March 21, 1939. H. T. H. ANDRESEN 2,151,368

ARRANGEMENT IN SAIL SHEETS

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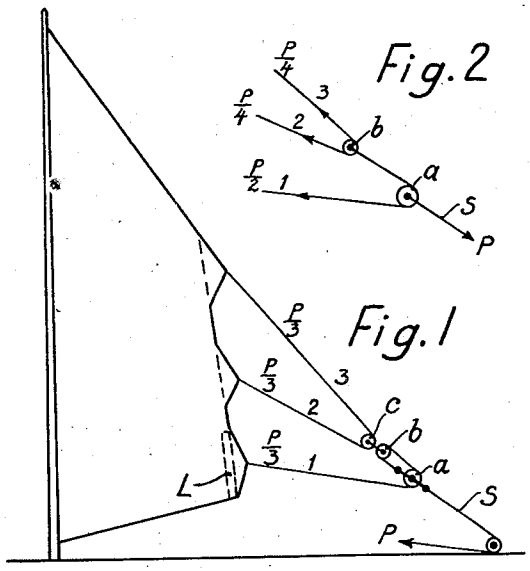


Fig. 1

Fig. 2

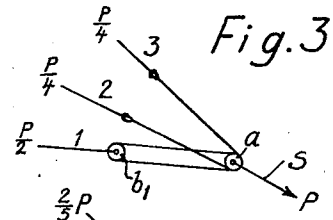


Fig. 3

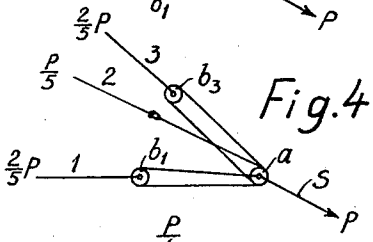


Fig. 4

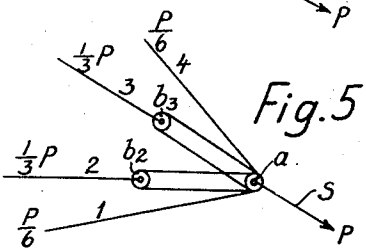


Fig. 5

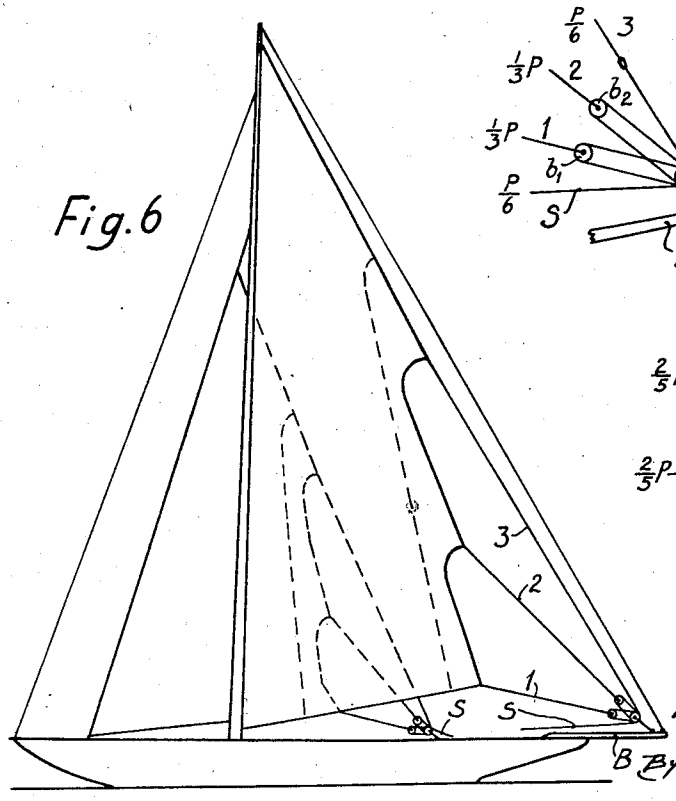


Fig. 6

Fig. 7

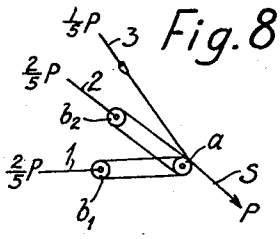


Fig. 8

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ARRANGEMENT IN SAIL SHEETS

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The present invention relates to arrangements in sail sheets wherein the stretch from the sheet is transmitted to the sail by means of a plurality of lines tensioning the aft area of the sail at different heights.

