JOURNAL
OF
THE FRANKLIN INSTITUTE
OF THE STATE OF PENNSYLVANIA
FOR THE
PROMOTION OF THE MECHANIC ARTS.

SEPTEMBER, 1855.

CIVIL ENGINEERING.

For the Journal of the Franklin Institute.

On a System of Telephonic Signals for Avoiding Collisions at Sea. Communicated by CHARLES H. HASWELL, C. & M. E.

Having received and considered the communications of Professor D. H. Mahan, of the U. S. Military Academy, and of Lieut. W. T. Bartlett, U. S. N., regarding precautionary measures to be observed by steamers at sea, when running in an obscured atmosphere; I have to present to your notice the following reply thereto, together with my own views as to the precautions to be observed in such cases:

In the communication of Professor Mahan, it is proposed to resort to the use of blasts from a steam whistle in systematic connexion with the vibrations of a gong, which being interpreted by reference to a key in possession of navigators, the position and course of a steamer may be readily ascertained; and in that of Lieut. Bartlett, the same end is proposed to be attained by blasts from a steam whistle, peculiar to each of the cardinal points of the compass.

Both of these systems are practicable, but objectionable in some of their features, and for the following reasons:

1st. That of Professor Mahan is unnecessarily complicated by the introduction of a gong, and the interval between the signals is so short, as to render attention to them unceasing, whilst the frequent occurrence of them would be more objectionable of endurance to passengers and crew than the risk of collision.

2d. That of Lieut. Bartlett is the least objectionable of the two, but

alike to the first named, the time between the signals is too short and the number of the blasts unnecessarily extended, and therefore liable to induce confusion and consequent error.

A reference to the facts of the late loss of the U. S. mail steamer *Arctic*, to the existing elements of precaution and necessity for it, to guard against like occurrences, presents the following details :

1st. The end desired to be attained is the increased security of lives and of property from the collision of steamers with each other and with sailing vessels.

2d. The only practicable method that suggests itself is, that of the navigators of steam vessels to avail themselves of the very effective means of a steam whistle, an instrument with which nearly all of our steamers are now supplied, and where it is not in use, the cost involved in its purchase and attachment is so inconsiderable, its utility considered, that it cannot present any objectionable feature to its adoption : and with sailing vessels, when such an instrument is not available, the watch bell can be resorted to.

3d. Signals are only necessary to guard navigators from the collision of their vessels, one with another, within the space of half a mile.

4th. The highest speed yet attained by steamers and sailing vessels at sea, or likely to be attained by them, *in an obscured atmosphere*, within many years, would not justify any assumption of a higher combined velocity to two vessels approaching each other upon opposite courses, than that of thirty-six miles (knots) per hour; a half of a mile, therefore, would be made by them in the space of fifty seconds; and when the speed was altogether upon the part of one vessel, as in the cases of the sailing vessel being becalmed, or the steamer crippled or disabled, the speed would not exceed twenty miles, and the time consumed then in running half a mile would be one minute and a half.

5th. The board of supervising inspectors of steam vessels, appointed under the act of Congress of 30th August, 1852, have ordered, that the pilots of all steam vessels navigating seas, gulfs, bays, lakes, or rivers, of the United States, when their vessels are running in a fog, "shall cause a bell to be struck, or the steam whistle to be sounded, every two minutes." No provisions are here required from navigators as a precaution from collision when their vessels are at anchor, and a critical construction of the regulation might, with those who were indisposed to practice the precaution required, furnish a justification for noncompliance with it, when the atmosphere was obscured by snow, rain, or mist. Further, the regulation is confined to the maritime jurisdiction of the United States.

6th. The variations of time on board of all vessels, would have the effect, in an average of cases, of reducing the intervals between the sounding of signals one-half.

With these elements before me, then, I present the following regulations to be observed by navigators of steam and sailing vessels, during the existence of an obscured atmosphere :

1st. All steam and sailing vessels to be provided with watch bells, and all steamers to be further fitted with a steam whistle of sufficient capacity to be heard in calm weather, five miles.

2d. Navigators of steamers and sailing vessels, without the maritime jurisdiction of the United States, when running, lying to, or at anchor, to give one full stroke of their bell or blast from their steam whistle, as they may be provided and prepared to, every five minutes, and when they shall hear either of these signals from another vessel, they shall immediately telephone their course or position after the following rules:

When running or heading between north-west and north-east, with one stroke of their bell or one blast upon their steam whistle, or when running as above between north-east and south-east, with two distinct strokes or blasts, and when between south-east and south-west, with three distinct strokes or blasts, and when between south-west and north-west, with four distinct strokes or blasts, and they shall continue their signals every two and one-half minutes, until they shall have passed beyond the risk of collision with each other.

