

**APPLICATION FOR A STANDARD PATENT
OR A STANDARD PATENT OF ADDITION**

6 1 3 0 5 5

Insert full
name(s) of
applicant(s)

(71) I/We HAIGIS Erich
of Neutalweg 10, CH-4203 Grellingen (Switzerland)

Insert address(es)
of applicant(s)

Insert title
of invention

(54) hereby apply for the grant of a ☒ standard patent ☐ patent of addition for an invention entitled SYSTEM FOR
ALTERING THE POSITION OF SAILBOAT MASTS.

(tick appropriate
box)

which is described in the accompanying ☐ provisional ☒ complete specification.

Insert name of
actual inventor

(72) The actual inventor(s) of the said invention is/are Erich HAIGIS

Insert address
for service of
notices in
Australia

(74) My/our address for service is Duncan, A.D. (DAVIES & COLLISON) AMP Bldg.,
19 Logan Street, NARRABUNDAH Capital
Hobart Place, Canberra City, Australian Territory, 2601

Ph. (062) 488062

*THESE SECTIONS ARE ONLY TO BE COMPLETED WHERE APPLICABLE:

for Convention
cases only

(ONLY TO BE USED IN THE CASE OF A CONVENTION APPLICATION)

Details of basic application(s) —

(31) Number of basic application 02...6.7.5.1.8.7...9

(33) Name of Convention country in which basic application was filed Switzerland ISO Code 2604

(32) Date of basic application July 14th 1987

for Divisional
applications only

(ONLY TO BE USED IN THE CASE OF A FURTHER APPLICATION MADE BY VIRTUE OF SECTION 51)

(62) Number of original application

Person by whom made

for Patents of
addition only

(ONLY TO BE USED IN THE CASE OF AN APPLICATION FOR A PATENT OF ADDITION)

I request that the patent may be granted as a patent of addition to the patent applied for on

(61) Application No. Patent No.

in the name of 05/07/88

I request that the term of the patent of addition be the same as that for the main invention or so much of the term of the patent for the main invention as is unexpired.

Insert day, month
and year form
signed

Dated this 24 day of June 19 88

Signature of
applicant or
Australian
attorney

TO

Haigis

(Signature)

(Erich HAIGIS)

THE COMMISSIONER OF PATENTS

This form must be accompanied by either a provisional specification (Form 9 and true copy) or by a complete specification (Form 10 and true copy).

Patents Act 1952

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

In support of the Application made by Erich HAIGIS, Neutalweg 10,
CH-4203 Grellingen (Switzerland).
 for a patent for an invention entitled *SYSTEM FOR ALTERING THE POSITION
OF SAILBOAT MASTS*

I, Erich HAIGIS
 of Neutalweg 10, CH-4203 Grellingen (Switzerland)
 do solemnly and sincerely declare as follows:—

* 1. I am the applicant for the patent.

 (or, in the case of an application by a body corporate)

1. I am authorized by ---
 the applicant for the patent to make this declaration on its behalf.

and* 2. I am the actual inventor of the invention.

 (or, where a person other than the inventor is the applicant)

2. Erich HAIGIS
of Neutalweg 10, CH-4203 Grellingen (Switzerland)
is the actual inventor of the invention and the
facts upon which I am
~~the~~ entitled to make the application are as follows:—

I am the actual inventor of the invention.

Declared at 4203 Grellingen this 24th day of June 1988.

TO :

THE COMMISSIONER OF PATENTS.

Haigis
 (Signature of Declarant)

Erich HAIGIS

(IMPORTANT - Cross out inapplicable words in the a e Form.)

(12) PATENT ABRIDGMENT (11) Document No. AU-B-18694/88
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 613055

(54) Title
SYSTEM FOR ALTERING THE POSITION OF SAILBOAT MASTS

International Patent Classification(s)
(51)⁴ B63B 015/00

(21) Application No. : 18694/88 (22) Application Date : 05.07.88

(30) Priority Data

(31) Number	(32) Date	(33) Country
2E75/87	14.07.87	CH SWITZERLAND

(43) Publication Date : 19.01.89

(44) Publication Date of Accepted Application : 25.07.91

(71) Applicant(s)
ERICH HAIGIS

(72) Inventor(s)
ERICH HAIGIS

(74) Attorney or Agent
P.F Kildea , 19 Logan St, Narrabundah, ACT 2604

(74) Attorney or Agent
Paul F. Kildea , 19 Logan Street, NARRABUNDAH ACT 2604

(57) Claim

1. A construction system for sailboats consisting of

a mast foot that joins the mast to the boat's hull, said foot being constructed in the form of a universal joint (cardan joint or ball-and socket joint) that allows the mast to be directed to any direction and inclined to any inclination in relation to the hull,

