United States Patent

[11] **3,568,787**

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[33] **France**
[31] **135553**

[54] **TRACTOR FOR A SKIER**
14 Claims, 19 Drawing Figs.

[52] **U.S. Cl.** **180/5,** 180/9.24
[51] **Int. Cl.** **B62m 27/02**
[50] **Field of Search** 180/5, 9.22, 9.24

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Primary Examiner—Richard J. Johnson
Attorney—Waters, Roditi, Schwartz & Nissen

ABSTRACT: A tractor for a skier comprises a motor supporting a driving pulley around which passes an endless crawler belt which in turn passes on a guide pulley adjustably supported on a frame rail attached to the motor for tensioning the belt. The frame rail supports rollers which guide the lower run of the belt, said frame rail being dismantleable or foldable to enable transport of the tractor. Footrests on either side of the tractor are pivotably supported on a bar on the frame rail and stabilizer arms extend rearwardly of the footrests and are resiliently urged into contact with the ground for enabling the skier to shift his weight toward one or the other of the footrests and respective stabilizer arm to thereby steer the tractor.

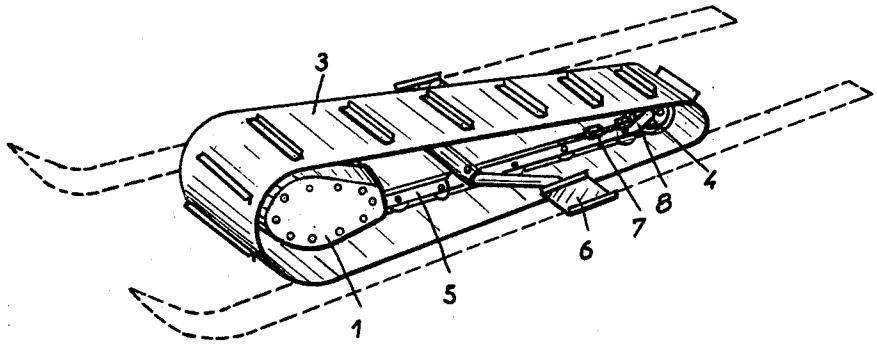


Fig.1

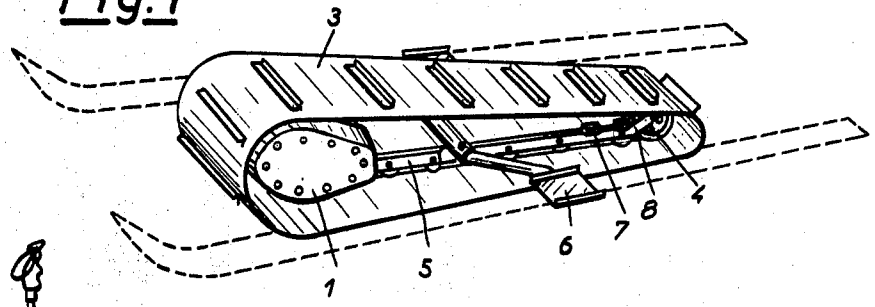
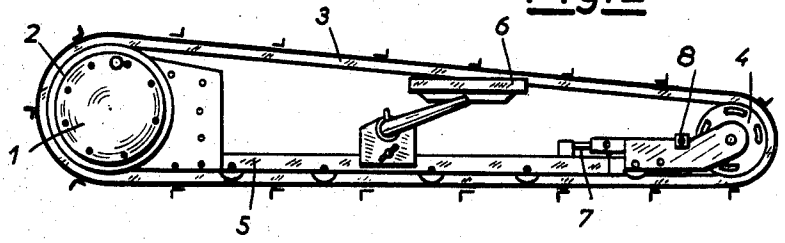