In arrangements of this kind it is of importance for the correct setting of the sail that the total force of the sheet is so distributed on the lines that the stretching force transmitted by the individual lines is in a favourable relation to the wind pressure acting on that portion of the sail which is held by the line in question, as well as to the setting required of the same portion of the sail, in order to give the entire sail a correct setting. In other words, the entire sail area may be given a favourable aerodynamic form by a correct distribution of the force on the individual lines and of the points of attack of the said lines on the sail.

In accordance with the present invention this arrangement is obtained in that the individual lines, which are all tightened by means of the main sheet, are simultaneously tightened by being carried over or through a system of rings or blocks, which system permits the individual lines to adjust themselves freely according to the force transmitted by the individual lines.

The number of lines used and the distribution of the force on the said lines are dependent on the size and form of the sail.

In the accompanying drawing some embodiments of the invention are shown.

Fig. 1 is a schematic view in elevation of an arrangement in accordance with the invention;

Figures 2–5, 7 and 8 are diagrams of certain embodiments of the block systems are shown; and

Figure 6 arrangements as applied to a boat provided with a mainsail and a foresail are shown in side elevation.

In all the figures, S designates the main sheet, P the total force transmitted to the sail and **1**, **2**, **3** and **4** the lines connected to the sail. In the embodiments shown in the Figures 1–4, and 6–8 three such lines are used and in Fig. 5 four lines are used, but two lines or a number of lines greater than four may be used.

In the embodiment shown in Fig. 1, the attacking points of the lines are located in the aft edge or leech of the sail, so distributed that each of the lines conveniently is taking up equal forces

$$\frac{P}{3}$$

Accordingly the block system to which the main sheet S is attached is so arranged that the bottom line **1** is carried over the pulley of a block *a*, to which the sail sheet S is connected, therefrom over the pulley in a block *b* and back to the center of the block *a*. The lines **2** and **3** are interconnected and are running over the pulley of a block *c*, which is connected to the block *b*. In order to strengthen the sail at the securing points of the lines one or more laths L may be sewed up in the sail.

In Fig. 2 a tackle system is shown wherein the force from the sheet S is distributed with one half on the line **1** and one fourth on each of the lines **2** and **3**. Here the line **1** is running over the pulley in the block *a*, which is connected to the sheet S, and is secured to the center of the block *b*, wherein the lines **2** and **3** are running over the pulley.

In Fig. 3 a tackle system is shown with the same distribution of forces on the lines as in the system shown in Fig. 2. The block *a*, to which the sheet S is connected here is a two-pulley block and the line **3** is running over one of the pulleys, over the pulley in the block b_1, to the center of which block the line **1** is connected, back over the second pulley of the block *a*, wherefrom the line is continued in the line **2**.

In Fig. 4 a tackle system is shown wherein the distribution of the force on the lines is the following: two fifths on line **1**, one fifth on line **2** and two fifths on line **3**. Here the line **2** is carried over one pulley in the two-pulley block *a* which is connected to the sheet S, over the pulley in the block b_3, to the center of which the line **3** is connected, back over the second pulley in the block b_1 to the center of which the line **1** is connected and therefrom to the center of the block *a*.

In the system of four lines shown in Fig. 5, the block *a*, which is connected to the sheet S, is a three-pulley block. The line **1** is running over one of these pulleys, over the block b_2, to the center of which the line **2** is connected, over the pulley in the block b_3, to the center of which the line **3** is connected, and is therefrom continued as line **4**.

In all the embodiments above described the main sheet S is connected to the center of the block *a*, but obviously it is possible to carry the main sheet through the blocks of the system. Embodiments of this kind are shown in the Figures 6–8. In Figure 6 a sail-boat provided with mainsail and foresail is shown, each sail being tightened by means of three lines **1**, **2** and **3**. The tackle systems used are shown in a larger scale in the Figures 7 and 8, wherein the Figure 7

is illustrating the tackle system of the mainsail and Figure 8 the tackle system of the foresail.

