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(54) Device for outboard motor control via shifting the body of the driver.

(57) Control device for an outboard motor, connected mechanically, hydraulically or pneumatically with two footboards on which the driver shifts his body weight to make the boat deviate from its straight line path, causing rotation of the motor shaft around the vertical axis and inclination with respect to the horizontal axis to compensate for the inclination of the boat during turns.

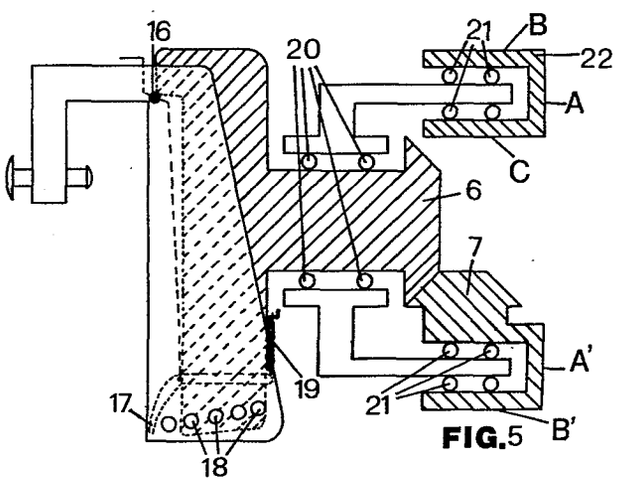

FIG.5

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COMPLETE DOCUMENT

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Device for outboard motor control via shifting the body weight of the driver

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This invention relates to a device, realized in several variants, designed to control an outboard motor by shifting the driver's body weight.

Some recreational and sport boats are currently known in which the direction of motion is changed by shifting the driver's body weight to cause inclination of the boat with respect to its longitudinal axis.

However, in said boats the maneuvering possibilities once the propellors are out of the water during motion are limited, with noticeable loss of engine performance.

The object of this invention is to realize an outboard motor control device which is simple, convenient and highly functional.

This aim is achieved with two foot boards placed in the upper part of the boat on which the driver rests his weight, symmetrically parallel to the longitudinal axis and connected mechanically, hydraulically or pneumatically to a device designed for rotation of the motor shaft around its vertical axis and its inclination with

respect to the horizontal axis, to compensate for the inclination of the boat during turns, which are in turn caused by the shifting of the driver's body weight on said foot boards.

A first mechanical variation of the device according to this invention consists principally of a pair of conical cogged wheels, one of which is fixed and preferably coaxial to the longitudinal axis of the boat while the other acts directly, or indirectly via the interposition of mechanical organs, on the shaft of the outboard motor or on its support, so as to effect rotation about the vertical axis of the motor or an axis parallel to it.

In one possible variant, the invention calls for sectors of conical cogged wheels or other organs designed for mechanical transmission of a rotation movement from a first axis to a second axis at approximately 90° to it, so as to allow amplification or reduction of the amplitude of the movement.

In a further variant, the device may consist of a compact mounting at the stern of the boat, characterized by the possibility of rotation about an upper pin to raise the motor and prevent any collisions, with a conical couple with ball bearing to allow movement along the longitudinal axis and to two upper and lower double pressure bearings to achieve the desired aim, where

said bearings may be connected to one another.

Of course, the existing pivots may alternatively be used to mount the outboard, fixing them both, leaving the upper one mobile or leaving both mobile.

For supporting and moving the motor, the device may also involve a telescopic tube with a spherical pivot placed in the stern of the boat or joined to the compact mounting containing eventually a bearing, where said tube terminates at the opposite end with a pivot on the vertical plane; the inside of said tube, modest in diameter with respect to its length, may be joined on the outside end with the mounting or directly with the motor and terminate on the inside end with a small ball or the like placed deep in the boat in a suitable groove, thus eliminating the sealing telescopic system.

The same function may be performed by rods from the foot boards equipped with a pulley, connected to the mounting or the motor, in order to realize the two movements.