Fig.2



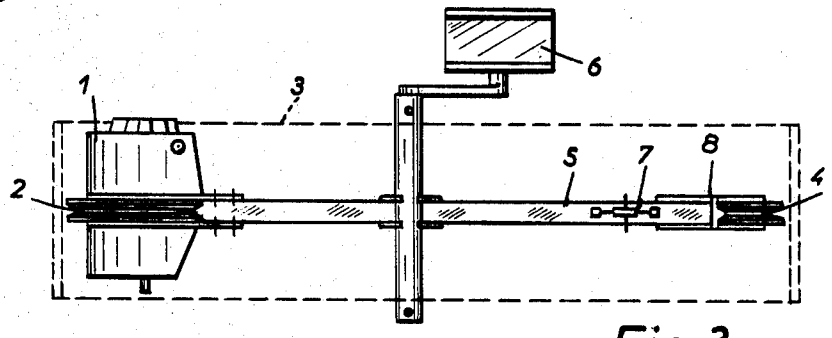


Fig.3

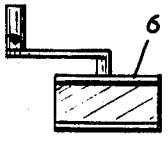
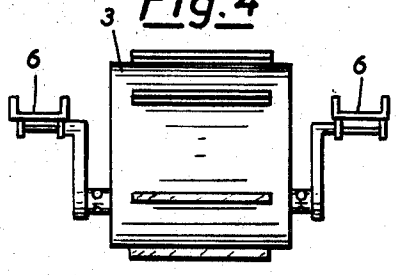


Fig.4



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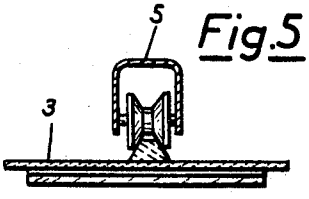


Fig.6

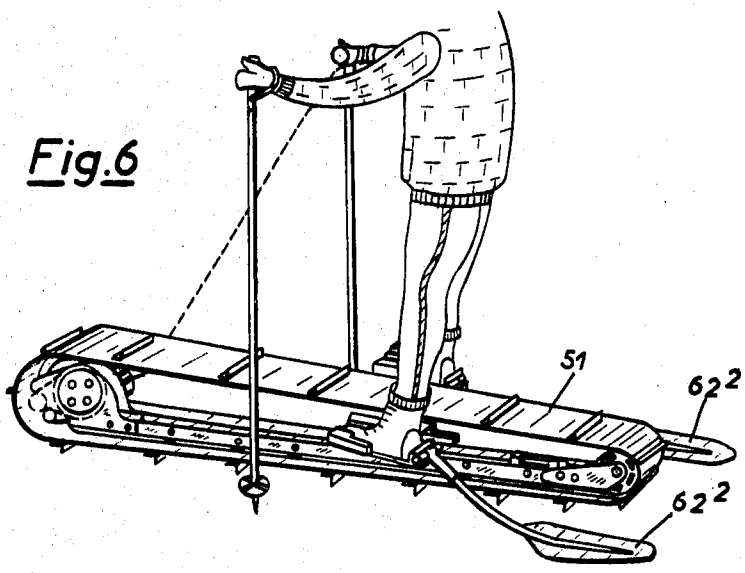
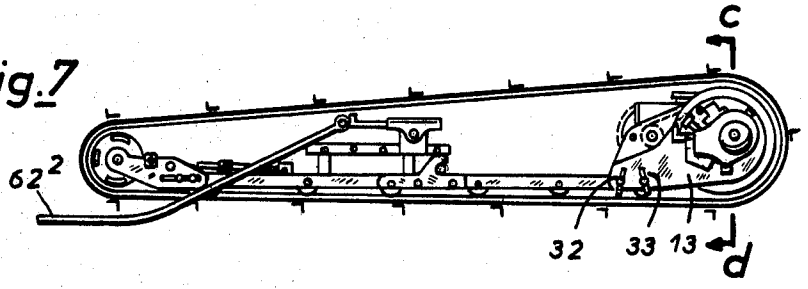
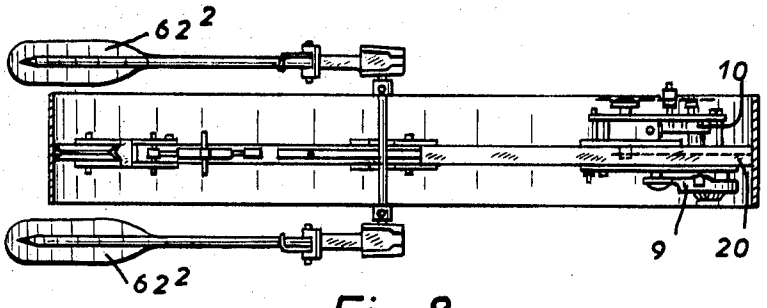


