United States Patent [19]

Schreiber

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[54] **VEHICLE, IN PARTICULAR FOR TRAINING IN THE COORDINATION OF SEVERAL CONTROLS**

[76] Inventor: **Hermann Schreiber**, Wangi, Switzerland

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[30] **Foreign Application Priority Data**

Mar. 31, 1970 Switzerland 4714/70

[52] **U.S. Cl.** ..... **280/16**, 280/21 A

[51] **Int. Cl.** **B62b 13/04**

[58] **Field of Search** ..... 280/16, 21 R, 21 A

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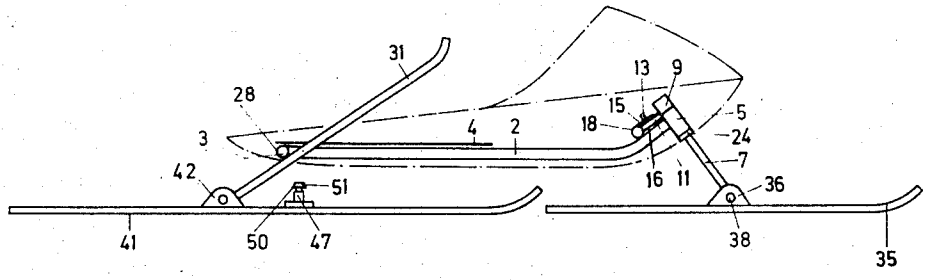
Primary Examiner—Robert R. Song

Attorney—Browdy & Neimark

[57] **ABSTRACT**

A vehicle for training in the coordination of various controls provided with at least travelling units containing skids, wheels or floats, having at least one seat, each of the travelling units being capable of being lifted or lowered for tilting about its longitudinal and/or transverse axis and at least one travelling unit being adapted to swivel about a vertical axis.