Of course, in a structural variant, the motor may be placed on a plane connected on top to the boat via a pivot rotating about the longitudinal axis and a telescopic connection as described above, arranged on the bottom between said motor and the boat.

In a further variant, the conical couple mounting may be joined during construction to the rear part of the boat, so as to allow application and fastening of the motor, thus eliminating the vertical mounting jaws normally used on the vertical plane or on a stern with vertical wall.

Finally, the connection between the control organs may, according to the invention, be of the flexible type using cables, chains and the like or rigid using levers and rods, or it may use fluid pressure, that is, hydraulic or penumatic. To achieve a proper ratio between the amplitude of movement of the control organ (foot board, lever) and the organ causing the deviation (rotation of the shaft or tiller), elements to amplify or reduce the movement may be placed between said organs. Moreover, the control system may be perfected by dampers, pull-out organs or other known mechanisms.

The invention is represented in some preferred variants in the attached drawings, figures 1 to 9.

Figure 1 shows the scheme for motion transmission from the footboards to the device.

Figures 2 and 3 show cross sections of two variants characterized by the pin of the conical wheel with hinged vertical axis from its two ends, resepctively, and embossed.

Figure 4 shows a device with the axis of rotation of the support of the motor shaft coincident with the vertical rotation axis.

Figure 5 shows a variant of the mounting to be applied to the stern of the boat.

Figure 6 shows respectively side and rear views of the pulleys for the rods which control the direction of the motor.

Figure 7 schematizes, with a side and rear view of the pulley, a variant characterized by connection of the foot boards with a transverse bar, to prevent relative movements of said foot boards.

Finally, figures 8 and 9 show axonometric views respectively of a two foot board control device and of one equipped with a control lever.

With reference to the particulars of the design, fixed to the stern 15 of a boat or floating body, in a position approximately coaxial with the longitudinal axis of the boat, via plate 1, is a pin 2 with conical cogged wheel, or sector, 6; a mobile carter 4 is supported on said pin, equipped with bearings for hinging a shaft 8, with pin 8b or tubular support 11 respectively arranged approximately 90° to the horizontal axis. Pin 8b, shaft 8 or tubular support 11 is equipped with a

conical cogged wheel 7, or cogged sector, which engages the corresponding wheel 6. At the end of the shaft 8, tubular support 11, or the outboard support plate, is applied via arms 10.

In the execution in figure 3, arms 10 are hinged on one part to the outside end of pin 8b and on the other to pin 8c coaxial with the axis of pin 8a, on carter 4. According to figure 4, tubular support 11 coincides with its axis of rotation with that of the conical cogged wheel, or sector 7. Support 11 allows both direct insertion of the shaft of the outboard motor as well as application using the pivot of the vertical rotation axis already provided in many known motors.

Movement of the control device according to the arrow occurs via one or more transmission devices, which may be rigid, flexible or means using fluid pressure exerted via the end 14 of the footboards. A simple variant may consist of flexible metal wires 13 fixed at oen end 13a on end 14, which may be rotated according to arrows 14a, and at the other 13b on pulley 5 joined to carter 5, which may be rotated in sense 5a.

When the foot boards are moved in sense 14a by shifting the body weight, carter 4 is put in action in sense 5a, rotating the wheel 7 in sense 8a and with it, directly or with arms 10 interposed, the support 11, thus rotating the motor about vertical axis 12 or one parallel

to it, 8c. In this way, a force transverse to the longitudinal axis is applied to the boat, causing deviation from the straight course and at the same time inclining the outboard motor 5a to compensate for the inclination 1a of the boat during the curve and to always maintain a substantially vertical position of the motor shaft with respect to the surface of the water.

In one variant of the invention, a slightly conical cogget sector may be placed on the motor shaft during its manufacture, either joined or removeable, able to replace cogged sector 7, and equipped with the upper and lower pivots already existing in the motor.