Fig.7





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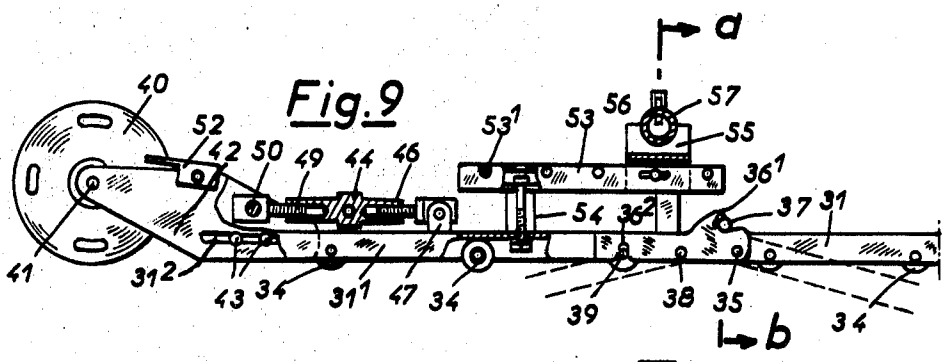


Fig.9

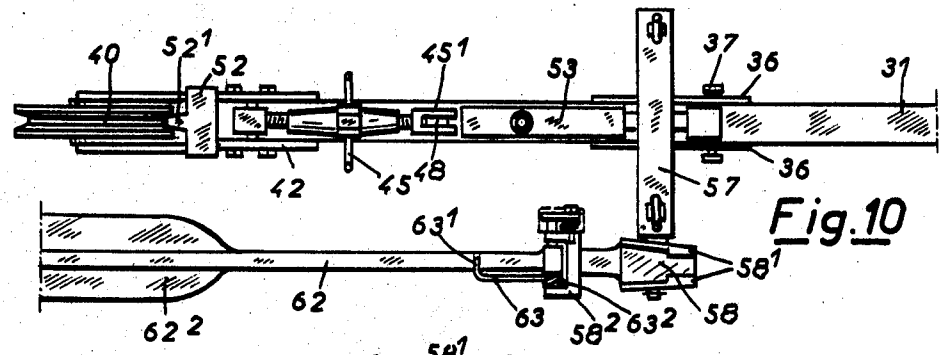


Fig.10

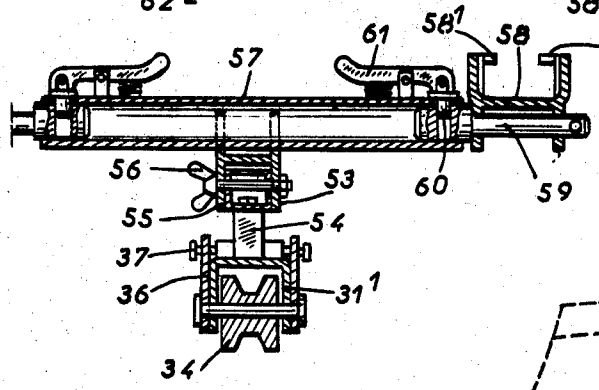


Fig.11

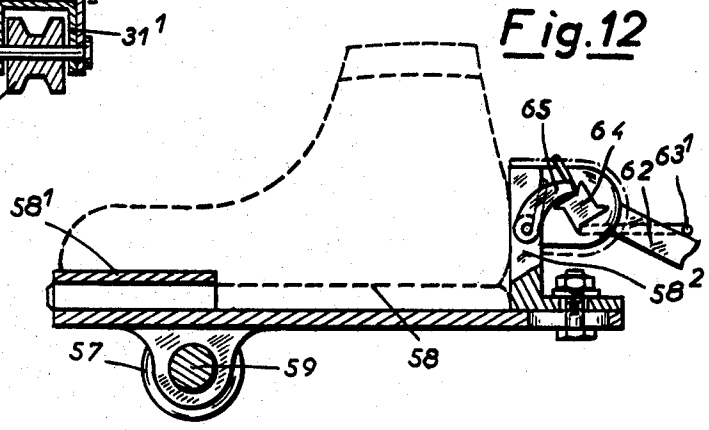


Fig.12

Fig.13

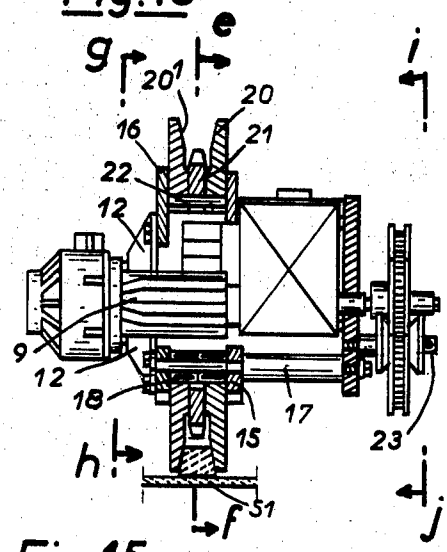


Fig.14

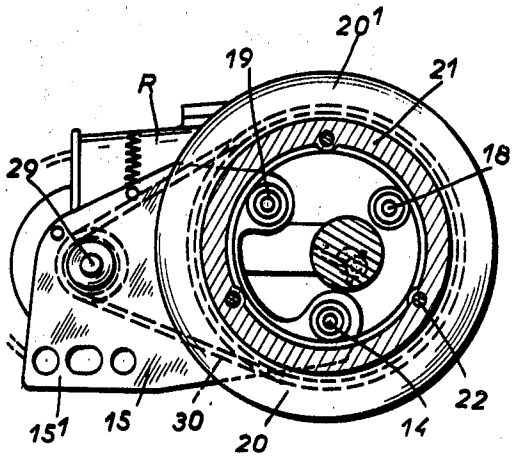
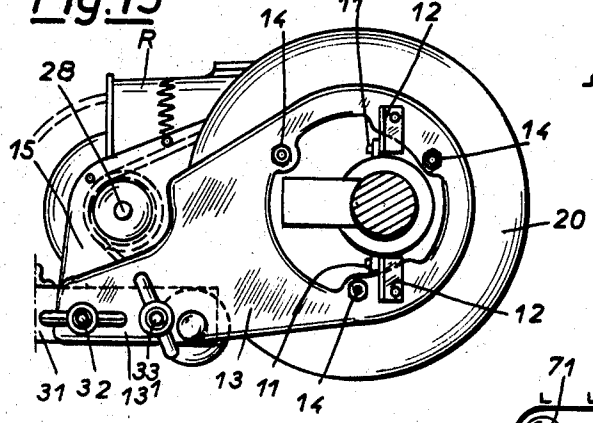