17 Claims, 28 Drawing Figures



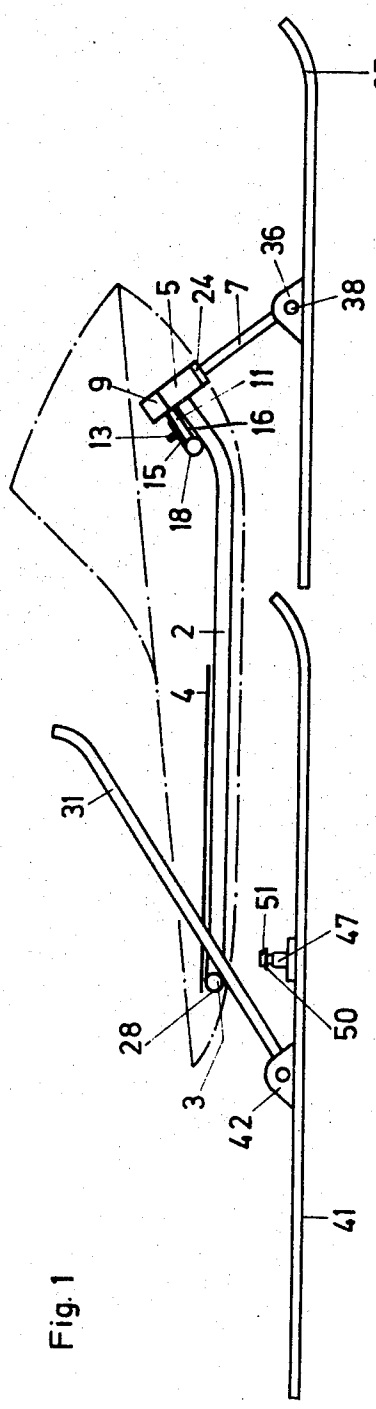


Fig. 1

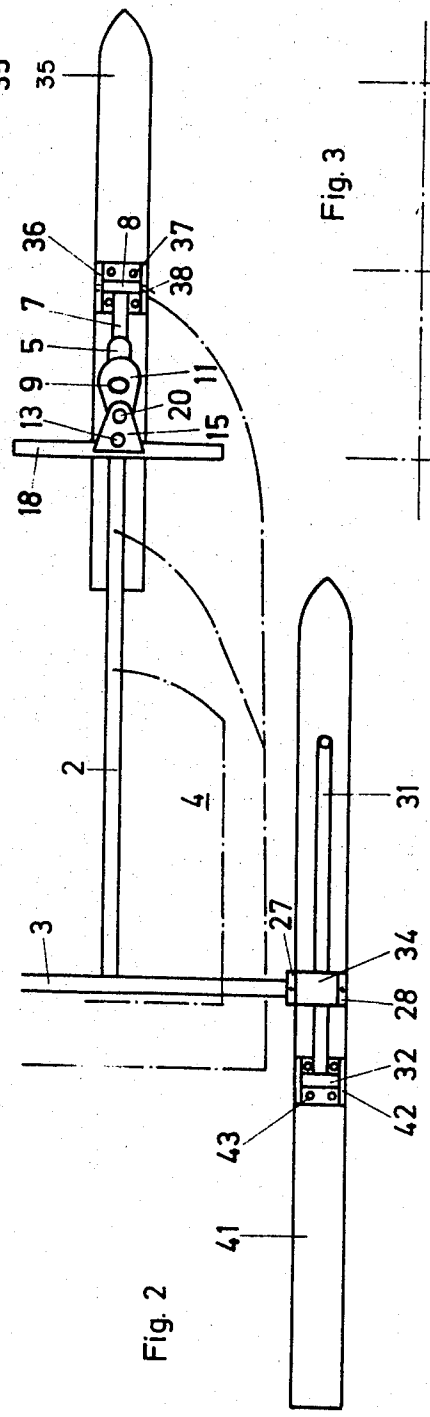


Fig. 2

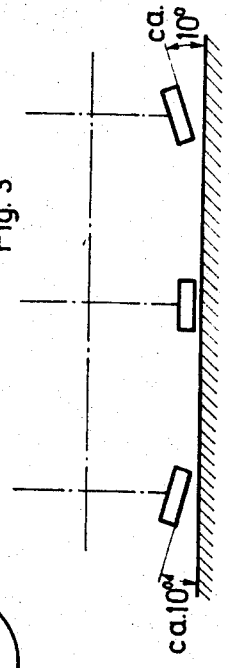


Fig. 3

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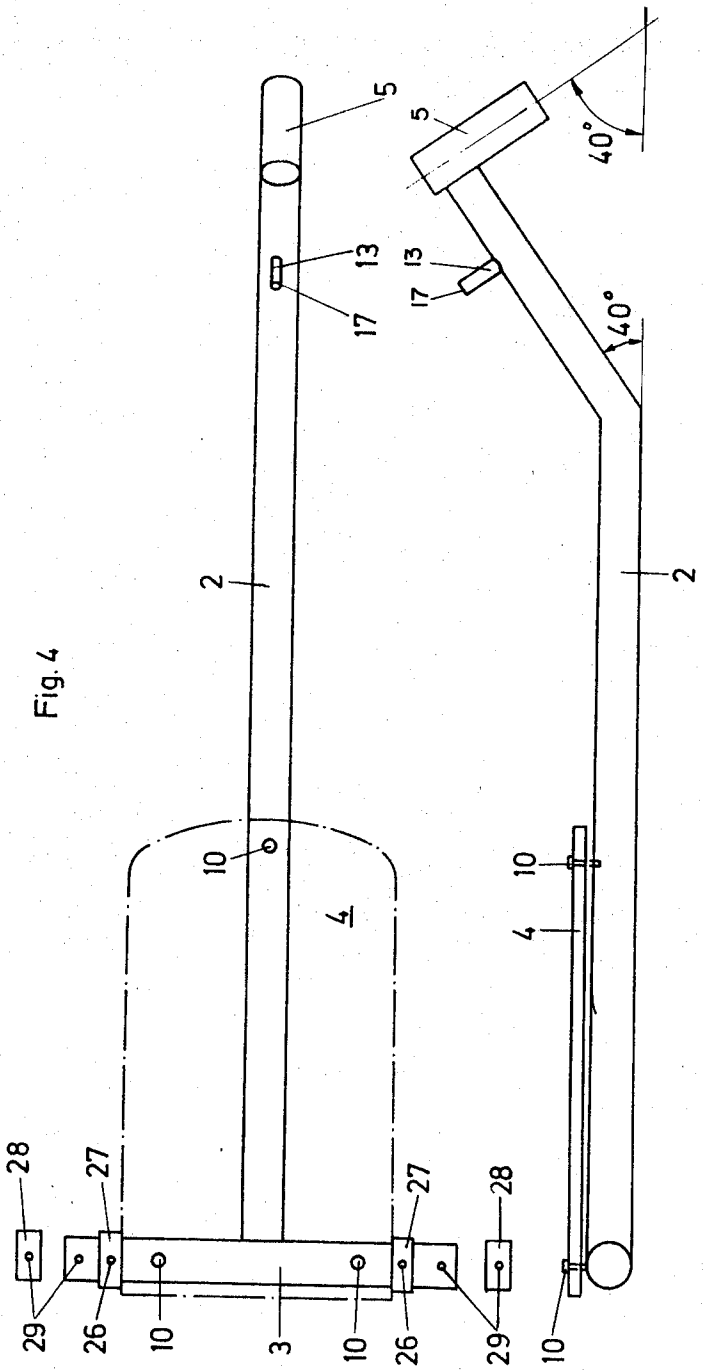