In the variant shown in figure 5, the compact mounting on the stern of the boat has upper pin 16 to raise the motor and prevent any collisions, pin blocking device 17 in holes with spring 19, and the conical couple 6-7 with ball bearing 20 for movements around the longitudinal axis, as well as double pressure bearings 21, which may be interconnected. Naturally, the motor can be attached at various points in mobile structure 22, such as A-A', B-B', A-B', A'-B and with the upper mounting in C as well.

The conical couple 6-7 may also have a central internal support consisting of a vertical axis with crank, preferably right angle, to be inserted in a suitable cavity in cogged conical wheel 6, preferably with an inter-

posed bearing, in order to eliminate the need for the lower part of carter 10 and the possible reduction of bearing 20 in its upper position only.

With regard to the direction of the boat, the control rods may be of type 23 (that is, singly acting) or a closed circuit with lateral pulleys 24 and central pulley 25, with a double parallel ring groove 26 small in diameter, in the necks of which the belts or chains connected to the foot boards are isnerted, so that their movement is transmitted to the motor via wire 27, wth varied faces to prevent slippange, eventually fixed in its central point and attached to the head of the traditional motor or around structure 22, which moves about bearings 20 and 21.

In one important variant, the end of motor steering rod 27 may start in a sheath of known type and end with one end a rigid bar, curved rather than straight and equipped with a pivot on the horizontal plane, joined to the motor so that after it comes out of the sheath of said end, the motor shaft may be moved around the vertical and horizontal axes.

In the variant shown in figure 7, the rods 28 form a closed circuit with the foot boards 14 and the motor 29 with propellors 30; to prevent movement of the foot boards 14 relative to one another, they may be connected to rigid transverse bar 31.

In the variants shown in figures 8 and 9, movement of the inclinable foot boards or of lever 32, effected by the driver, is transmitted via bars 33, 34 supported by structure 35, rotating according to arrows 14a and 36a, to organs which allow the motion to be sent to shaft 37, rotating it as in 37a around its vertical axis to make propellor 30 deviate from the longitudinal axis of the boat.

In figure 8, these organs are pulleys 14 connected to one another with a chain, a flexible cable or a belt 38 arranged so as to prevent slippage of the pulleys. The connecting organ 38 (chain, cable, belt) with a rectilinear movement 39a passes the movement to a cogged sector 39 joined to the shaft of the outboard motor, which rotates as shown in 37a in the tubular support 40 joined to the boat.

The ratio of the radius of the cogged sector 39 to that of pulleys 14 determines the amplification or reduction of the movement 14a from the foot boards.

In figure 9, control lever 32, joined with the front end of a bar 34 rotating as 36a in supports 35, is connected mechanically via arm 36, rod 41 and arm 42 to the shaft 37 of the outboard, rotating as 37a, in tubular support 40 joined to the boat. Suitable pivots are placed between arms 42 and 36 and rod 42. When the lever 32 is operated in sense 32a, arm 36 is rotated in

sense 36a, dragging rod 41 in sense 41a, which in turn acts on arm 42 joined with shaft 37, rotating as 37a, to cause propellor 30 to deviate from the longitudinal axis of the boat.

The invention does not exclude that rod 41 operate as a rack, changing arms 42, 36 for cogged wheels or cogged sectors.

Of course, the amplitude and reduction of the movement between lever 32 and shaft 37 depend on the ratio of the length of arm 36 to that of arm 42.

In all the variants described, the foot boards may have support and steering levers, with control grips, eventually incorporated in the boat, and/or foot rests which may be regulated along their length; said foot boards may alternatively be removeable, like those used for water skiing.

In one variant, a front rest at adjustable height may be provided for the hands, eventually telescopic and replaceable in the boat, with a motor control grip.

There may be an ignition switch, eventually with a jack on the spark plug cables, which is operated via the control grip or in some other way, in order to shut the motor off in case of a spill.

