green shade, one blank, or metal shade, and one red shade; these shades are caused to move up and down (around the burner) by the movements communicated from the ship's helm. These shades also act as a chimney to the flame, and thereby consume the smoke and greatly increases the power of light.

The following are the advantages I claim for these signals:—Whilst they do not in any way alter the existing lights carried by sailing and steam-vessels, nor necessitate in any manner the alteration of the present sailing orders or "rule of the road at sea," they furnish an inexpensive and certain mode by which the course vessels are steering, or about to steer, is at once made manifest, and must consequently very greatly diminish the chances of collisions. They furnish a better method than the present by which vessels may be piloted by signals into tidal harbours, and they will also prevent vessels coming into crowded rivers and roadsteads, taking up foul berths.

Mr. Gray, of the Board of Trade, has in his Aids to Memory, made use of rhymes which he has got the sanction of the Admiralty to have printed in different languages, to set forth the rule of the road at sea. If Mr. Gray is right in theory, I certainly must be right in practice. He says,—

" Meeting steamers do not dread,
Port your helm and show the red,
Green to green, or red to red,
Perfect safety, go ahead!"

* Models also may be seen at the Office, No. 6, East India Avenue, Leadenhall Street.



And in his third verse,—

“If to your starboard red appear,
It is your duty to keep clear;
To act as judgment says is proper,
To port, or starboard, back, or stop her.”

I say,—

“If you don't know which way he'll steer,
The indicator makes it clear.
For if the helm to starboard goes,
The green masthead-light clearly shows.
But, if he with a port-helm steers,
The red light then aloft appears.”

I will now show you the appearance of a steamer with the regulation lights (exhibiting a diagram), and here is a steamer in the distance with a starboard-helm light. With our helm-light it would be clearly seen which way he intends to steer. He starboards his helm, and you see by the light that he is bearing away to go astern of your steamer. If he ported his helm you would know that he intended to cross your bows. But with the regulation light the great question is, “Which side will he pass?” You wait for him and he waits for you; hence one-half of the collisions. But as soon as you see his “helm-light,” (I do not care whether there is a look-out or not) you know what he is going to do. The man on the look-out may say, “There's a ship on the starboard bow; with starboard helm.” The reverse, if so, with “port helm.” By our arrangement if the officer should give the order to port the helm, and looks up at the mast-head, he can see whether the steersman has done it. If the man puts the helm wrong, the officer is able to detect it in an instant. It would also prove to the approaching ship that you intend to obey the rule of the road at sea and port your helm, and, of course, he would port also. It would also prove in the Admiralty Court the position of the rudder when the collision took place. This is the appearance of a tug (showing a diagram), which is compelled by law to carry two mast-head lights. Where those two mast-head lights are carried by the tugs, I should carry ours. Our light is equally clear on a stay or a backstay, or on any other part where it is considered suitable. Here is a diagram of a ship in the Downs riding in a crowded roadstead. I am running into the Downs, and I want to get a clear berth to anchor. With our helm light above the anchor light, a ship seeking a berth would say, for instance, “There is a ship at anchor with port helm, and the cable is on the port bow, I shall have a clear berth if I get on her starboard side.” The two anchors will be at the extreme on the turn of the tide. Since I have been stationed at Deal, I have seen many vessels collide through anchoring in what is called a foul berth; they cannot make out each other's position; the consequence is, they have to slip their anchors, or they collide and smash each other up.

I will now explain the semaphore. The semaphore is simply a yard (which need not cost more than a shilling or two), made of wood and slung as you see it; the two lines are simply brought to the wheel ropes of the tiller. If the ship steers with the wheel on the bridge,

we have less gear. I propose to have a flexible wire rope, as wet or cold will not affect it. The semaphore would be of great use to steamships in the British Navy. I was cruising last summer, and saw a squadron, with the ships steaming one vessel after the other. It was difficult to know when a steamer was coming on behind at full speed, on which side she intended to pass. With this indicator there will be no doubt at all. We see the ship is porting her helm, and we know that she intends to come up on the right side. Reverse the semaphore, and it indicates that the ship is going to starboard her helm and to pass on the port side. Where the conformation of a river forms a bend, the hull of a vessel is often not seen at all; so the mast-head is the thing to look at; you see by the indicator that she has got starboard helm, and you know that she intends to go close round the point. The same with regard to lights at night. The present lights are deceptive. One vessel going down the river, and another vessel coming up, where the river forms a bend, the one shows the port light, and the other the starboard light; the consequence is that they cannot comply with the rule, without going right round each other's bows. With our light that difficulty is avoided. The light is slung in the ordinary way. It can be applied to the topmast stay or to the forestay clear of all square sails; and it can be lowered down. There is only one line to lower it down, and one line to trice it up.