Fig. 4

Fig. 5

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Fig. 6

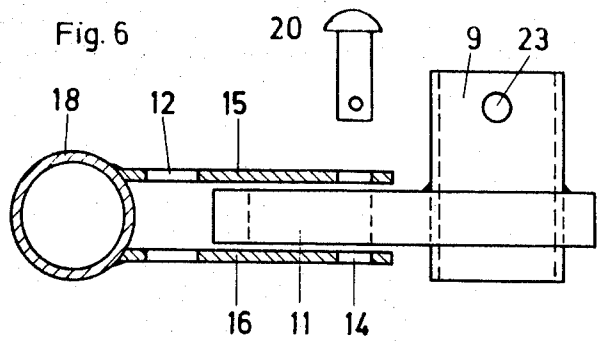


Fig.8

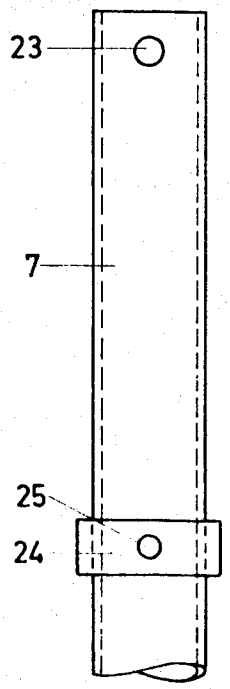
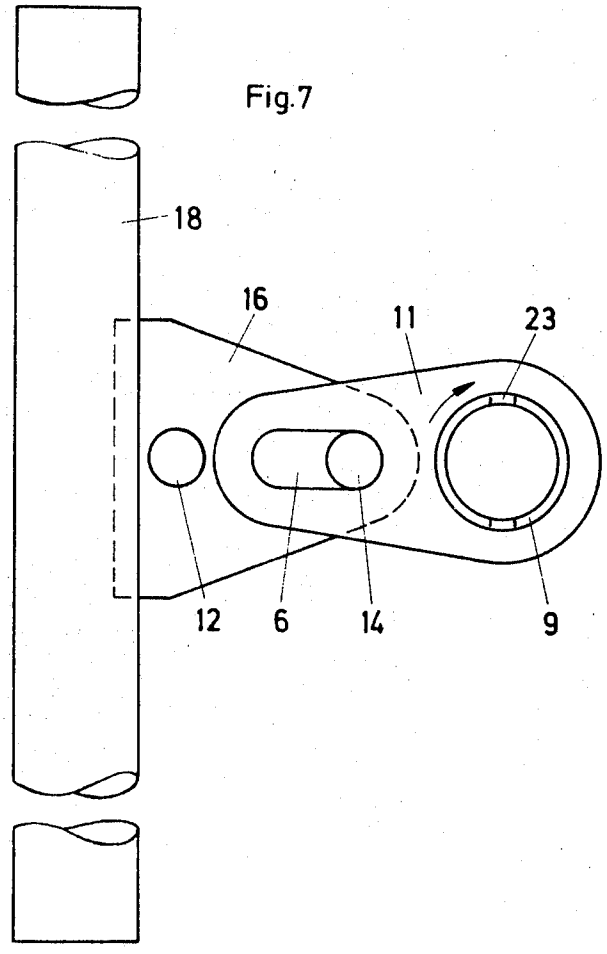


Fig.7



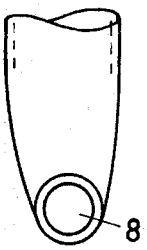
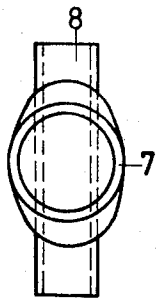


Fig. 9



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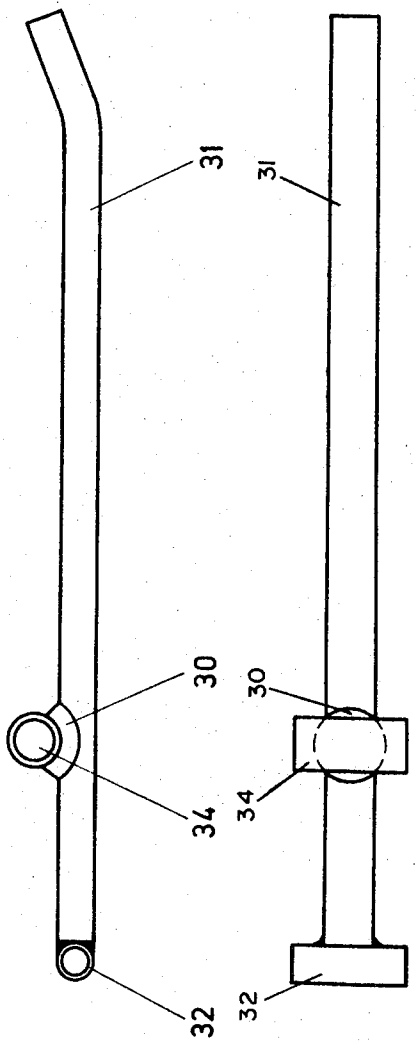

Fig. 10

Fig. 11

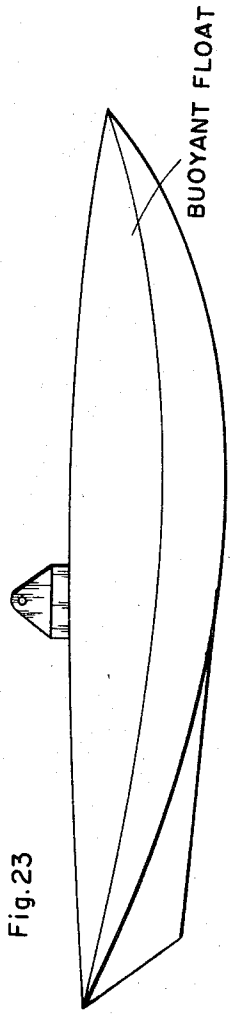

Fig. 23

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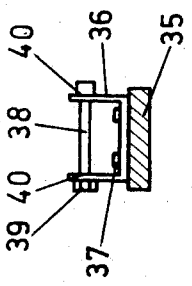