Claims:

1. Device for the control of an outboard motor able to rotate the motor around its vertical axis to effect curves and to incline it with respect to its horizontal axis, so as to maintain the propellor always immersed in the water, as a result of the driver's body weight shifts on two foot boards placed in the boat.

2. Device for the control of an outboard motor according to claim 1, wherein it consists principally of a pair of conical cogged wheels, one of which is fixed and preferably coaxial to the longitudinal axis of the boat while the other acts directly, or indirectly via the interposition of mechanical organs, on the shaft of the outboard motor or on its support, so as to effect rotation about the vertical axis of the motor or an axis parallel to it.

3. Device for the control of an outboard motor according to claim 1, wherein there are sectors of conical cogged wheels or other organs designed for mechanical transmission of a rotation movement from a first axis to a second axis at approximately 90° to it, so as to allow amplification or reduction of the amplitude of the movement.

4. Device for the control of an outboard motor according to claim 1, wherein it consists of a compact moun-

ting at the stern of the boat, characterized by the possibility of rotation about an upper pin to raise the motor and prevent any collisions, with a conical couple with ball bearing to allow movement along the longitudinal axis and to two upper and lower double pressure bearings to achieve the desired aim, where said bearings may be connected to one another.

5. Device for the control of an outboard motor according to claim 1, wherein the existing pivots may alternatively be used to mount the outboard, fixing them both, leaving the upper one mobile or leaving them both mobile.

6. Device for the control of an outboard motor according to claim 1, wherein the device may also involve a telescopic tube with a spherical pivot placed in the stern of the boat or joined to the compact mounting containing eventually a vearing, where said tube terminates at the opposite end with a pivot on the vertical plane.

7. Device for the control of an outboard motor according to cliam 6, wherein the inside of said tube, modest in diameter with respect to its length, may be joined on the outside end with the mounting or directly with the motor and terminate on the inside end with a small ball or the like placed deep in the boat in a suitable groove, thus eliminating the sealing telescopic

system.

8. Device for the control of an outboard motor according to claim 1, wherein the motor may be placed on a plane connected on top to the boat via a pivot rotating about the longitudinal axis and a telescopic connection as described above, arranged on the bottom between said motor and the boat.

9. Device for the control of an outboard motor according to claim 4, wherein the conical couple mounting may be joined during construction to the rear part of the boat, so as to allow application and fastening of the motor, thus eliminating the vertical mounting jaws normally used on the vertical plane or on a stern with vertical walls.

10. Device for the control of an outboard motor according to claim 1, wherein the connections between the control organs may be of the flexible type using cables, chains and the like or rigid using levers and rods, or it may use fluid pressure, that is, hydraulic or penumatic; to achieve a proper ratio between the amplitude of movement of the control organ (foot board, lever) and the organ causing the deviation (rotation of the shaft or tiller), elements to amplify or reduce the movement may be placed between said organs.

11. Device for the control of an outboard motor accor-

ding to claim 2, wherein fixed to the stern 15 of a boat or floating body, in a position approximately coaxial with the longitudinal axis of the boat, via plate 1, is a pin 2 with conical cogged wheel, or sector, 6; a mobile carter 4 is supported on said pin, equipped with bearings for hinging a shaft 8, with pin 8b or tubular support 11 respectively arranged approximately 90^{o} to the horizontal axis; pin 8b, shaft 8 or tubular support 11 is equipped with a conical cogged wheel 7, or cogged sector, which engages the correspondong wheel 6; at the end of the shaft 8, tubular support 11, or the outboard support plate, is applied via arms 10.

12. Device for the control of an outboard motor according to claim 2, wherein arms 10 are hinged hinged on one part to the outside end of pin 8b and on the other to pin 8c coaxial with the axis of pin 8a, on carter 4; tubular support 11 coincides with its axis of rotation with that of the conicial cogged wheel, or sector, 7; support 11 allows both direct insertion of the shaft of the outboard motor as well as application using the pivot of the vertical rotation axis already provided in many known motors.