In Fig. 7 the main block *a* is secured to the beam B extending from the deck of the boat, the tackle system being thereby maintained in position by the said beam B. The distribution of the force on the lines in this arrangement is one third on line 1, one third on line 2 and one sixth on line 3, the main sheet S thus transmitting only one sixth of the total force transmitted.

In the arrangement shown in Fig. 8 the block *a* is free, thereby enabling the free movement of the foresail from one side of the boat to the other, the total force being in this case transmitted by the main sheet S from the deck to the main block *a*. The force distribution in this arrangement is the following: two fifths on line 1, two fifths on line 2 and one fifth on line 3, the main sheet in this case transmitting the total force transmitted.

In both the last described arrangements the main sheet S is running over a pulley in the block *a*, over the pulley of the block b_1, to the center of which the line 1 is secured, back over a pulley in the block *a*, over a pulley in the block b_2, to the center of which the line 2 is secured, back over a pulley in the main block *a* and is continued in the line 3.

Other arrangements in the tackle system or other distributions of the lines than in the examples shown in the figures may be used, according to conditions.

It is obvious from the above description that the tackle system in itself may be made comparatively small as the relative movements of each line are small. Each of the stretching lines proper is connected to a separate point or is carried over a separate block in the tackle system. Of course, the terms "block", "blocks", and "pulleys" are used in an exemplary and broad sense in the present specification and claims and are intended to cover all permissible substitutions under the doctrine of patentable equivalents, such as for example rings or eyes which may be attached to certain of the lines and through which certain other lines may run freely.

What I claim is:

1. In the running rigging of sailing craft, a sheet arrangement in connection with a fore-and-aft sail, comprising a plurality of lines secured at spaced points along the greater part of the leech of the sail, a main sheet, and a system of blocks and pulleys connecting said lines to said main sheet, whereby said lines are self-adjusting and may adopt a setting corresponding to the force transmitted by the same, and the sail may assume the most favorable aerodynamic form under the wind conditions prevailing.

2. In the running rigging of sailing craft, a sheet arrangement in connection with a fore-and-aft sail, comprising a sheet, a plurality of points of attachment distributed along the greater portion of the height of the leech of the sail, means for distributing the force transmitted through the sheet among said points of attachment in various proportions, said means comprising a system of blocks and lines connecting said points with said sheet, said lines being freely movable relatively to each other through said system, whereby they will at all times adopt a setting corresponding to the force transmitted by the same, and the sail may assume the most favorable aerodynamic form under the wind conditions prevailing.

3. In the running rigging of sailing craft, a sheet arrangement in connection with a fore-and-aft sail, comprising a sheet, a plurality of points of attachment distributed along the greater portion of the height of the leech of the sail, means for distributing the force transmitted through the sheet among said points of attachment in various proportions, said means comprising a system of blocks and lines connecting said points with said sheet, certain of said lines being secured to certain of said blocks and other of said lines being reeved through said blocks, said lines being freely movable relatively to each other through said system, whereby they will at all times adopt a setting corresponding to the force transmitted by the same, and the sail may assume the most favorable aerodynamic form under the wind conditions prevailing.

4. In the running rigging of sailing craft, a sheet arrangement in connection with a fore-and-aft sail, comprising a sheet, a plurality of points of attachment distributed along the greater portion of the height of the leech of the sail, means for distributing the force transmitted through the sheet among said points of attachment in various proportions, said means comprising a main block to which an end of said sheet is secured, a plurality of lines connected to said points and reeved through and connected to said main block and the other blocks of said system, whereby each line may adopt the appropriate setting to the force transmitted thereby at any given time and the sail may assume the most favorable aerodynamic form under the wind conditions prevailing.

5. In the running rigging of sailing craft, a sheet arrangement in connection with a fore-and-aft sail, comprising a sheet, a plurality of points of attachment distributed along the greater portion of the height of the leech of the sail, means for distributing the force transmitted through the sheet among said points of attachment in various proportions, said means comprising a system of blocks and lines connecting said points with said sheet, certain of said lines being secured to certain of said blocks and other of said lines being reeved through said blocks, the sheet itself being reeved through the blocks of said system and attached to one point on the sail, said lines being freely movable relatively to each other through said system, whereby they will at all times adopt a setting corresponding to the force transmitted by the same, and the sail may assume the most favorable aerodynamic form under the wind conditions prevailing.

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