I should tell you in conclusion that Lord Granville, who saw our plan tried, described it as "talking with the rudder;" and Mr. Gladstone, to whom I also had the honour of showing it, said that it was "the mute language of the rudder." He was much pleased with the illustration, which I had the honour of showing him, of our system. The great object I have in view is to save the lives of my fellow-creatures at sea.

APPENDIX.

From Sir Luke Smithett, late Manager, Royal Mail Packets, Dover.

I beg to state that I have, with several nautical and scientific gentlemen, carefully investigated Mr. Read's "HELM INDICATOR," as well as observed it when fitted on board a steam vessel for trial, and I am of opinion if generally known and applied to vessels at sea, many of the dangerous collisions which so frequently occur might be avoided.

The invention being simple, inexpensive, and easily applied, I can have no hesitation in recommending it to the shipping interest.

From J. A. W. Harper, Esq., the Secretary of Lloyds' Salvage Association.

Mr. Read has made an invention, which, after much consideration here, and many experiments, seems to those who have conducted and been present at the experiments, and have examined minutely the invention, very complete, and of serious importance.

The distinguishing points in this invention, are, that preserving the white light of a steamer unaltered, it presents two red lights when the ship has port helm, and

two green lights when she has starboard helm, and that the changes in the lights are mechanically effected by a communication between the lights and the wheel itself, so that whenever the wheel is put to starboard, the green lights present themselves, and on the contrary, directly the wheel is put to port, the red lights show themselves.

And it will be seen that even changes in the direction of the ship, to port or to starboard, will be indicated by the shifting of the lights, because the lights vary mechanically with every movement of the wheel.

Considering how many collisions there are in the course of twelve months, I am sure that anything which gives a real chance for diminishing that number is something that deserves attentive consideration.

From the President of the Mercantile Marine Service Association, Liverpool.

On behalf of the Mercantile Marine Service Association, and as its President, I have much pleasure in conveying to you the unanimous approval of the Council, of your "HELM INDICATOR," for the prevention of collisions at sea.

After a careful inspection of your model, and also after, what is more important, an actual experimental test of the invention on board a steamer engaged for the purpose, during the day time, and after dark as well, the favourable impression your explanations have made upon the Board was fully confirmed.

It is their decided opinion that the invention is a most simple, and at the same time a most faithful and admirable contrivance for preventing collisions, more especially in the case of steamers.

I trust that this expression of approval by thoroughly practical men may be the means of furthering the adoption of the invention to the general benefit of the sea-going portion of this and other communities, and of the public at large in the probable saving of life and property.

From Mr. J. B. Millen, Cinque Port Pilot.

Your invention for the better protection of life and property at sea, is both ingenious in its design and very simple in its working, which, if adopted, especially amongst steam ships, would prove one of the best means ever introduced for the prevention of those fearful collisions we so frequently have now.

Steam ships, by adopting your invention, would confer a great boon on those navigating in sailing ships.

It is often a source of anxiety to those in charge of the latter, when a steam ship is approaching, to know the intent of those in command of those ships, especially in narrow waters, whereas your design at once reveals, I may say, the mind.

I have had many years' experience in navigating between Dungeness and Gravesend, therefore feel some confidence in giving you my opinion; I have often thought that some such invention as yours was much needed.

From thirty-one Deal Pilots.

We, the undersigned Trinity Cinque Port Pilots, having examined your "HELM INDICATOR," are unanimous in our opinion that it is the most efficient and practicable invention, in conjunction with the present system of lights ever brought before the public for the prevention of collisions at sea, as it is at once trifling in cost, simple in its working, and not easily liable to get out of order, and that it can be placed at the "fore stay," or any other convenient place when there is not sufficient room between the fore yard and the masthead light. We are sure that your invention must meet with the hearty approval of all practical men as the one thing long needed, for by the very movement of the helm you at once communicate your intentions to any approaching ship, which fact must materially reduce the risk of collisions.