a mast that can be altered in its location in relation to the hull,

a counterweight that is arranged inside said hull and acts to provide full compensation of the torque acting on the mast foot,

a mast guidance construction that joins said weight to said mast and serves to control and hold the mast, and

a weight suspension system that joins said counterweight to said hull and serves to shift the counterweight both laterally to either side and fore and aft and fix it in position,

and with which the mast of a sailboat can be inclined rapidly in any direction to any inclination and fixed in the desired position and

(11) AU-B-18694/88
(10) 613055

-2-

location while the boat is moving, without the torques of the mast or of the construction system being transmitted to the boat's hull,

and with which, in particular, the mast can be inclined windward and abaft in order to utilize the force of the wind optimally by exploiting the lift applied by the wing action of the sail in this position.



613055

P 00/011
Form 10

PATENTS ACT 1952

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

Int. Cl:

Application Number:

Lodged:

Complete Specification—Lodged:

Accepted:

Lapsed:

Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant:

HAIGIS Erich

Address of Applicant:

Neutalweg 10
CH-4203 Grellingen
(Switzerland)

Actual Inventor:

HAIGIS Erich

Address for Service:

Paul F. Kibbea
~~Duncan, A.D. 19 Hogan St. Narrabundah ACT~~
~~(DAVIES & GOLLISON) AMP Building, Hobart Place,~~
~~Canberra City, Australian Capital Territory,~~
~~2601. Ph. (062) 488063.~~



Complete Specification for the invention entitled:

System for altering the position of sailboat masts.

The following statement is a full description of this invention, including the best method of performing it known to me:—

* Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.

System for altering the position of sailboat masts

Description

Field to which the invention relates

The present invention relates to a structural system with which the position of a sailboat's mast may be altered in relation to the hull to suit the wind velocity. The foot of the mast is supported in a joint permitting inclination of the mast to either side and toward the bow or stern. The position of the mast is influenced by a weight in the hull that can be shifted sideways or fore and aft.

On conventional sailboats, the mast - or masts in the case of boats with more than one mast - is (are) joined to the hull at a fixed angle when readied for sailing. Shrouds and stays are used to keep the mast always in the same vertical position in relation to the boat's hull. Whenever the mast is inclined by the pressure of the wind, the boat heels to the same extent.

As a result of this rigid connection between mast and hull, the forces acting on the mast via the sails, and therefore their resultant force M , are transmitted to the boat's hull. The resultant force M , which acts on the mast at about one-third to one-half of its height, can be divided into three components: a component A directed forward, parallel to the hull's fore-aft axis; a horizontal, lateral component B , and a vertical component C (see Fig. 1).

The forward-directed component A results in, firstly, the forward movement of the boat and, secondly, a torque that places a load on the bow and removes a load from the stern.

The lateral component B , which becomes significant when the boat is

sailed at right angles to the wind, causes the boat to drift off course and produces a torque around the hull's tilting axis (or axes). The boat heels as a result of this torque.

5 When the hull heels, i.e. with the mast inclined sideways, component A produces a torque around the vertical central axis of the hull. This torque turns the boat "into the wind". When the mast is inclined to leeward, the vertical component C points downward. It places a load on the hull and also
10 creates a torque that adds to the torque produced by component B and causes the boat to heel even more.

The present invention prevents the torques produced by the forces A, B and C from being transmitted to the hull by decoupling the rigid connection between mast and hull. Accord-
15 ing to the present invention, this decoupling is effected on the one hand by supporting the mast foot F in a movable joint (ball-and-socket joint, universal joint) and on the other by counteracting the described torques with opposing torques produced by one or more sufficiently heavy weights positioned
20 suitably in the hull, in such a way that the torque around the mast foot joint becomes zero. The weights located in the hull must be joined to the mast foot in such a way that, as far as possible, they influence only the torques acting on the mast and do not transmit any adverse torques to the
25 hull.

