Feb. 27, 1968 B. E. ILON 3,370,561

TRIM AND HEELING BOARD DEVICE FOR BOATS

Filed Oct. 19, 1966 2 Sheets-Sheet 1

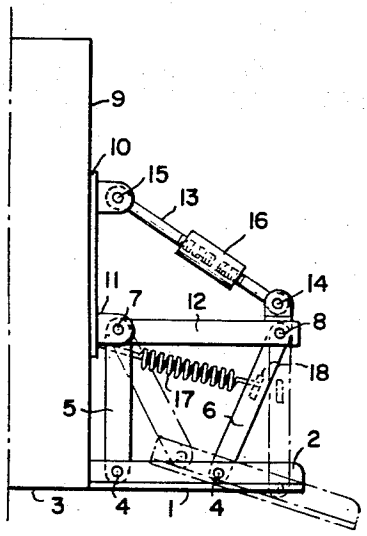

FIG. 1.

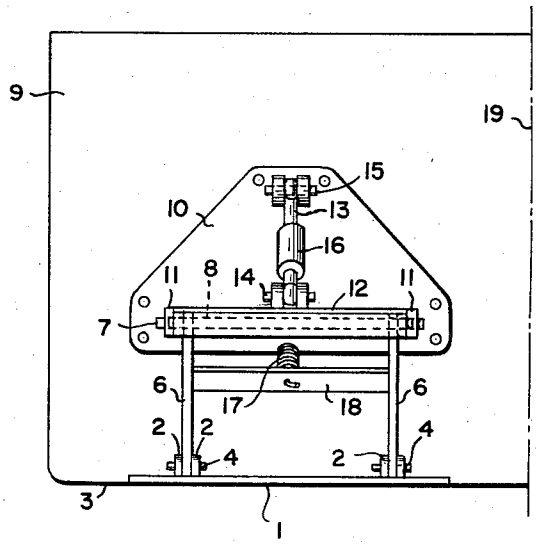

FIG. 2.

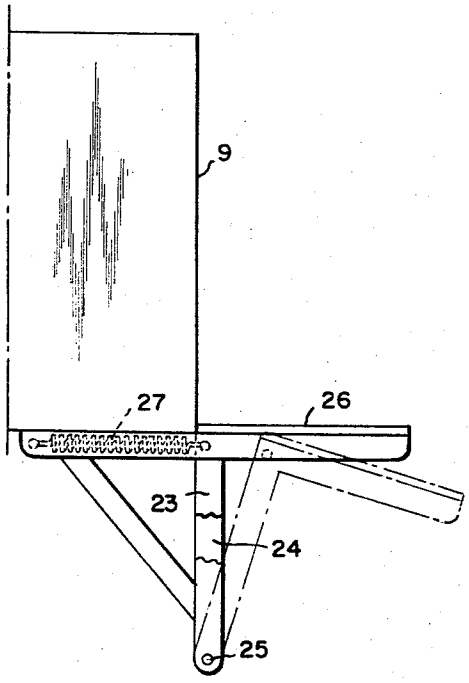

FIG. 4.

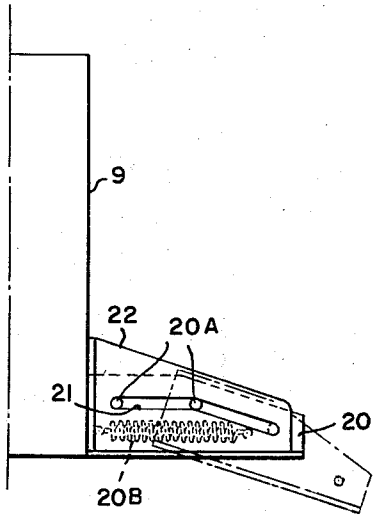

FIG. 3.