13. Device for the control of an outboard motor according to claim 12, wherein movement of the control device occurs via one or more transmission devices, which may be rigid, flexible or means using fluid pressure exerted via the end 14 of the foot boards.

14. Device for the control of an outboard motor according to claim 2, wherein a simple variant may consist of flexible metal wires 13 fixed at one end 13a on end 14, which may be rotated according to arrows 14a, and at the other 13b on pulley 5 joined to carter 5, which may be rotated in sense 5a; when the foot boards are moved in sense 14a by shifting the body weight, carter 4 is put in action in sense 5a, rotating the wheel 7 in sense 8a and with it, directly or with arms 10 interposed, the support 11, thus rotating the motor about vertical axis 12 or one parallel to it, 8c; in this way, a force transverse to the longitudinal axis is applied to the boat, causing deviation from the straight course and at the same time inclining the outboard motor 5a to compensate for the inclination 1a of the boat during the curve and to always maintain a substantially vettical position of the motor ship with respect to the surface of the water.

15. Device for the control of an outboard motor according to claim 11, wherein a slightly conical cogged sector may be placed on the motor shaft, eitherjoined or removeable, able to replace cogged sector 7, and equipped with the upper and lower pivots already existing in the motor.

16. Device for the control of an outboard motor according to claim 4, wherein the compact mounting on the stern of the boat has upper pin 16 to raise the motor

and prevent any collisions, pin blocking device 17 in holes 18 with spring 19, and the conical couple 6-7 with ball bearing 20 for movements around the longitudinal axis, as well as double pressure bearings 21, which may be interconnected; of course, the motor can be attached at various points in mobile structure 22, such as A-A', B-B', A-B', A'-B and with the upper mounting in C as well.

17. Device for the control of an outboard motor according to claim 1, wherein the control rods may be of type 23 (that is, singly acting) or a closed circuit with lateral pulleys 24 and central pulley 25, with a double parallel ring groove 26 small in diameter, in the necks of which the belts or chains connected to the foot boards are inserted, so that their movement is transmitted to the motor via wire 27, with varied faces to prevent slippage, eventually fixed in its central point and attached to the head of the traditional motor or around structure 22, which moves about bearings 20 and 21.

18. Device for the control of an outboard motor according to claim 1, wherein the end of motor steering rod 27 may start in a sheath of known type and end with one end a rigid bar, curved rather than straight and equipped with a pivot on the horizontal plane, joined to the motor so that after it comes out of the sheath of said end, the motor shaft may be moved around the vertical

and horizontal axes.

19. Device for the control of an outboard motor according to claim 18, wherein the rods 28 form a closed circuit with the foot boards 14 and the motor 29 with propellors 30; to prevent movement of the footboards 14 relative to one another, they may be connected to rigid transverse bar 31.

20. Device for the control of an outboard motor according to claim 1, wherein movement of the inclinable footboards or of lever 32, effected by the driver, is transmitted via bars 33, 34 supported by structure 35, rotating according to arrows 14a and 36a, to organs which allow the motion to be sent to shaft 37, rotating it as in 37a around its vertical axis to make propellor 30 deviate from the longitudinal axis of the boat.