Such a weight can be prevented from applying a torque to the hull only by fastening it exclusively to the mast or the mast foot F (pivot) (Fig. 1). To this end, the weight can be sus-
30 pended from the mast with ropes or with tackle of adjustable length. Such a weight can also be suspended from the mast or mast foot by means of a sturdy pendulum rod capable of bearing tensile and compressive loads (Fig. 1). Such a

weight can also be fastened to a ring system that rotates freely around the pivot D (Fig. 3). Either a single counterweight or an entire system comprising a number of counterweights in suitable positions can be used to compensate the torques produced by the forces A, B and C (Fig. 1). The sum of all weights and their lever arms with reference to the mast foot pivot F must result in the torques around this pivot F being cancelled out.

In the simplified case, the compensation of the torques can be restricted to the torque produced by forces B and C, in other words to compensation of the rotation around the boat's fore-to-aft axis.

Essentially, the weight or weights can be hoisted to different heights and swung out laterally to different distances in relation to the pivot F or D. The lever arm or arms, which serve on the one hand to support the weights but whose primary function consists in swinging out the weight and maintaining its distance from the pivot F, can be constructed so as to be adjustable in the length. In other words, this adjustable length of the lever arm can guide the weight along a path that does not represent a circular path with F as its centre.

The advantage of the present invention consists in counteracting the torques acting on the mast. This makes it possible to place the mast in that position at which the force of the wind can be utilized to the maximum. Depending on the wind velocity, the mast can be positioned vertically or be inclined to windward and/or toward the stern. If the mast is inclined to windward, the vertical force C is no longer directed downward as shown in Fig. 1, but upward, which reduces the load bearing on the sailboat.

The described system of a mast that does not transmit any torques to the hull is also applicable to boats with more than one mast. In this case, the position of each mast can

be altered individually, or the different masts can be set in concert in order to achieve optimal mutual positioning.

The identification and establishment of the optimal mast position for maximum utilization of the wind force can be accomplished on the basis of human judgement or with the aid of technical devices. Measuring instruments and sensors for measuring the wind force and the force M acting on the mast, and angle measuring instruments, can also be used to collect data that can be fed to an electronic data processing system for control of the counterweight (or the various counterweights) and therefore for establishment of the mast position.

The position of the counterweight(s) can be altered with tackle systems and winches by means of human muscle power or with the aid of motors. But it is also possible to employ hydraulic systems to position the counterweight and adjust the length of the lever arm.

Previous state of the art

U.S. Patent 3,985,106 describes a stabilization system for sailboats characterized in that the mast is supported to rotate sideways and carries a counterweight. Furthermore, the mast is fastened to weights that can be hoisted in the sides of the hull. In this system, the mast's pivot is a simple joint permitting rotation to either side but no inclination of the mast fore or aft. In this system, the mast is carried past the pivot point downward into the hull in the form of a continuous, straight bar; the pivot is not the end of the mast. The tackle used to connect the counterweight on the mast with the hoisting weights in the hull prevent the mast from rotating freely, thus transmitting torques to the hull.

CH Patent Application No. 1148/87-3 describes a structural system for inclining the mast of a sailboat windward. An essential characteristic of this patent is a pendulum weight (dolphin) that is located outside the hull either under the boat or next to it in the water and serves to hold the mast in position.

Description of the new knowledge

In contrast to U.S. Patent No. 3,985,106, the mast in the present invention is not carried downward past the pivot point in order to support a counterweight joined immediately to it in the hull. Except for the mast foot pivot (point F or D), the present invention avoids any rigid connection of the mast to the hull. Similarly, in the system described herein the counterweight or counterweights are not brought into contact with the hull, with the consequence that no torques are transmitted to the hull. The mast and the counterweight (or counterweights) constitute a unit that transmits all forces acting on the mast to the pivot F or D without any torque whatever.

In contrast to CH Patent Application No. 1148/87-3, the counterweight (or counterweights) employed in the present system for positioning the mast is (or are) located inside the hull. This system has the advantage of eliminating the resistance to motion created by a counterweight in the water (dolphin). Another advantage is that the counterweight in the hull weighs more than the same weight outside the boat under water by the amount of the buoyant force.

Ways of executing the invention

Example 1

Figure 2 shows a cross-section through the hull of a sail-boat. The mast is free to lean in any direction around the mast foot (F). The mast foot F is constructed as ball-and-socket joint or universal joint. The mast foot F is the bottom end of the mast.

Fastened in point F is a pendulum rod, which is likewise supported to swing freely in any direction. Fastened to the lower end of this pendulum rod is a weight G. Consequently, the weight G is able to swing freely in any direction, in other words to either side and fore and aft. Along its path of movement (G'), the weight G does not contact the hull.