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TRIM AND HEELING BOARD DEVICE FOR BOATS

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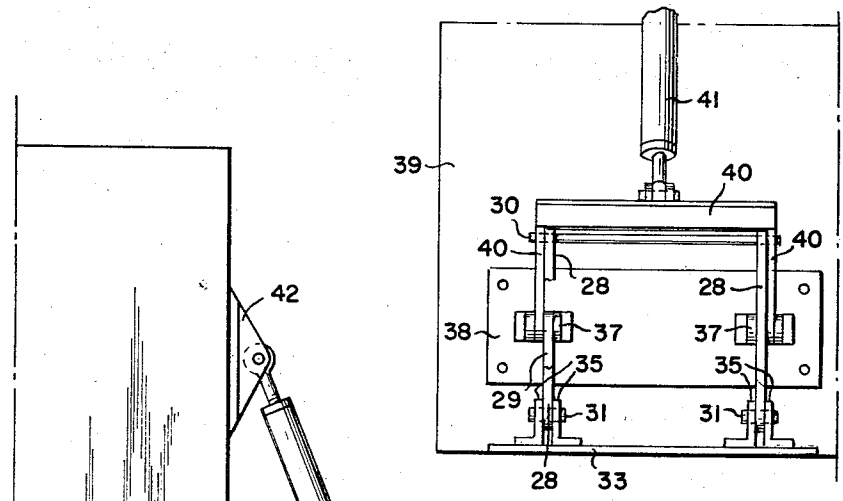

FIG. 6.

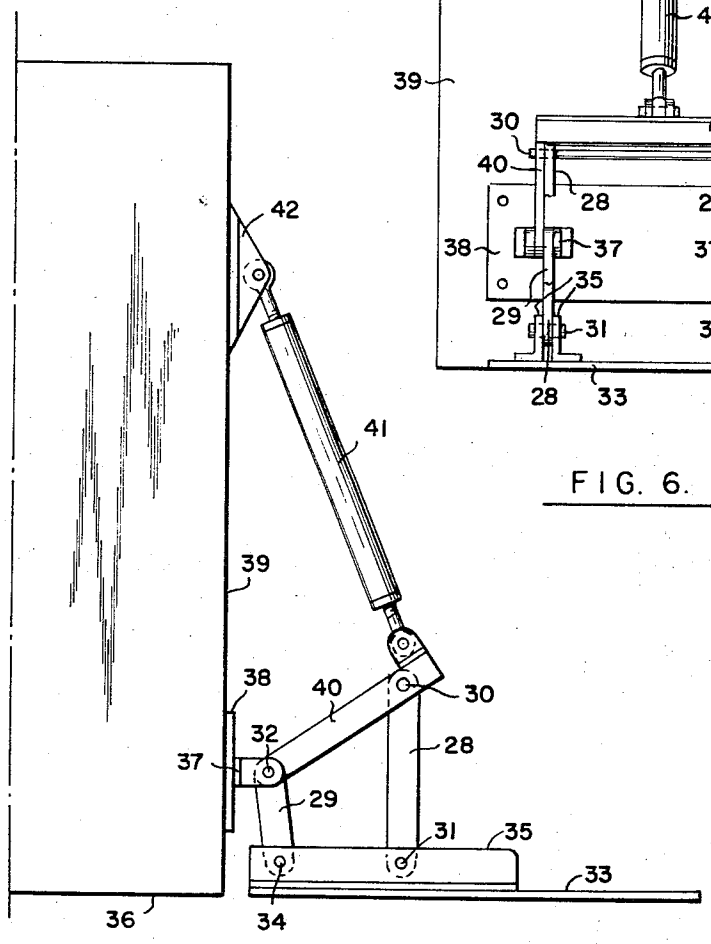

FIG. 5.

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TRIM AND HEELING BOARD DEVICE FOR BOATS

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7 Claims. (Cl. 114—66.5)

This invention relates to a trim and heeling board device for boats.