Fig.15



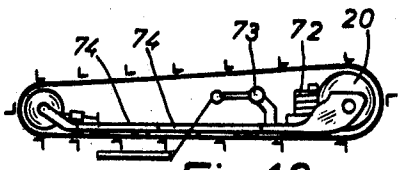


Fig.18

Fig.16

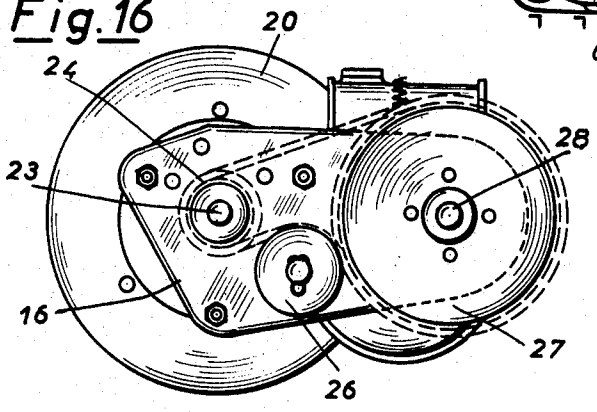
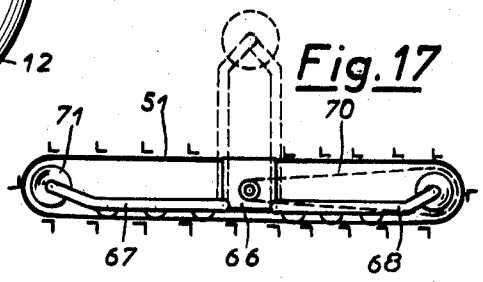


Fig.17



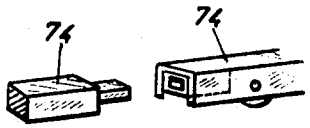


Fig.19

TRACTOR FOR A SKIER

BRIEF SUMMARY OF THE INVENTION

The invention relates to a small individual tractor of the track-layer or crawler type, adapted for carrying a skier up slopes covered with snow.