Fig. 13

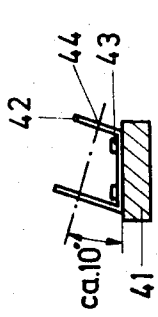

Fig. 15

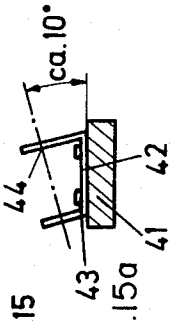

Fig. 15a

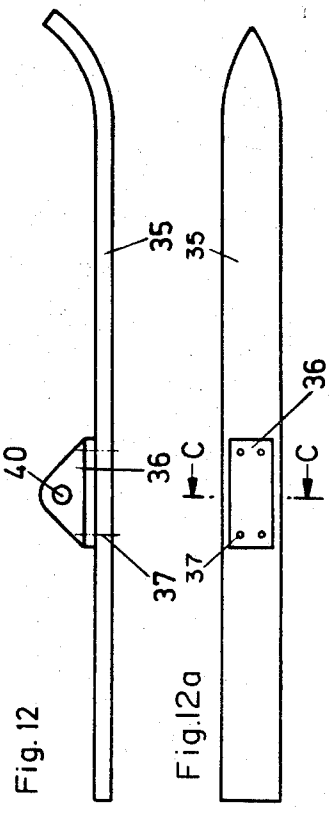

Fig. 12

Fig. 12a

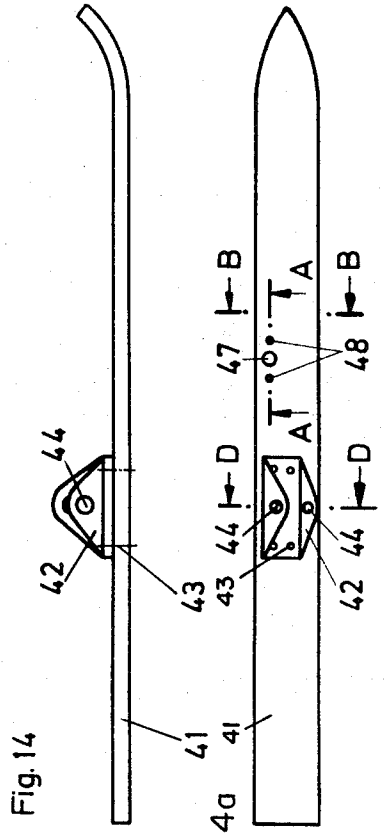

Fig. 14

Fig. 14a

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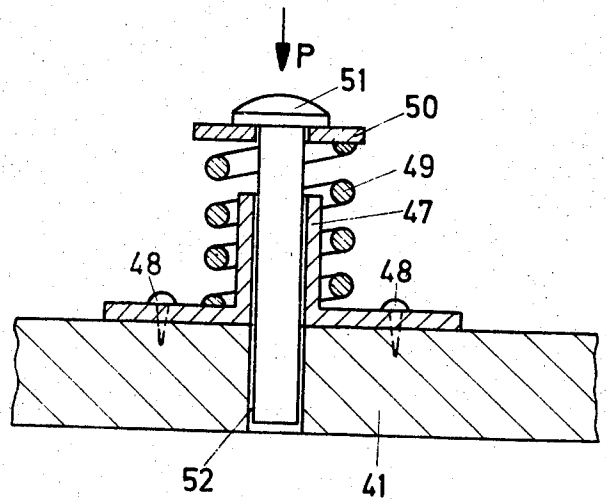
Fig. 16



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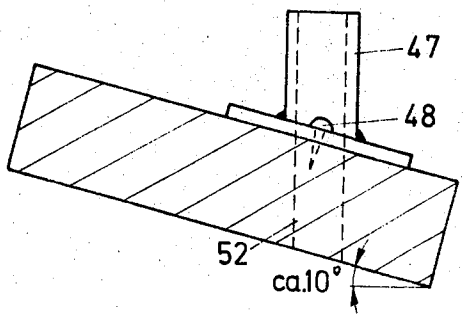

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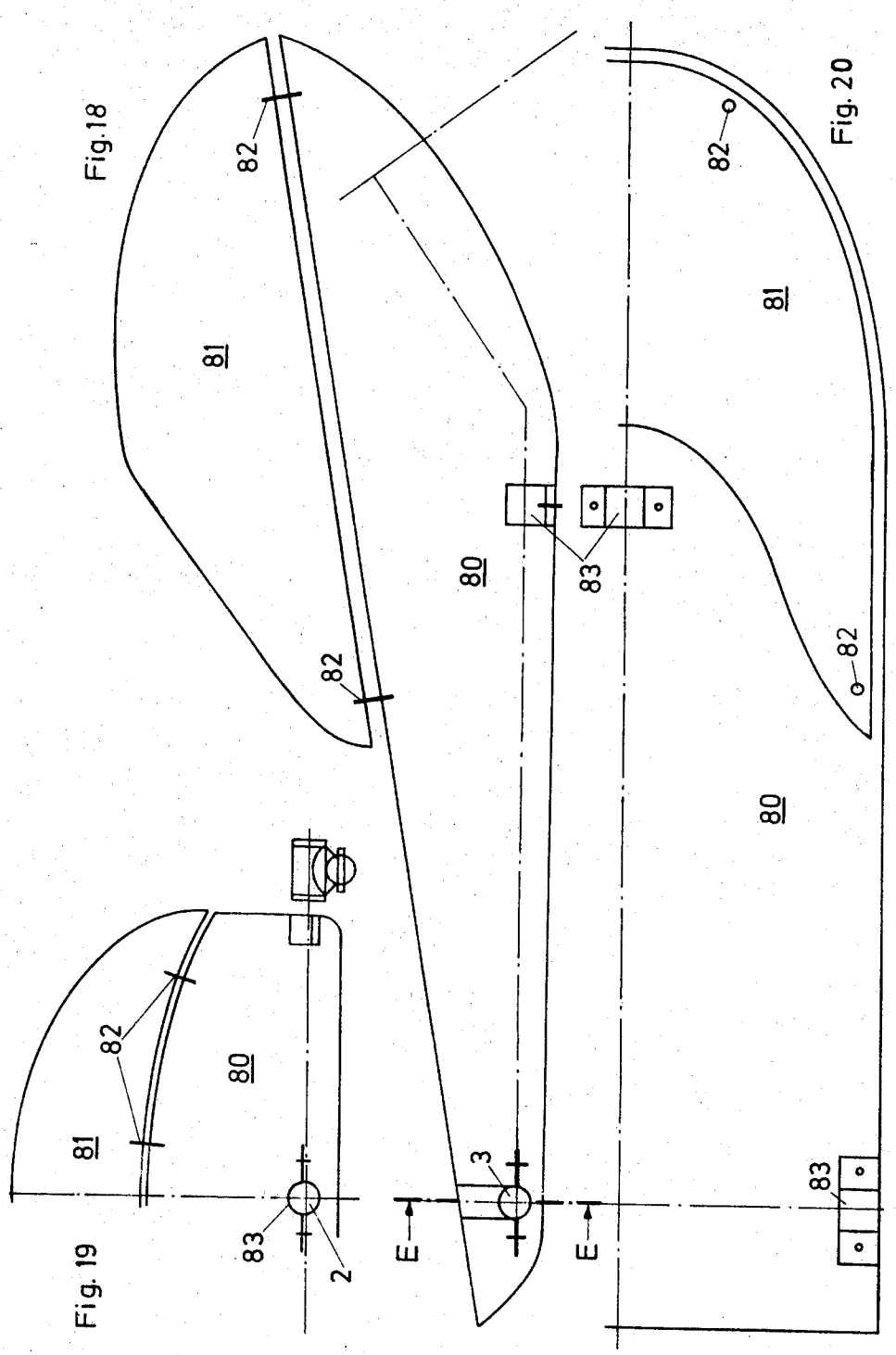