It becomes more and more common to provide boats with trim boards of one kind or the other. Such trim boards are used for stabilizing purposes, particularly in order to prevent alterations of the position or rolling of the boat in relation to its traverse horizontal axis through the center of gravity. The trim boards used for this purpose generally comprise plates which in the normal position are approximately horizontal, and to which, dependent on the position of the boat, is imparted the necessary angular setting in relation to the direction of travel of the boat by manual operation by means of electrohydraulic actuating means, so that the intended stabilization of the position be achieved. Such stabilizers will for natural reasons be fairly complicated and hence expensive, and in order to maintain stability they must also be subjected to constant survey and adjustment, which naturally also highly reduces the value of such arrangements.

By means of the present invention, the object of which is a trim and heeling board for boats, the above drawbacks are avoided.

The invention will be described more in detail hereinafter with reference to the accompanying drawings.

In the drawings:

FIG. 1 is a port side diagrammatic view of the rear portion of a boat provided with a trim and heeling board device of the invention;

FIG. 2 shows a rear elevation of the structure of FIG 1;

FIG. 3 is a diagrammatic port side view of a further embodiment of the invention;

FIG. 4 is a diagrammatic port side view of a further embodiment of the invention;

FIG. 5 is a port side diagrammatic view of the rear portion of a boat provided with a modified trim and heeling board of the invention; and

FIG. 6 is a rear elevation of the structure of FIG. 5.

The trim and heeling board illustrated in FIGS. 1 and 2 comprises a level board or plate **1** of sheet metal or any other suitable rigid material. The plate **1** is braced by means of stays **2** of iron or the like attached to the same and simultaneously forming suspension means for the plate, which, in its normal position is assumed to provide a direct extension of the bottom **3** of the boat. By means of pivot pins **4** stays **2** are pivotally mounted onto the lower ends of two fore and two rear links **5** and **6**, respectively, which in turn at their upper ends are pivotally mounted by pins **7**, **8**. Pins **7** are supported by lugs **11** projecting from a support plate **10** arranged on a boat transom **9**. The pin **8** is carried by a yoke **12** directed approximately horizontally and the free leg ends of which are pivoting on the pivot pins **7**. An inclining stay **13** is at its ends by means of pins **14**, **15** linkably connected to the yoke **12** and the support plate **10**. The stay consists of two parts, which are kept together by means of a sleeve **16** having one right and one left thread. In this way it is possible to adjust the length of the stay **13** within certain limits and the inclination of the plate **1** may be set, so that it obtains a normal or initial position suitably adapted to the boat in each special case, and in which position the foremost edge of the plate may possibly abut

on the transom **9**. An extension coil spring **17** is inserted, for example, between the support plate **10** and a cross bar **18** arranged between the rear links **6**. This spring tends to bring the plate to the position just mentioned. In FIG. 2 the line **19** represents the plane of symmetry of the boat hull. Thus only the left half of the boat is shown in this figure. The right half of the transom **9** has a trim and heeling board, which is symmetrically positioned in respect of line **19** and identical to the trim and heeling board shown.

The device described hereinbefore operates in the following manner:

Assuming that the stem of the boat during its travel rises relative to the stern, for example, by an increase in the load at the stern, i.e., that the angle between the longitudinal extension of the boat, the fore-and-aft line, and the direction of travel of the boat increases, the force of current acting on the trim and heeling board of the water in which the boat is moving forward will increase due to the increase in the angle of attack of the water. This in turn results in the plate **1** and the links **5**, **6** being moved backwards from the transom, for example, to the position indicated by dashed lines. As will be clear, this displacement brings about an increased inclination of the plate by the effect of the four link mechanism formed by the plate **1**, the links **5**, **6** and the yoke **12**. In this way the plate provides a supplementary lifting force for the boat stern, so that the primarily assumed relative raising of the boat stem will be opposed and totally or partly prevented. In suitably adapting the restoring force by the spring **17** and the magnitude of the angular alteration of the plate's position, which is defined by the length relations of the fore and rear links and their mutual inclination, such a trimming of the boat is possible, that during her travel the boat will practically maintain a constant angular position as to the inclination of the fore-and-aft line independent of any possible displacement of the center of gravity in the longitudinal extension of the boat. The effect will, of course, be the same when the equilibrium of the boat is disturbed in other ways, for example, by waves. The trim and heeling boards have a stabilizing effect also in respect of the boat's rolling about a fore-and-aft line, so called heeling, in which case, however, it is mainly the bevelling function of the boards that will be utilized.