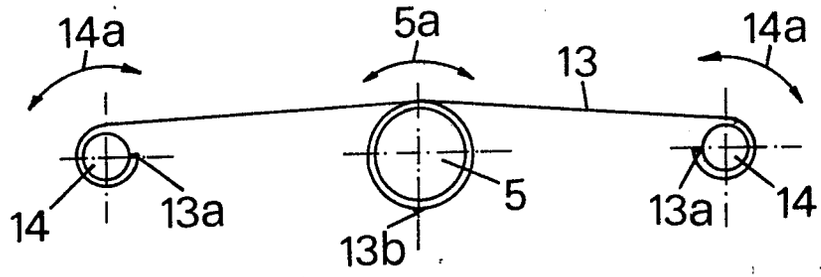


FIG.1

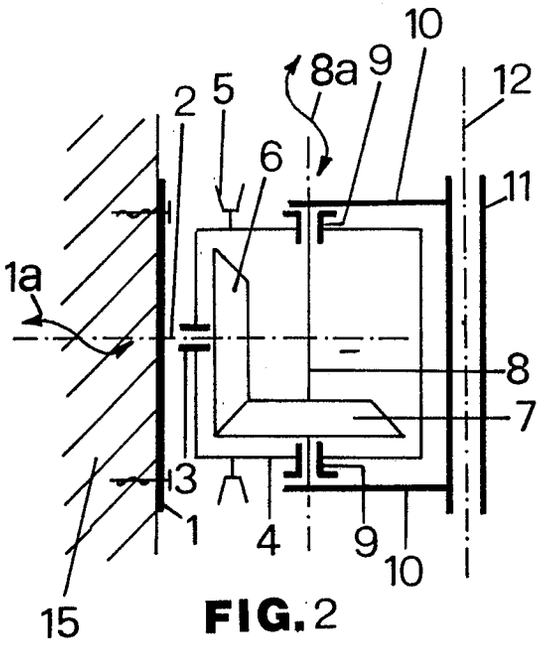


FIG.2

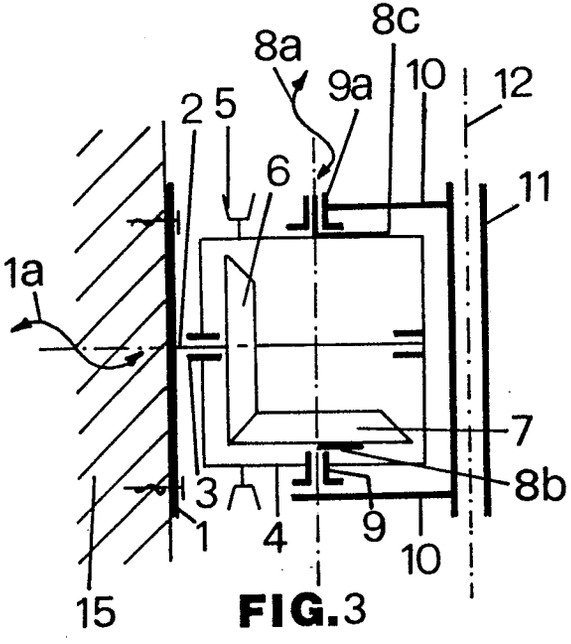