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Fig. 21

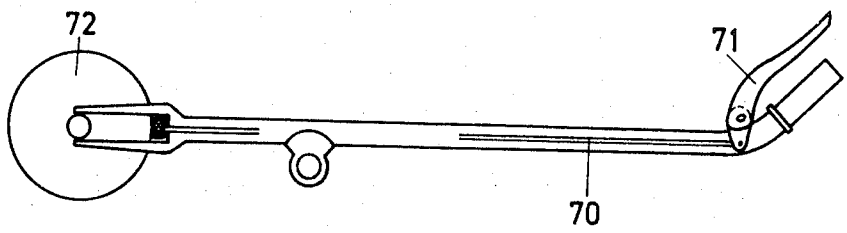


Fig. 21a

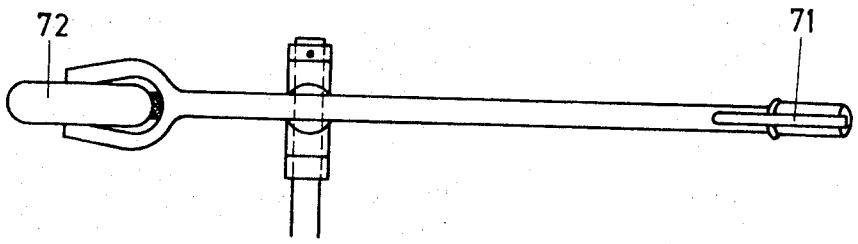


Fig. 22

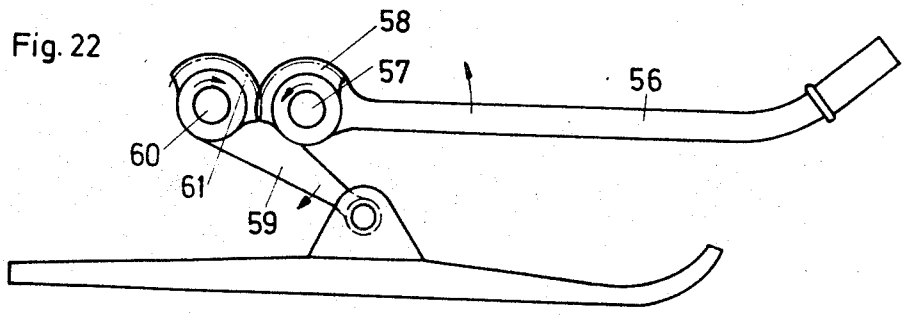
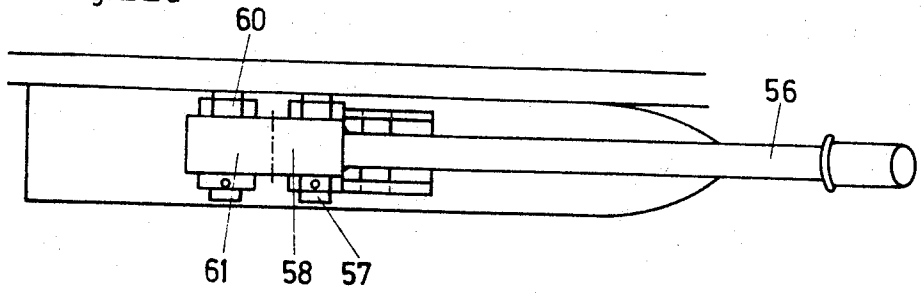


Fig. 22a



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VEHICLE, IN PARTICULAR FOR TRAINING IN THE COORDINATION OF SEVERAL CONTROLS

The present invention concerns a vehicle, in particular for training in the coordination of several controls, which rests on at least three travelling units and which has one or several seats.

Experience in the training of aircraft pilots shows that from a relatively large number of applicants only a few can be selected as suitable. The selection is made partly on the applicant's ability to coordinate several controls. Often this ability cannot be assessed until a later stage of training. It may even be absent in applicants who meet the other requirements. There are known systems, so-called simulators, which can represent the movements about the three space axes of an aircraft, but which are stationary and can hardly demonstrate the effect of such movements on the forward motion of the aircraft. The operation of such simulators is confined to indoors and is in some cases very expensive. They are therefore not suitable for use by the general public.

One of the objects of the present invention is to enable the general public to test and train the skill for controlling the movement of a vehicle about several axes, without involving expensive installations. This object is achieved hereunder in that the travelling units can be controlled singly.