The trim and heeling board shown in FIGS. 1 and 2 is arranged perpendicularly to the plane of symmetry of the boat hull. However, particularly in boats having a V-shaped bottom, it may be convenient to let the two trim and heeling boards incline towards the plane of symmetry of the hull, since their stabilizing effect will be increased in this way.

The automatic displacement of the trim and heeling board in the longitudinal extension of the boat and the alteration of the angle necessary in this connection may be achieved by other means than the four link suspension illustrated in FIGS. 1 and 2. A trim and heeling board **20** may, for example, as seen in FIG. 3, be provided with pins **20A** or the like displaceably disposed in bent or angular slots or grooves **21**, arranged in brackets or arms **22** (only one being shown) projecting from the boat transom **9**. Board **20** is biased forwardly by spring **20B**. Alternately it is also possible, as shown in FIG. 4, at the boat transom **9** to arrange a bracket **23** directed downwards and at the lower end of which arms **24** (only one being shown) attached to the trim and heeling board **26** are pivotally suspended by means of pivot pins **25**. A spring **27** biases board **26** forwardly.

The embodiment according to FIG. 5 is provided with rear links **28** which are longer than fore links **29**, the upper pivot pin **30** of the links **28** being straight above lower pivot pins **31** but positioned higher than the upper

pivot pins 32 of links 29. In the resting position of the device the links 28 are about vertically directed and substantially perpendicular to the level board 33, whereas links 29 are inclined and have their lower pivot pins 34 somewhat behind the upper pivot pins 32. Due to the performance of the apparatus according to FIG. 5, there doesn't need to be any spring corresponding to the spring 17 shown in FIG. 1, since the weight of the lower moving parts urges the board 33 towards the stern when it is moved in a direction away from the stern. Also here the level board or plate 33 is provided with stays 35 for its suspension and provides as shown in the drawing, in its normal or resting position a direct extension of the bottom 36 of the boat. Lugs 37 project from a support plate 38 arranged on the boat transom 39. A yoke 40 carries the pin 30, and an adjustable inclining stay 41 is at its ends linkably connected to a support plate 42 and the yoke 40. Support plate 42 is secured to transom 39.

Due to the arrangement of the links 28, 29 and their pivot pins as described above, a very small displacement backwards of the lower pivot pins 31 of links 28 corresponds, when said links are swinging about their upper pivot pin 30, to a rather great displacement backwards and upwards of the pivot pins 34, and hence to a great angular motion of the plate 33 about the centers of the pivot pins 31 and this is a very favorable fact.

Further embodiments within the scope of the invention may also be considered, and the invention is not limited to any definite kind of vessels.

What is claimed is:

1. In combination with a boat:

a trim and heeling board,

means mounting said board adjacent the stern of the boat adjacent the water to provide for a downward inclining of the board as it moves rearward from the stern,

means urging the board towards the stern and overcoming the force exerted by relative movement between the boat and the water to maintain it adjacent the stern with the boat at the desired trim and permit it to move rearwardly when the trim is such that the bow is high relative to the stern.

2. The combination of claim 1 in which the urging means is a spring.

3. The combination of claim 1 in which the angle of inclination of the board increases with an increase in the rate of relative movement between the boat and the water.

4. The combination of claim 1 in which the means mounting the board comprises a four bar linkage.

5. The combination of claim 1 in which the means mounting the board comprises a slot and a guide pin for following the slot.

6. The combination of claim 1 in which the means mounting the board comprises a downwardly extending arm pivoted to a bracket extending below the stern.

7. The combination of claim 4 in which the four bar linkage comprises a fore link and a rear link the upper ends of which links are pivotally connected to one member and the lower ends of which are pivotally connected to the level board, the rear link being longer than the fore link and, in its normal position about vertical and at least substantially perpendicular to the level board.

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ANDREW H. FARRELL, *Primary Examiner.*