3d. Navigators of steamers and sailing vessels, when entering into a harbor, are to give two continuous strokes of their watch bell, or blasts from the steam whistle, every five minutes.

4th. When navigators of steamers and sailing vessels have entered into a harbor, they are to conform to the maritime regulations of it, and where it is known that none exist they are to be guided by the existing regulations of the United States as here given.

5th. When it may be necessary in the opinion of any one or both of the navigators, of two vessels approaching each other, to know the courses of each other, nearer than that provided for as above; as in the case of a vessel running upon an extreme of the range of eight points embraced in a signal, and another either upon the other extreme of the range of the same signal or upon the near extreme of the range of the signal contiguous to it; the navigator who desires to know the course of the vessel approaching him, to give his course as above directed, and immediately thereafter should give the signal of the course in the range nearest to his, in short and rapid strokes of his bell or blasts from his whistle as he may be provided to do, and the other is to reply in like manner and to give the course in the range nearest to his. Thus, if the course of a steamer was between east and south-east, the signal would be two distinct strokes or blasts, and immediately thereafter three rapid strokes or blasts, signifying that her course, although within the range of N. E. and S. E., approached to that of S. E.

The utility of this system over that of one where the course of a vessel is being constantly indicated, is, that it reduces the number of signals and thereby removes from it the objectionable features of unnecessary labor, to those in charge of the duty, and of unnecessary disturbance to the passengers and crew, whilst it retains the whole of the essential feature, that of the indication of the courses of vessels in proximity with each other.

In the operation of this system however, full success is neither claimed or anticipated; neither is it conceded to any system depending alone upon telephonic signals, for in order to meet some cases of which the following are fair instances, a light, of sufficient power to reflect its rays in a fog or mist, at a distance of a quarter of a mile, must be resorted to and placed upon the bows of all vessels.

The instances alluded to, or such as would seem to render the precaution of even a steam whistle inoperative, are:—

1st. When a sailing vessel is "lying to" in heavy thick weather, and a steamer approaches her on the course of her lee beam, the watch of the sailing vessel may be unable either to see or hear the steamer until she is too close upon them to be avoided, in the inert condition of "lying to," and the watch of the steamer unable either to see the sailing vessel, or to hear her watch bell (it being of the usual size carried in vessels), they cannot discover their proximity to another vessel, until it is too late at their rate of speed to avoid collision, they only under the immediate command of the helm.

2d. The times of two vessels being alike, their signals may be given identical in time and duration, and if approaching each other at a high velocity, collision would be difficult of avoidance.

3d. The steam whistle of a steamer may become temporarily inoperative from a fracture of its pipe or other causes, and the watches of one or both vessels may neglect a signal.

I am of the opinion, therefore, that no system of signals adapted to an obscured atmosphere at sea can be always reliable, without the introduction of a light of great power, placed so as to be seen only from ahead of the vessel carrying it, and in connexion with this view of the requirements of navigation, I am gratified at being able to advise you that a light designed to meet this purpose, has just been brought to my notice, and that it is one holding forth much promise of its practicability.

I am, respectfully, your obedient servant,

CHARLES H. HASWELL.

To WALTER R. JONES, Esq.,

President Board of Underwriters, New York.

New York, October 30th, 1854.

For the Journal of the Franklin Institute.

On Errors Committed by Writers on Mechanical Engineering.

By WILLIAM TRURAN, Esq.

The March number of the *Journal of the Franklin Institute*, (Vol. XXIX, p. 145,) contains an article on errors committed by Writers on Mechanical Engineering. The subject being a refutation of the assumed gain of power attending a certain disposition of the handles of a windlass or other similar machine, actuated by manual labor, written after a lengthy practical experience on the matter, and, therefore, entitled to a favorable consideration from theoretical writers. In it, mention was made of an error committed by the late editor of the *London Mechanics' Magazine*, in stating that "the force of two men rightly applied to a crank, is more than twice one in the proportion of 70 to 60." This remark has called forth a reply from the present editor, Mr. R. A. Brooman, so thoroughly at variance with its professed object, that we have to request permission to answer a few of his allegations.

Mr. Brooman considers it necessary, to correct our version of Desagu-