Instead of a single weight free to swing in any direction, it is also possible, for instance, to fasten two pendulum weights at point F, one of which is free to deflect only to the sides and the other only in the fore-aft direction.

Fastened to the pendulum weight G are the two ends of a wire rope, which passes over a number of rollers to connect G rigidly with the mast. The distance from G past L to F can be shortened or lengthened. When this happens, the distance from G past R to F is correspondingly lengthened or shortened. The total length of the polygon figure remains constant. The deflection from G to G' is accomplished with a winch located at point F.

The force M acting on the mast must be compensated by suitable selection of the weight G and by suitable deflection of the weight (force P). Only the forces acting on point F are transmitted to the hull. The hull is stabilized by the keel K. In the case of boats with more than one mast, the described system can be applied either individually for each mast or for all of the masts in concert.

Figure 3 shows a cross-section through a boat's hull. In order to create a free space within the hull that is not swept by the mast or the pendulum rod, the pivot point D in this design is constructed as the centre of a double ring system. The pivot point D acts as the pivot for both the mast and the pendulum weight G.

This illustration shows only the lateral rotation of mast and pendulum weight, but the principle can also be applied three-dimensionally, in other words with mast and pendulum weight free to swing in any direction (partial spherical surface instead of the ring system, or a number of double ring systems).

The double ring system consists of two rings, both of which are supported so as to be able to rotate freely in relation to the hull and also freely and concentrically in relation to each other. The mast is fastened to one of the rings, the pendulum weight to the other. The rings can be turned in relation to each other in order to alter and fix the position of the weight G in relation to the mast as required. The hull is stabilized by the keel K.

System for altering the
position of sailboat masts.

Summary

Structural system with which the position of a sailboat mast can be altered in relation to the hull as the wind force changes. The mast foot is supported in a joint allowing the mast to be inclined to either side as well as fore and aft.

5 The position of the mast is influenced by a weight located in the hull that can be shifted sideways and fore and aft.

The advantage of the present invention consists in the fact that the torques acting on the mast are compensated by pendulum weights and are not transmitted to the hull. With

10 the pendulum weight, the mast can be set in that position at which the wind force is utilized to the maximum.

Fig. 2 is proposed as illustration.

The Claims defining the invention are as follows:-

1. A construction system for sailboats consisting of

a mast foot that joins the mast to the boat's hull, said foot being constructed in the form of a universal joint (cardan joint or ball-and socket joint) that allows the mast to be directed to any direction and inclined to any inclination in relation to the hull,

a mast that can be altered in its location in relation to the hull,

a counterweight that is arranged inside said hull and acts to provide full compensation of the torque acting on the mast foot,

a mast guidance construction that joins said weight to said mast and serves to control and hold the mast, and

a weight suspension system that joins said counterweight to said hull and serves to shift the counterweight both laterally to either side and fore and aft and fix it in position,

and with which the mast of a sailboat can be inclined rapidly in any direction to any inclination and fixed in the desired position and location while the boat is moving, without the torques of the mast or of the construction system being transmitted to the boat's hull,

and with which, in particular, the mast can be inclined windward and abaft in order to utilize the force of the wind optimally by exploiting the lift applied by the wing action of the sail in this position.



2. Construction system according to Claim 1, in which said counterweight is suspended from the universal joint of the mast foot by means of a pendulum arm of adjustable length in such a way that the pendulum plane can be adjusted as desired in relation to the hull and fixed in position.
3. Construction system according to Claim 1, in which said counterweight is joined to the mast by a system of ropes in such a way that the mast can be shifted to the desired direction and inclination by lengthening or shortening the lengths of the two lateral shrouds and of the forestay and backstay and fixed in the selected position.
4. Construction system according to Claim 1, in which said counterweight consists of a number of weight segments, with which the sum of all torques occurring around the mast foot and the roll axes of the boat's hull is compensated.
5. Construction system according to Claim 1, in which said mast is joined to the counterweight by telescoping arms in such a way that the mast can be shifted in the desired direction and to the desired inclination by lengthening or shortening the telescoping arms and fixed in the selected position.
6. Construction system according to Claim 1, in which said mast foot consists of an ordinary hinge joint allowing the mast to be inclined fore and aft, and in which the mast foot is fastened to a rotation ring, which is integrated in the hull and through which the mast foot can be shifted to either side by rotating the ring, thus inclining the mast to the desired inclination on the desired side.