The present invention is now to be described by way of example with reference to the accompanying drawings, in which

FIG. 1 shows a side view of a vehicle with skids, wherein the lateral travelling units can be lifted and lowered independently of each other.

FIG. 2 shows the vehicle according to FIG. 1 in plan;

FIG. 3 shows the skid positions of the vehicle according to FIG. 1, viewed from the front;

FIG. 4 shows the vehicle chassis according to FIG. 1 in plan, with the seating surface indicated;

FIG. 5 shows a side view of the chassis according to FIG. 4;

FIG. 6 shows a side view of the front travelling unit control assembly;

FIG.7 shows the control assembly according to FIG. 6 in plan, with the upper lug omitted;

FIG. 8 shows a side view of the front control column and the front skid bearing;

FIG. 9 shows the front skid bearing according to FIG. 8 in plan;

FIG. 10 shows a side view of a side control lever with lever bearing and rear skid bearing;

FIG. 11 shows the side control lever according to FIG. 10 in plan;

FIGS. 12 and 12*a* show a side view and a top view respectively of a front skid with bearing support;

FIG. 13 shows a section along line C—C through a front skid according to FIG. 12;

FIGS. 14 and 14*a* show a side view and a top view respectively of a rear skid with bearing support;

FIGS. 15 and 15*a* show a section along line D—D through the left and right rear skids respectively according to FIG. 14*a*;

FIG. 16 shows a longitudinal section along line A—A in FIG. 14 through a rear skid portion with braking mechanism attached;

FIG. 17 shows a cross-section along line B—B in FIG. 14, with bush screwed on;

FIG. 18 shows a side view of the vehicle according to FIG. 1 with casing fitted;

FIG. 19 shows a cross-section along line E—E in FIG. 18;

FIG. 20 shows the vehicle according to FIG. 18 in plan;

FIGS. 21 and 21*a* show a side control lever for wheels, with brake attached, viewed from the side and the top respectively;

FIGS. 22 and 22*a* show a side view and a top view respectively of a two-arm lateral travelling unit support with gearing.

FIG. 23 shows a side view of a float with bearing support suitable for use as a surface engaging member in accordance with the present invention.

On a T-shaped chassis (FIGS. 1, 2, 4, 5) of a vehicle, a seat 4 is arranged in such a manner that a longitudinal tube 2 extends in the forward direction. The seat 4 is fixed to the longitudinal tube 2 and the transverse tube 3 by three screws 10 (FIGS. 4, 5). The foremost quarter of the longitudinal tube 2 is bent upwards through about 40°. A front cylindrical bearing 5 is attached to the end of the longitudinal tube 2 at right angles to the bent portion, so that its longitudinal axis, together with that of the tube 2, defines a plane perpendicular to the chassis plane. Extending through the bearing 5 is a column 7 whose upper end is held in a bush 9 by a pin, not shown, slipped into a bore 23 (FIGS. 6 and 8). Fixed to the bush 9 is a slotted plate 11. Below the bearing 5, the column 7 is secured by a collar 24 secured to it by a pin 25 (FIG. 8). A pin 13 (FIG. 4) is fixed to the tube 2 in such a manner that a foot lever 18 can be pivoted thereon by the holes 12 of two lugs 15 and 16 (FIG. 6). The foot lever is secured by a cotter pin, not shown, slipped into the bore 17 of the pin 13 (FIG. 5). The lugs 15 and 16 (FIG. 6) of the foot lever 18 present two further holes 14 arranged so that a pin 20 can be slipped through the holes 14 as well as through the slot 6 of the slotted plate 11. The lower end of the column 7 is tapered to match better with a front skid bearing 8.

A front skid (FIG. 12), to which a bearing support 36 having two holes 40 is bolted by four screws 37, is pivoted to the column 7 by a stud bolt 38 slipped through the holes 40 and the front skid bearing 8. The stud bolt 38 is secured by a nut 39 (FIG. 13). The two side control levers 31 (FIGS. 10 and 11) are each provided at their rear ends with a rear skid bearing 32. Cylindrical bearing 34 is soldered to each side control lever 31 by means of an intermediate collar 30 consisting of a ring bent about two axes intersecting at right angles. After two collars 27 have been slipped over the ends of the transverse tube 3 and secured by cotter pins in the holes 26 of the collars 27 and the transverse tube 3 (FIG. 4), the side control levers 31 are pivoted to the transverse tube 3 by means of the bearings 34. The levers 31 are secured in the axial direction of the transverse tube by two collars 28, which also are secured by cotter pins slipped through the holes 29 of the collars 28 and the transverse tube 3.

The rear skids 41 each present a bearing support 42 fixed by four screws 43. To fix the rear skids 41 to the levers 31, a stud bolt (not shown) is slipped through the holes 44 of the bearing support 42 and the skid bearing 32 of the lever 31 and secured by a nut. The bearing supports 42 of the rear skids 41 cause the skids to rest on the ground with an inward tilt of about 10° (FIGS. 3, 15). The rear skids 41 each present a hole 52 (FIG.

16). Over each of these holes **52**, a spring bush **47** is fixed by screws **48** (FIGS. **16**, **17**). Slipped over the spring bush **47** is a compression spring **49**, which projects beyond the top of the spring bush **47** (FIG. **16**). The projecting spring end rests against a spring plate **50** on which rests the head of a spike **51**. This spike **51** is slipped into the spring bush **47**, and its end extends into the hold **52** of the rear skid **41**. A force P acting on the spike head is transmitted through the spring plate **50** to the compression spring **49**. The hole **52** in the rear skid **41** is so arranged that the spike **51** need only move a minimum distance to the ground, despite the tilt of the skid (FIG. **17**).