We sincerely wish your invention the success it in our opinion so richly merits, and that we shall shortly see it added to the present system of lights.

From Rear Admiral Sir W. R. Meads, K.C.B., to Clarke Aspinall, Esq.

Mr. Read has suggested a plan for notifying to ships the position of the helm by day or night. The plan is, in my opinion, simple in design though clever in conception, and is certainly deserving of the best consideration; whether adopted for the high sea by Board of Trade or not, it would assuredly be of service in narrow waters.

Mr. BUTCHART, Trinity pilot: I should like to ask one question with reference to the semaphore. Would it have a green ball on the starboard side, and a red ball on the port side?—(Mr. READ: Just so.)—It is used at night?

Mr. READ: No, the semaphore is not used at night. In the river you are crowded with barges, and I propose this (showing a cheap kind of semaphore) as a semaphore for bargemen. If they could not get a rod of iron, they could get a broomstick, and sling it in the middle, and connect it with the tiller in order to show which way they are steering. (Really a cabbage at one end, and a bunch of carrots at the other, would answer the purpose, and at the end of the voyage they might be eaten.) Many collisions take place in the day-time, and it is quite as necessary you should know what a man is going to do in the day-time with his rudder as in the night. With such an apparatus as this there is no excuse for him.

The CHAIRMAN: Will you show the new lamps, which I see on the table, in action? Which of the two sets do you propose to adopt?

Mr. READ: This one has been lately finished, and is not quite perfect. I will exhibit the difference of the two. This one, I should tell you, is made out of a common ship's lens; it was made by myself. I converted the side lenses, and put them into this cylinder. I show three colours by the motion of the rudder; white with the helm amidships, green to starboard, and red to port. It is a question to be decided hereafter, whether a vessel shall show a white light representing danger with the helm amidships. With white for the helm amidships, I do not interfere with the rule which Government have sanctioned, that a tug shall carry a white light for a second light. But as soon as ever the helm is shifted to starboard, it changes the colour to green; and when it is shifted to port you see the red light. This is simply a common mast-head light, but it shows with this lens the different colours. The regulation lights would not be interfered with in any way. If the Board of Trade should decide upon adopting our lights to register the movements of the rudder, then, I say, "here are your regulation lights, with the white light for steamers."

The CHAIRMAN: In the new lamp I see you have no light at all for helm amidships?

Mr. READ: No. There is already a bright light carried by steamers at the mast-head, so that with this "helm-indicator" you do not want another white light.

The CHAIRMAN: Is it not possible to make that take the place of the ordinary white mast-head light?

Mr. READ: We could do so by putting the white light in the centre. At present it is a blank; but it could be made to show white, as well as red and green by putting another burner in the centre. But that is a question of detail to be decided on hereafter. Some persons object to showing a white light with the helm amidships, so I would rather have it blank. The white light with the helm amidships shows that the vessel is steering a straight course, and is coming dead on you.

Mr. BUTCHART: Where do you propose to fix this light on sailing vessels? I can quite understand the principle on board a steamer, but with all sails set?

Mr. READ: I propose to put it on the topmast-stay, or on a stanchion that may come up under the foot of the foretop-sail. But I can place it anywhere; I can place it on the topmast stay, or I can lower it down wherever you like. This is another apparatus made of copper, made by another lamp-maker. It is a very powerful lamp on a dark night, but it is a very expensive one.

A VISITOR: At what distance can that light be distinguished?

Mr. READ: The red can be seen from four to five miles off; the green would be seen about three or three and a quarter miles. It is not so powerful; you cannot see the green as well as the red.

The CHAIRMAN: In all cases it is about the same as with the ordinary side lights? It is a question of power of lights.

A VISITOR: What would be the cost of the mast-head light?

Mr. READ: With the other gear, it would be something like from £1 to £5.

The CHAIRMAN: But the expense of burning would be no greater than that of the present mast-head light?

Mr. READ: No.

Mr. HENWOOD: What would be the expense of the apparatus you propose?

Mr. READ: That would depend upon the vessel. If the ship was steered from the bridge, the drift would be shorter, and, consequently, there would be less expense. I should say, that the whole apparatus could not possibly cost more than £10 for the biggest vessel afloat. Wire rope is cheap, and can easily be put in tubes, and sunk in the deck, and covered over in the water ways. The friction is no more than that of the ordinary gear with blocks and tackles, on board ship.