FIG.3

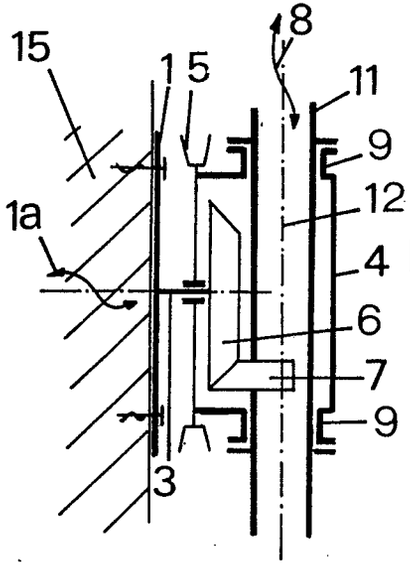


FIG.4

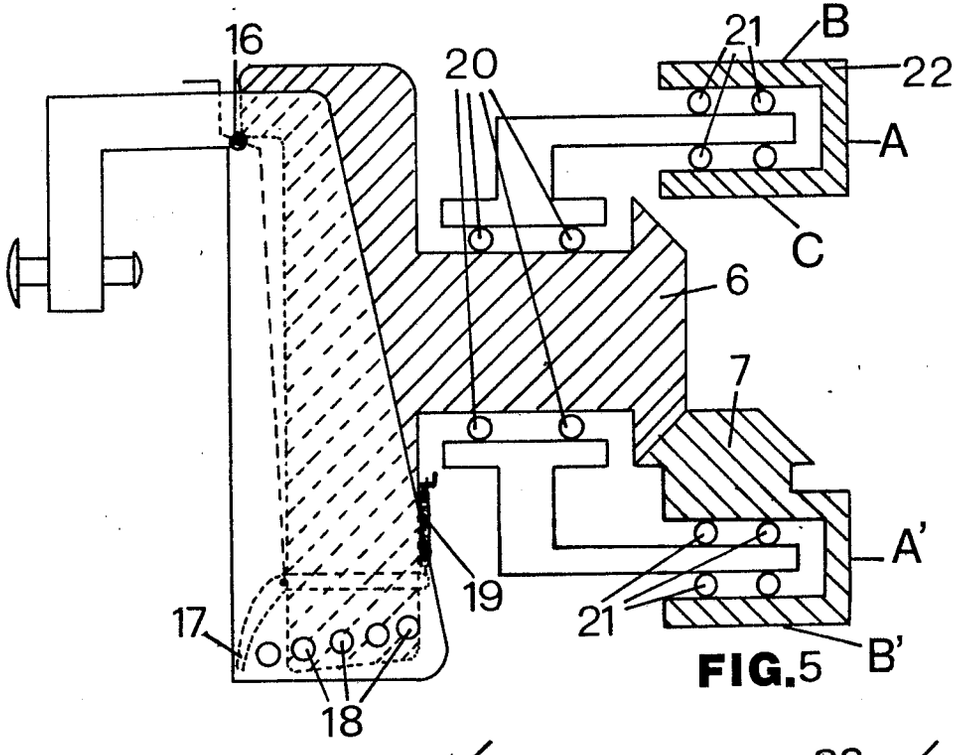
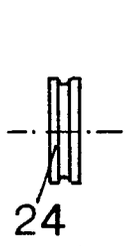