7. Construction system according to Claim 6, in which said counterweight is fastened to a rotation ring, which is incorporated in the hull and through which the counterweight can be shifted along the ring either by rotation of the ring or by displacement of the weight fastening device on rollers and brought into the desired position in relation to the mast foot and fixed there, and in which, following fixation, the mast foot and counterweight are free to oscillate together along the ring track without transmitting any lateral torques to the hull.
8. Construction system according to Claim 1, in which the shifting of the counterweight and the alteration of the mast position are accomplished by motorized rope systems, gearing systems, or hydraulic systems, and wherein the control of counterweight positioning and mast positioning is effected by electronically processed measured data.
9. Construction system according to Claim 1, in which said sailboat has more than one mast and consequently the construction system is implemented on several masts.

DATED this 10th. day of MAY 1991.

DR. ERICH HAIGIS

By His Patent Attorney

PAUL F. KILDEA.



18 694/88

Figure 1

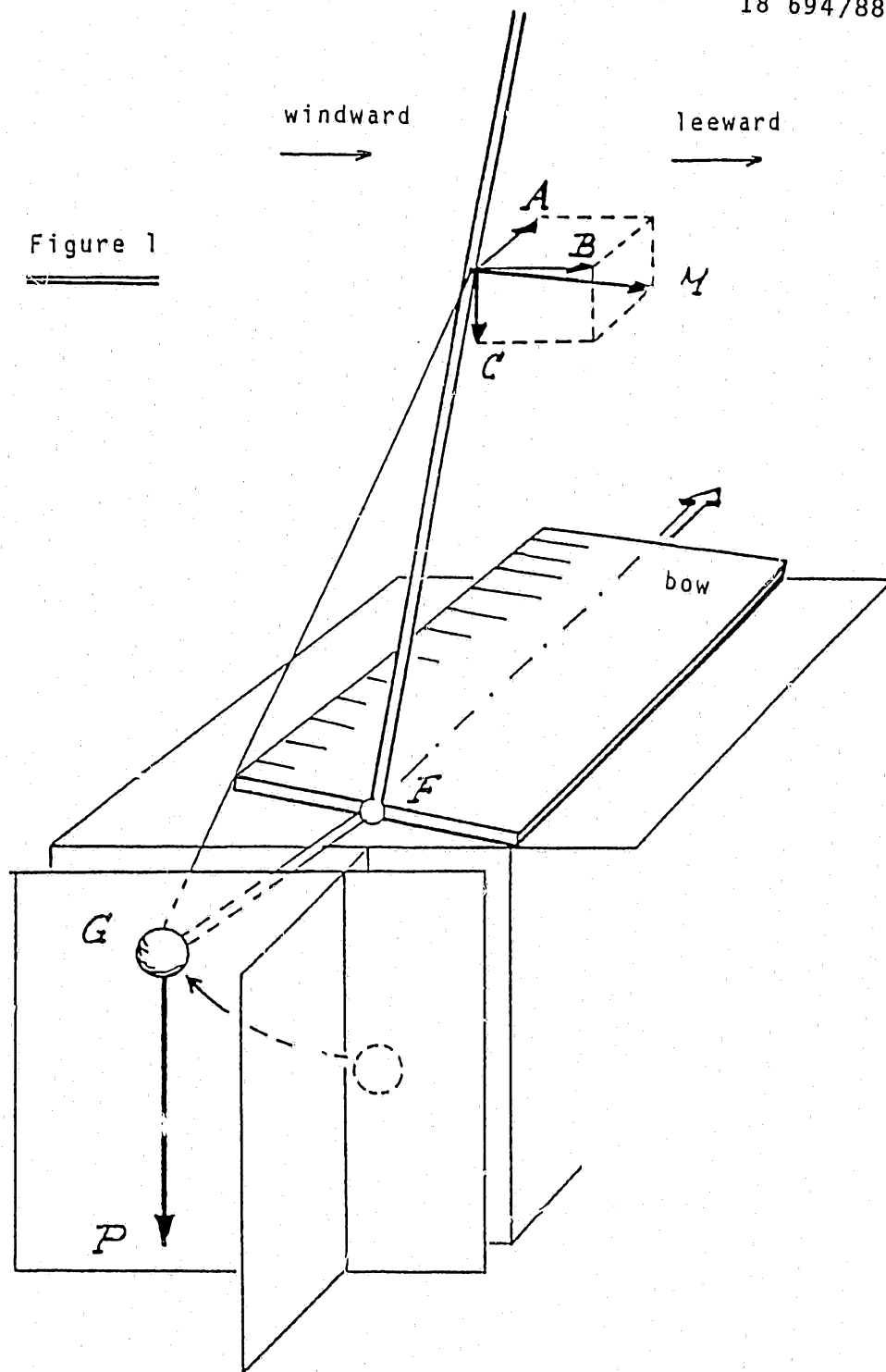
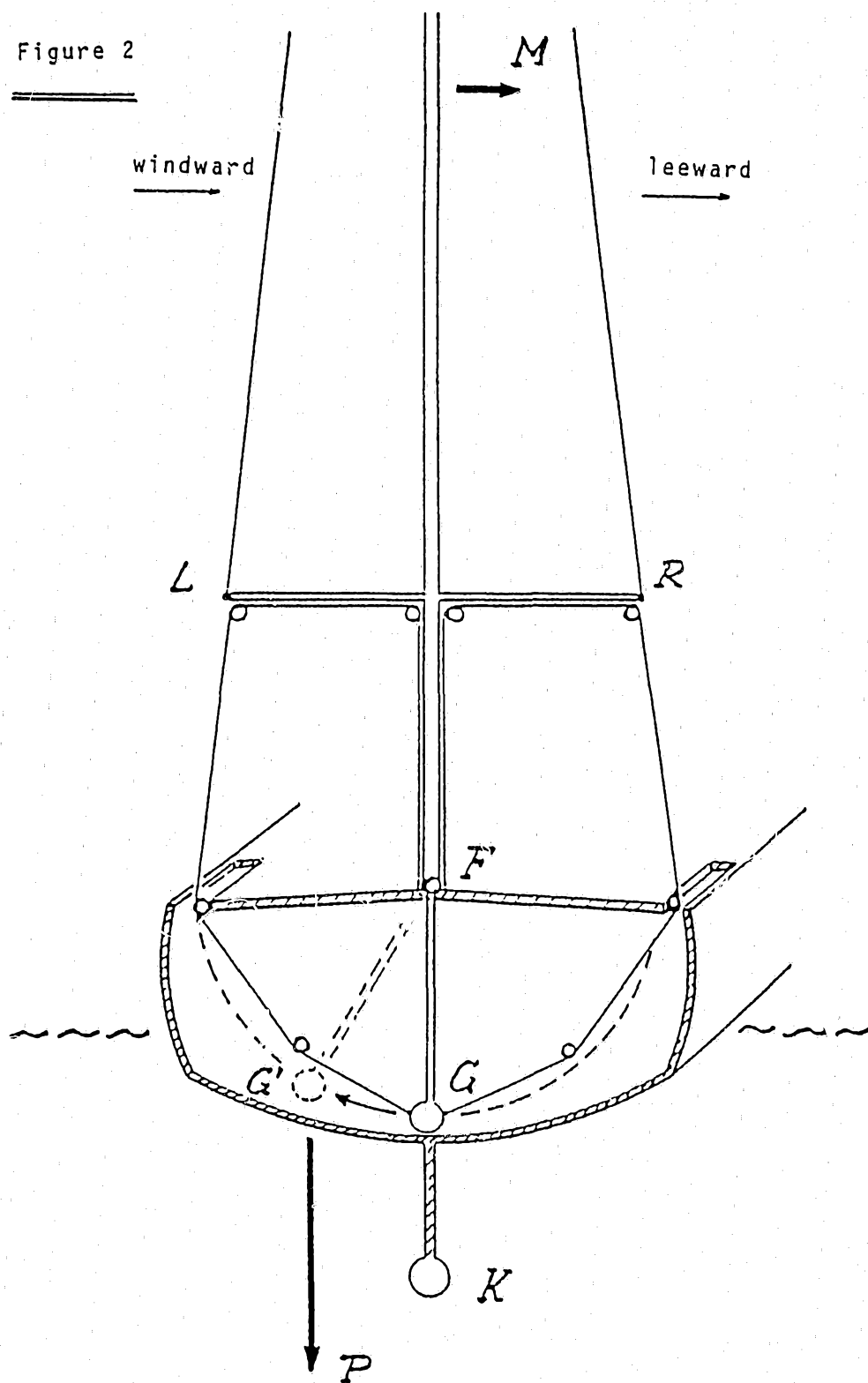


Figure 2



windward



M



leeward



Figure 3