A VISITOR: Then, when this lamp with the bright light for "helm amidships," is shown on board a sailing-vessel, how do you distinguish her from a steamer? The steamer at present shows a bright light?

Mr. READ: The question is, whether the steamer shall have a white light, with helm amidships, or whether the sailing-vessel shall be blank.

The VISITOR: But if I understand you correctly, yours is an addition to the mast-head light of the steamer. (Mr. READ: It is.) Then the mast-head light would always be there?

Mr. READ: It would always be there. I do not interfere with the regulation lights in any way whatever. Mine is a useful adjunct to the navigator in order to reveal to a ship under weigh the mind of the man who is steering an approaching ship. A steamer steaming steadily on would show two bright lights; but that is a question to be decided hereafter. I propose to show to the approaching ship the motion of the rudder by the aid of the lights and semaphore. I consider that, if this helm-light is used as a position light, with white showing right ahead, green starboard, red port, it would do away with side lights altogether.

A VISITOR: Could it be used for lighthouse purposes?

Mr. READ: Yes, or for dock-heads and light-ships on dangerous shoals. The light-keeper would say, "There is a vessel running along, I am sure she will be on the Goodwin." He sends up a rocket, and begins to show one of these indicators. The man in the vessel says, "There's the light-ship, he is drawing my attention: he is giving me a signal to starboard my helm. He knows I am running into danger, he can see it."

Mr. BUTCHART: The difficulty in that case would be this. Supposing there were two or three vessels running in the same direction, how would any one of them know that the light ship was signalling to him especially?

Mr. READ: I can only explain it in this way. The "Gull" light-ship the other night fired a gun and sent up two rockets, pointed in the direction in which the ship was on the Goodwin. The rocket is always sent in the direction of the ship. We can see it from the shore, five miles off, and can tell where a ship is on the Goodwin because a rocket is sent in that direction. The same thing could be done in this case, a rocket could be sent towards the ship for whom the signal was intended, and it could be seen as plainly as a light.

Mr. BUTCHART: I have a good deal of feeling in favour of the present regulation lights, as necessary for all the purposes that ordinary navigation requires, especially for rivers, and for any part in fact. You said that the officer in charge would know whether the man at the wheel was doing right. Now, on board steamers you have the man on the bridge, and the officer of the watch is always beside him; so he knows, without taking notice of the light, whether it is green or red. He has got the man under his eye, and he knows whether he is porting or starboarding his helm.

Mr. READ: Of course, if you are always watching the man at the wheel. But your attention cannot be directed to two things: you cannot be looking out ahead, and seeing what the man is doing at the same time.

Mr. BUTCHART: But it is most important in a dangerous navigation, to have your eye upon the wheel.

Mr. READ: They have more often to look out for danger astern, where there is no light to be seen at all, than they have ahead; because if one steamer is going five knots, and another is coming up at the rate of twelve knots, they have to look out astern to see which way that vessel is going to pass. The indicator would show whether she was going to port or starboard.