FIG.5



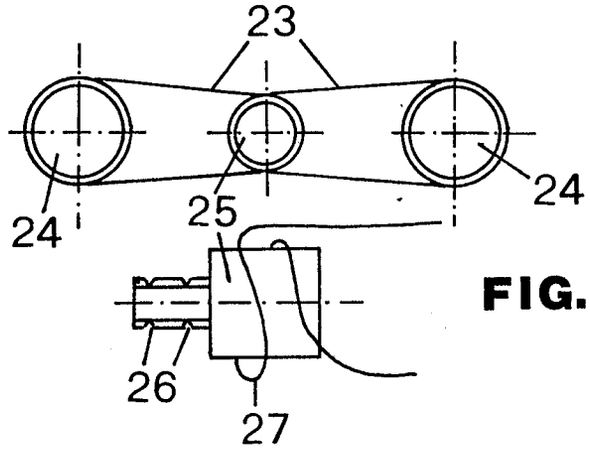


FIG.6

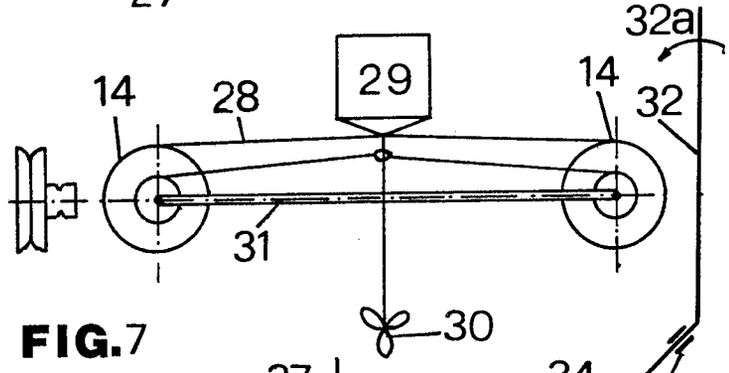


FIG.7

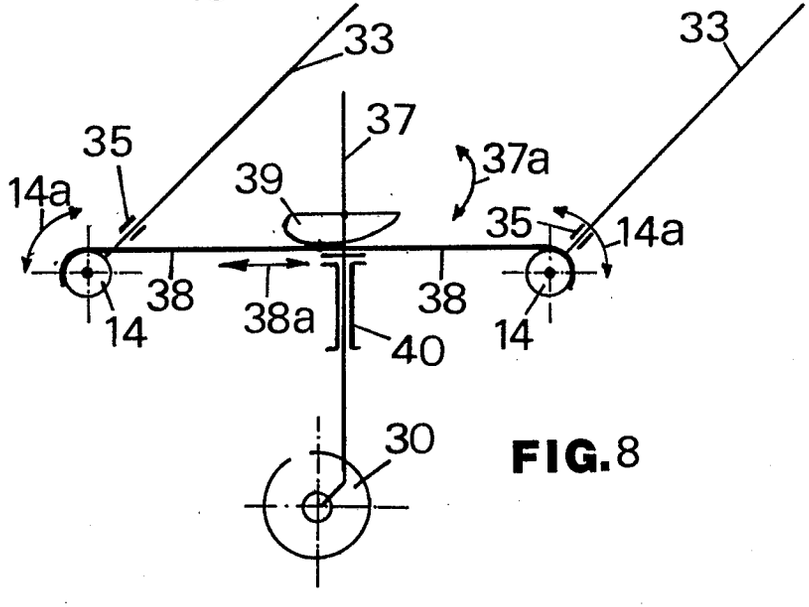


FIG.8

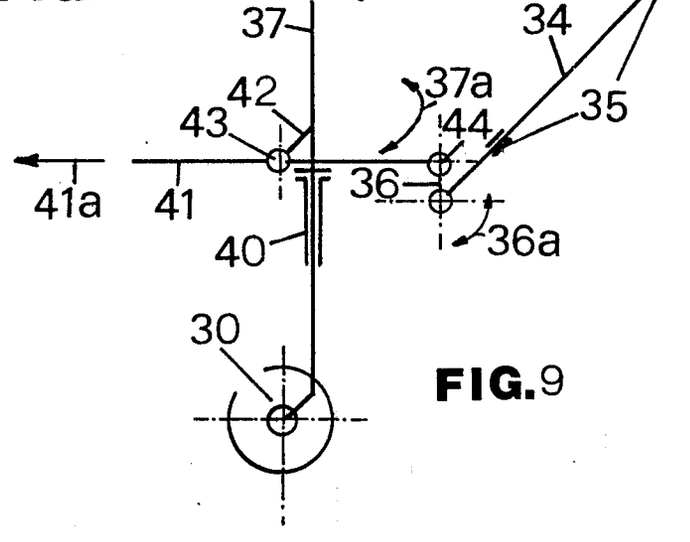


FIG.9

European Patent Office

EUROPEAN SEARCH REPORT

0069077

Application number

EP 82 83 0086

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	US-A-2 666 407 (J.P. WILKIRSON) * Column 2, lines 10-63; column 3, lines 1-24; figures 1-7 *	1	B 63 H 21/26
A	US-A-3 475 985 (A.H. OLDHAM) * Column 2, lines 24-59; figure 1 *	1	
A	US-A-4 077 353 (L.W. WEBB) * Column 2, lines 3-68; column 3, lines 1-23; figures 1-5 *	1	
A	US-A-4 177 747 (H. PICHL) * Column 1, lines 56-61; figure 1 *	1	
A	US-A-3 693 577 (M. SADE) * Column 1, lines 49-68; figure 1 *		TECHNICAL FIELDS SEARCHED (Int. Cl. ³) B 63 H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13-10-1982	PRUSSEN J.R.

CATEGORY OF CITED DOCUMENTS

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