The vehicle operator controls the foot lever **18** with his feet. When he presses the left end of the foot lever (FIG. **7**), the pin **20** moves clockwise on a circular path and entrains the slotted plate **11**, sliding in the slot **6**, so that the bush **9** and, with it, the column **7** turn anticlockwise, i.e. to the left. This turning movement is transmitted by the front skid bearing **8** and the stud bolt **38** to the front skid **35**, which therefore swings to the left and thus imparts a transverse component to the vehicle motion. Thus, by pressure of his left foot, the vehicle operator can make the vehicle swing to the left, and by pressure of his right foot, to the right, which corresponds to swivelling about the vertical axis of the vehicle.

Further, the operator holds with each hand the front end of a side control lever **31**. When he pulls one of the levers **31** towards him, the chassis lifts on that side and the vehicle thus tilts about its longitudinal axis. This permits the operator to keep a tilted position in a bend (turn) or transverse a slope. The effort which the operator must apply for the purpose is the smaller, the higher the lever **31** is raised, or the farther back the bearing **34** is fitted, i.e. the greater the lever between bearing **34** and hand is. The maximum lift of the chassis corresponds to the distance of the bearing **34** from the skid bearing **32**. To offset unevenness of the ground, for instance, the vehicle chassis can be lifted or lowered at the rear by simultaneous operation of the two side control levers **31**, — a movement corresponding to a tilt about the transverse axis of the vehicle.

To slow down the vehicle, the operator pushes the levers **31** downwards until they rest on the spikes **51**, so that the rear of the vehicle moves down and the levers **31** impart a weight component of chassis and operator to the spikes **51**. The compression spring **49** and the spring plate **50** are so dimensioned that this pressure is not yet sufficient to press the spikes **51** into the ground. But if the operator now presses the levers **31**, the combined force will be sufficient to compress the spring **49** accordingly. As a result, the spike **51** is pressed through the hole **52** in the rear skid **41** into the ground. When the operator pulls the lever **31** towards him again, the spike **51** is relieved and returned to its home position by the compression spring **49**. This braking action can be applied on both sides or on one side.

Instead of having skids, the vehicle may be provided with wheels **72**. As shown in FIG. **21**, the braking action in this case may be applied by means of a linkage **70**, a brake lever **71** and a conventional braking device such as is common on bicycles.

To reduce the effort required to lift the rear of the vehicle, gearing may be interposed, as shown in FIG. **22**. In this case, the side control lever **31** is replaced with an operating lever **56**. The latter is supported by a pin **57** on the chassis. The pivoted end of the lever **56** presents a toothed segment **58**. A lifting arm **59**, whose end is also pivoted on a pin **60** on the chassis, presents at that end a toothed segment **61** which meshes with the toothed segment **58**. When the operator pulls the lever **56** towards him, the toothed segment **58** turns anticlockwise about the pin **57** (FIG. **22**), and so the tooth segment **61** turns clockwise about the pin **60**. As a result, the lifting arm **59** is moved downwards.

The vehicle may instead be so designed that the front travelling unit forms the twin travelling assembly while the single travelling unit forms the rear travelling unit. In this case, the front travelling units can be lifted and lowered independently or singly by side control levers, for instance, and the rear travelling unit can be swung about its vertical axis by a foot lever and cable pulls, for instance.

Instead of being T-shaped, the chassis may be triangular, which does not basically change the construction of the vehicle. All variants of the vehicle can be cased. FIGS. **18**, **19**, **20** show a simple casing of the vehicle according to FIG. **1**. The casing consists of two sections. The bottom section **80** is bolted to the longitudinal tube **2** and the transverse tube **3** (both indicated) by means of pipe collars **83**. The nose of the vehicle is closed by a top casing section **81** bolted to the bottom casing section **80** by screws **82**.

Instead of having skids or wheels, the vehicle may have crawler tracks or floats, for instance. The drive may be by an external force, such as gravity, traction, wind, or by a fitted motor or by muscle power. The control effort may be provided by muscle power and/or servomotors.

In conclusion, it is pointed out that such a vehicle may readily be used as a popular sports appliance, which would be in keeping with the object of early familiarizing as many people as possible with different control functions such as are common in aircraft.

The expression "travelling unit" can be replaced by "undercarriage" or "alightning gear." Instead of "side control," "lateral control" may be used. "Rear Skid" also means "lateral skid."

It will be obvious to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown in the drawings and described in the specification.

What is claimed is:

1. In a vehicle for developing a drivers's coordination of various controls and capable of motion about the longitudinal, transverse and vertical axes thereof, said vehicle comprising (a) a frame including a longitudinal member and a transverse member, (b) at least three individually controllable surface engaging members connected to said frame, (c) at least one seat disposed between two of said surface engaging members and fixed with respect to said frame, (d) at least one control lever means for raising and lowering at least one of said surface engaging members with respect to said frame for effecting a turning of said vehicle about at least one of said surface engaging members with respect to said frame for effecting a turning of said vehicle about at least one of said axes, (e) steering means connected to at least one of said surface engaging members for causing said surface engaging member to rotate about a vertical axis to effect a motion of said vehicle about said vertical axis when moving, the improvement wherein:

said control lever means comprises a single rigid bar having one free end constituting a hand grip and having a second free end pivotally connected to one of said surface engaging members, and wherein said bar is pivotally connected to said transverse frame member at a point on said bar closer to said surface engaging member end than to said hand grip end; and further including

braking means for braking said vehicle in response to motion of said control lever means, said braking means comprising a braking pin connected to said surface engaging member, and spring means urging said pin out of engagement with the surface whereby contact of said rigid bar of said control lever means with said pin forces said pin into engagement with the surface.