Mr. BURCHART: I am a pilot, therefore, I presume, I know something of the matter. It is a subject in which I have for a long time taken a deep interest, and in which some years ago I had something to do in bringing about the present regulation lights. Before the establishment of these lights on sailing vessels, I saw the value of them: and my difficulty at that time was to know on what part of the ship to carry them. Experience has proved that to carry them either aft or forward is of little or no moment. The great thing is that the light shall be seen right ahead, and only in that direction, and two points abaft the beam. When two vessels are meeting each other, the law provides that both vessels shall port their helms and show their red lights. If both vessels are end on they see each other's lights distinctly. If you lose sight of the green and get full sight of the red, you know that the other vessel is porting her helm. That rule is very simple, and is generally easily acted upon. But with all this, collisions will no doubt occur, as they have occurred; as long as we have so much traffic at sea, long dark nights, foggy weather, gales of wind, and all the contingencies and changes of sea, there will be collisions, and all that can be said or done will not do away with them entirely. However, whatever will lessen the amount or probability of collisions, whatever means are adopted or aimed at to lessen collisions, is deserving of support and sympathy, and ought to be encouraged. But in the river Thames, for instance, there are difficulties not easily to be provided for. I am in the habit of taking vessels down from the docks to the Downs. The present rule is that vessels going down shall keep the right hand, and vessels coming up shall keep the other hand, that is, both vessels shall act on the port helm. But this is a rule that cannot be applied in the river in all cases; no rule can be rigidly applied. It seems rather paradoxical to say that if you acted upon a port helm in some parts of the river, and in certain states of the tide, you would be on the wrong side entirely. Above Gravesend, especially, these hard and fast rules will not do. If I go down in the day time or in the night time, and show my regulation lights, I think that is all that is required. I have great faith in the present system of lights, as to their sufficiency for nearly all the purposes of navigation. But suppose I am using the "helm-indicator," there may be two or three vessels ahead—which vessel is to know that I am telegraphing to her that I am going to port my helm? I may intend to port my helm to the vessel on my port bow; I may not be thinking about the other man at all, yet he may suppose that I am signalling to him, because both see the indicator. Another thing, you know we have got very large steamers to take down and bring up, and they require a great deal of care and good management to pilot them safely. We frequently have to port the helm, not to alter their course, but to keep them in their course. But your indicator would show that your helm is a-port, showing that your intention is to go clear of another vessel; whereas, the object is to keep the vessel straight and preserve her course. (Mr. READ: Then, he must put his wheel over.) Of course, he has got his wheel over. But, then, in the day-time the side of the vessel is a very important thing to keep in sight. If I have got a view of the starboard side of a vessel, and the pilot, or Officer in charge sees my starboard side, there is no difficulty in avoiding a collision. But the difficulty and danger is, if you, by your indicator show that you are altering your helm, without any intention of going near the other vessel, and which you are not intending to go near. Then, again, in the river there are very sharp bends; passing from one reach into another, sometimes involves an alteration of course to the extent of ten points. This is a very serious matter. Then, with porting the helm, or starboarding the helm, as the case may be, the pilot, or person in charge, is obliged to preserve the course of the river as much as possible without regard to right or left of a sailing ship. Then, we have so much traffic in the river, especially with sailing barges. The number of these craft is enormous. Since the repeal of the navigation laws, the traffic on the river has increased amazingly. In our days the difficulty lies with them, not so much with sailing vessels. We have to be guided a great deal by circumstances; we cannot

abide by a hard and fast rule, and say, "I will keep on this side of the river and no other." We cannot do that. I am obliged to port or starboard my helm without regard to any part of the river I may be in. Still, I said as before, there is a great deal of ingenuity about the scheme before us, and I should like to see it tested. I think it deserves the serious consideration of those who are interested in the question. It might answer in some parts, especially below Gravesend, or in the channel. Something was said about ships in tow of steamers. We know that according to the present regulation-lights a steamer towing a ship, is obliged to show two mast-head lights (8 or 10 feet apart); and as soon as we see the two mast-head lights, we know it is a steamer towing a ship. But if you are going to put a mast-head light on to sailing ships, according to the proposed plan, you will not be able to distinguish between a sailing vessel and a steamer. Then, something was said about guiding ships into harbours. I am not aware of any case where harbour-masters take any part in vessels entering a harbour of refuge. The pilot in charge is the person who is responsible; he is the best judge of the course he ought to steer. The harbour-master standing on the pier-head cannot tell so well. But I do not see how the harbour-master can in any way indicate to a vessel how he ought to put his helm. Again, about the anchor-light, there is something important to know about that. There are only two roadsteads in which the anchor-light as proposed would be available; that is the Downs and Yarmouth roads. In Portland, which is a large resort of shipping, it would be of no use at all, because ships always lie head to wind, for there is no run of tide at all. No doubt, when it is spring-tide in the Downs, and when the helm is an object, Mr. Read's suggestion is a very important one. But when it is neap-tide, and at other times, there is nothing for the helm to do; the ship lies head to wind. However, it is an important suggestion, and it is worth considering whether it could not be carried out. I have often, in trying to find an anchorage in the Downs, to observe which way a vessel is lying in regard to her anchor, and then to place my anchor so as to clear her. At night-time it would be very important for pilots, and others, in charge of vessels to know where there was a clear berth. About the changing of green, red, and bright lights, alternately, as shown by plan, showing that the helm is oscillating between one point and another, you must remember that lights at a little distance always blend. You would not be able to make anything of that at all, at least not distinctly. You would find at a certain distance the two lights would blend; you would not know whether it was red, green, or whatever colour it might be. I can only repeat that I am afraid the plan would not answer in the Thames. We have strong tides, and many things to contend with, which compel us to disregard these hard and fast rules, and to port or starboard as circumstances may dictate. However, it is a very ingenious plan, and the lecturer deserves very great credit. I hope it may succeed, and I think it may succeed in some places, and ought to have a fair trial.