2. A vehicle in accordance with claim **1** wherein said steering means comprises:

a foot lever pivotally connected to said longitudinal frame member;

means connected to said foot lever for causing said surface engaging means to turn in a direction opposite to the direction of pivot of said foot pedal; and

means therein for limiting the angular range through which said surface engaging member may be turned.

3. A vehicle in accordance with claim **1**, wherein said steering means comprises:

a foot lever having a lug integrally attached thereto;

a first pivot pin pivotally connecting said lug to said frame;

a connecting member connected to said surface engaging means at one end and pivotally connected to said frame at the other end;

a slotted plate fixedly connected to said connecting member and having a slot therein;

a second pivot pin pivotally connected to said lug and slidingly connected to said slotted plate within said slot;

whereby the length of angular motion of the slotted plate about said pivot point is limited by the length of said slot.

4. A vehicle in accordance with claim **1** wherein said surface engaging members are skids.

5. A vehicle in accordance with claim **1** wherein said surface engaging members are wheels.

6. A vehicle in accordance with claim **1** wherein said surface engaging members are floats.

7. In a vehicle for developing a driver's coordination of various controls and capable of motion about the longitudinal, transverse, and vertical axes thereof, said vehicle comprising (a) a frame including a longitudinal member and a transverse member, (b) at least three individually controllable surface engaging members connected to said frame, (c) at least one seat disposed between two of said surface engaging members and fixed with respect to said frame, (d) at least one control lever means for raising and lowering at least one of said surface engaging members with respect to said frame for effecting a turning of said vehicle about at least one of said axes, (e) steering means connected to at least one of said surface engaging members for causing said surface engaging member to rotate about a vertical axis to effect a motion of said vehicle about said vertical axis when moving, the improvement wherein said control lever means includes:

an operating lever pivotally connected at one end thereof to said frame and having a toothed segnemt at said pivoted end and having the other end thereof constituting a hand grip;

a lifting arm pivotally connected at one end thereof to said frame and having a toothed segment at said pivoted end intermeshing with said toothed segment of said operating lever, and having the other end thereof pivotally connected to said surface engaging member;

whereby the pivoting of said operating lever causes the pivoting of said lifting arm thus raising and lowering said surface engaging member with respect to said frame.

8. A vehicle in accordance with claim **7** wherein said steering means comprises:

a foot lever pivotally connected to said longitudinal frame member;

means connected to said foot lever for causing said surface engaging means to turn in a direction opposite to the direction of pivot of said foot pedal; and

means therein for limiting the angular range through which said surface engaging member may be turned.

9. A vehicle in accordance with claim **7** wherein said steering means comprises:

a foot lever having a lug integrally attached thereto;

a first pivot pin pivotally connecting said lug to said frame;

a connecting member connected to said surface engaging means at one end and pivotally connected to said frame at the other end;

a slotted plate fixedly connected to said connecting member and having a slot therein;

a second pivot pin pivotally connected to said lug and slidingly connected to said slotted plate within said slot;

whereby the length of angular motion of the slotted plate about said pivot point is limited by the length of said slot.

10. A vehicle in accordance with claim **7** wherein said surface engaging members are skids.

11. A vehicle in accordance with claim **7** wherein said surface engaging members are wheels.

12. A vehicle in accordance with claim **7** wherein said surface engaging members are floats.

13. In a vehicle for developing a driver's coordination of various controls and capable of motion about the longitudinal, transverse, and vertical axes thereof, said vehicle comprising (a) a frame including a longitudinal member and a transverse member, (b) at least three individually controllable surface engaging members connected to said frame, (c) at least one seat disposed between two of said surface engaging members and fixed with respect to said frame, (d) at least one control lever means for raising and lowering at least one of said surface engaging members with respect to said frame for effecting a turning of said vehicle about at least one of said axes, (e) steering means connected to at least one of said surface engaging members for causing said surface engaging member to rotate about a vertical axis to effect a motion of said vehicle about said vertical axis when moving, the improvement wherein said steering means comprises:

a foot lever having a lug integrally attached thereto;

a first pivot pin pivotally connecting said lug to said frame;

a connecting member connected to said surface engaging means at one end and pivotally connected to said frame at the other end;

a slotted plate fixedly connected to said connecting member and having a slot therein;

a second pivot pin pivotally connected to said lug and slidingly connected to said slotted plate within said slot;

whereby the length of angular motion of the slotted plate about said pivot point is limited by the length of said slot.

14. A vehicle in accordance with claim **13** further including:

braking means for braking said vehicle in response to motion of said control lever means said braking means comprising a braking pin connected to said surface engaging member, and spring means urging said pin out of engagement with the surface whereby motion of said control lever means forces said pin into engagement with said surface.

15. A vehicle in accordance with claim **13** wherein said surface engaging members are skids.

16. a vehicle in accordance with claim **13** wherein said surface engaging members are wheels.

17. A vehicle in accordance with claim **13** wherein said surface engaging members are floats.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,759,537 Dated September 18, 1973

Inventor(s) Hermann Schreiber

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, item [57] of the cover page, line 2, after "least" insert --three--

Column 4, lines 61-63 (claim 1), delete "surface engaging members with respect to said frame for effecting a turning of said vehicle about at least one of said".

Signed and sealed this 9th day of July 1974.

(SEAL)
Attest:

McCOY M. GIBSON,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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