A VISITOR: I am not a nautical man, but it appears to me that one or two of the last speaker's remarks cannot apply. He said, in the Thames he was obliged to put his helm hard-a-port in order to keep his course. (MR. BUTCHART: No: I did not say that.) In order to keep his course, or that he was obliged to work against the current by porting his helm or starboarding his helm; whereas the ship is not answering to it, but is simply keeping her course. I think it proves the use of the semaphore, because a vessel coming the other way would say, "It is nothing, he is doing all he can, he won't wash out against me, because I see his helm is ported," or the other way. With regard to the tidal harbour, it is perfectly true that the harbour-master cannot act. It very often happens that masters of vessels do not know the right tide at the harbour's mouth, so they often miss the entrance to the harbour; and a vessel often meets her death in trying to save her life. There is no reason why the harbour-master should not be entrusted with a duty of that kind; or, in the case of a ship approaching the shore, why he should not guide it into the right path. With regard to the Thames, I know from experience that there are many currents in the Thames, but at the same time I should be disposed to contend that if I was working against the current by means of my helm, I am only showing to others what I wish them to know.

Another VISITOR: I am a young man and my experience is very slight, only about ten years on the river. For nearly a year I went a voyage up and down

the river Thames every week. It used to be my delight to be on the bridge with the Captains of steamers going down the river at one o'clock in the morning. I know their great difficulty was this, they were always saying, "Where is that man coming to? what is he doing? how are we to tell which way he is steering, or where he is going to?" Simply because there was a barge or another ship hiding the red light on the port, or the green light on the starboard bow. Whereas, if there had been a light above, which was not hidden, showing which way that steamer was coming, there would be no fear of a collision. There is one case in which I know a man was drowned solely because the Captain of our steamer did not know that the steamer was coming in the way it was, and the man was knocked overboard. Although young to express an opinion, still I feel sure that a light like this proposed by Mr. Read is of very great importance.

The CHAIRMAN: I have great pleasure in recognizing the extremely clever way in which Mr. Read has put the whole subject before us. I think the meeting will agree with me that considering,—I presume,—he does not claim to be a highly mechanical man, we could not have had a clearer or plainer illustration of what his views are. As to the question which has been discussed, as to whether this be or be not of utility in all cases, I can only say that knowledge is always useful; that those who misuse it when they have got it are very much to blame; and that when one comes forward to enable us to acquire knowledge—for which we have long been seeking—for use more in the open sea than in narrow channels, that man deserves great praise and recognition. I think the Institution will bear me out in saying that Mr. Read has given us a most important addition to our knowledge upon the subject. I have been struck with the simple and cheap way in which the plan is carried out. I have seen many plans of this kind, but I have seen none which approaches it in simplicity or in action; nor have I seen any plan which produces so many effects. I hope the Meeting will allow me to thank Mr. Read for his very able lecture.

Description of Plate.—*a*, the signalling cylinder shown suspended to a fore stay and within which cylinder the lamp *c* is caused to slide up and down in unison with the motion of the rudder in the manner to be hereafter described; *d, d*, guide lines fixed at top to a cross piece *e*, and at bottom to the deck or other convenient point of attachment. On these guide lines the cylinder is steadied and supported by the eyes *f, f*, which, in the ordinary position of the cylinder, rest on the thimbles *g, g*, or other suitable supports fixed to the guide lines. The cylinder is hoisted into position and the guide lines tightened by means of a line *h*, one end of which is attached to the cross piece *e*, and the other rove through the pulley blocks *j, k*, being then carried down to the foot of the mast where it is made fast. The block *j*, is provided with a ring which allows it to be raised or lowered on the stay *b* at pleasure. In openings in the front part of the cylinder are inserted the lenses *l* and *n*; the upper *l* being, say green; and the lower one *n* red; the said lenses are of the usual segmental form, in order to allow the rays of light emanating from the lamp to be visible over the requisite arc, or if preferred, they may be made circular so as to show a light all round.

The lamp *c*, Figs. 2 and 3, is constructed as an ordinary ship's lamp, by preference circular in plan and provided with reflectors suited to the arc of the lenses. A guide groove *o*, formed in it receives a tongue or fillet *p*, fixed in the cylinder prevents the lamp turning therein; the holes for the admission of air into the cylinder to support combustion in the lamp may be conveniently formed in this fillet (which is shown hollow), other holes being cut in the back of the cylinder to admit air into the hollow fillet; by these means draughts of air in the cylinder or lamp may be avoided. The lamp is attached to a lanyard *q*, which passes up through the cover *r* of the cylinder over the pulley block *s*, fastened to the cross piece *e*, and down the mast to near the deck, where it is attached to a line connected with some convenient and suitable moving part of the steering apparatus. This line connected with the steering apparatus may be a single line such as *t*, attached at one end to, say, the tiller, as shown, and being led by guide pulleys, preferably beneath the deck, into a suitable position, has at its other end a balance weight *u*.

The motion of the steering apparatus in moving the rudder to one side, will thus impart to the line t , a movement in one direction raising the weight v , and when the rudder is moved to the opposite side, the weight will draw the line in the opposite direction. The lamp lanyard q being attached to the said line or to the weight as shown will receive a corresponding movement; a weight u , may also be applied to the other side of the tiller to counterbalance the weight v . It will now be understood that the lines q and t , being connected together in such manner that when the helm is amidships the lamp c in the cylinder is suspended in the centre of the cylinder and shows no light, any movement of the helm to the starboard or port side will depress or elevate the lamp so as to bring it opposite to the green or red lens, and thus indicate at a distance from the ship whether she is steering a starboard, or port course, and when desired the position of the lamp in the cylinder may be indicated to the officer of the watch through holes i, i , in the back of the cylinder provided with coloured glasses corresponding to the lenses. The line p should be attached to that part of the steering gear that will move the lamp from the centre of the cylinder to one of the coloured lenses, before the rudder shall have altered the course of the ship to any material extent (or if preferred, it may be so regulated as to show the light only at the last turn of the steering wheel either way).

The relative positions of the lamp and lenses are not altered by the further movement of the rudder in the same direction, by reason in the one case, of the lamp coming into contact with the cover r , and raising the said cylinder thereby, and in the other case by the lamp resting on the spring w , or on the bottom of the cylinder, the lamp lanyard q becoming slack; by these means the lamp can never be moved beyond the lenses.

The cover r of the cylinder may be removed to admit the lamp, after which it is closed and fastened by thumbscrews or staples and wedge, as shown.

Instead of the single line or rope t and balance weight u , an endless line and leading pulleys carried round the ship beneath the deck in any convenient manner and position, or rods and cranked levers or other suitable mechanism, may be employed to impart motion to the lamp; and it will be seen, that if preferred, the lamp may be made to remain stationary, and motion only given to the cylinder by similar means to those described for moving the lamp. If it is desired not to exhibit a white light when the helm is amidships, the white lens may be omitted and the cylinder left solid between the red and green lenses.

Figure 1 also shows a semaphore or yard arm, arranged and operated so as to indicate in the day-time the movements of the rudder; a^1 is the semaphore arm, centred on a pin and placed in some conspicuous position in the fore part of the ship, as on the mast; q^1, q^2 , lanyards attached one to each side of the centre thereof; these lanyards are led down and connected to endless line or to the weighted lines before described, in such manner that the motion of the rudder shall elevate as shown, that arm of the semaphore which corresponds to the side of the ship towards which the helm is put over, and thus indicate the direction she is taking or is about to take.

Instead of applying the before described light-apparatus at the masthead one such may be applied to each side of the ship, and being connected with the steering gear will indicate in a more efficient manner than the present regulation lights the position a ship's helm may be in at any moment, by so arranging the lenses, that the colour visible shall be that which accords with the side to which the helm is put over, and when so applying, the apparatus we prefer to use a masthead or position light the front of which shows white, and the starboard and port sides green and red respectively, for the purpose of indicating the general direction a ship may be taking.

By employing a suitable notation and code corresponding to the colours and positions of the lenses in the cylinder, any required messages or signals may be transmitted by the above apparatus, whether on land or sea; and for this purpose several cylinders and lamps may be employed with the lenses arranged and combined in any suitable manner, the lamp being moved in the cylinder by hand or by mechanical means, as may be preferred.