It is an object of this apparatus to provide a tractor which leaves the skier completely independent and the range of action of the tractor is limited only by its fuel capacity.

The apparatus is sufficiently light in weight to be carried on the back of the skier when traveling either downwardly or on flat terrain.

In accordance with the invention, there is provided a tractor which comprises a motor, a driving pulley driven by said motor and mounted thereon, and endless crawler belt in driving engagement with said driving pulley; an articulated frame rail supported from said motor and extending longitudinally of the tractor, a plurality of rollers on said frame rail for guiding a lower run of the crawler belt; an adjustable support mounted rearwardly of the frame rail, a guide pulley on said adjustable support engaging said belt; a tensioning means for displacing the support to tension the belt, a support bar mounted above the frame rail, a footrest on either side of the belt supported from said support bar for pivotal movement about a transverse axis.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatic perspective view of an individual tractor;

FIG. 2 is a side elevational view of the tractor;

FIG. 3 is a plan view of the tractor, the crawler arrangement having been removed and shown in dotted outline;

FIG. 4 is an elevation view of the tractor from the front thereof;

FIG. 5 is a cross-sectional view taken perpendicular to the track-laying arrangement and to the roller frame;

FIG. 6 is a perspective view showing the use of a track-laying tractor according to one embodiment;

FIG. 7 is an elevation view of the tractor in FIG. 6;

FIG. 8 is a plan view of the tractor of FIG. 7;

FIG. 9 is a side view, drawn to a larger scale, of the rear end of the tractor;

FIG. 10 is a plan view, partially in section, of the rear end of the tractor of FIG. 9;

FIG. 11 is a cross section taken along line *a—b* of FIG. 9;

FIG. 12 is a view in longitudinal section taken through a footrest of the tractor;

FIG. 13 is a cross section taken along line *c—d* of FIG. 7;

FIG. 14 is a view in section taken along the line *e—f* of FIG. 13;

FIG. 15 is a view in section taken along the line *g—h* of FIG. 13;

FIG. 16 is a rear elevation view taken along line *i—j* of FIG. 13;

FIG. 17 is a diagrammatical elevation view of a tractor according to one embodiment, with a chassis rail formed by pivoting and hingeable arms;

FIG. 18 is a diagrammatical elevation view of a tractor according to a variant having a chassis rail in the form of elements adapted to be interengaged end to end; and

FIG. 19 is a perspective view of a detail of the tractor of FIG. 18.

DETAILED DESCRIPTION

Referring to the drawing, therein is seen a tractor vehicle for a skier which comprises an internal combustion engine 1 provided with gear box, a centrifugal clutch and an appropriate speed-reducing means driving a hollow, grooved drive wheel 2 (FIG. 2) which engages a central belt 3' (FIG. 5) of the driving crawler 3.

The motor propulsion unit is disposed in the center of the hollow drive wheel 2, which is in the form of an annulus mounted on three pivots (as will be explained more fully in connection with a later embodiment), thus making it possible to arrange in extremely compact fashion the drive means in such a manner as to achieve a saving of space which is indispensable for a machine of this kind.

It is important to point out that the motor may be arranged, as desired, either at the front or rear of the tractor.

The driving crawler or track 3 is constructed in accordance with French Pat. No. P.V. 100,903, in the name of the same Applicant. The crawler is adapted for limited transverse oscillation relative to its longitudinal central axis and it includes the central belt 3' which is of trapezoidal shape, as shown in FIG. 5. The single central belt of the said crawler 3 is wound rearwardly about a takeup pulley 4 which is grooved and mounted for free rotation on a shaft. A screw-type tensioning system 7 secures the pulley 4 in such manner as to impart appropriate tension to the crawler 3. The crawler 3 is supported and guided over its entire path of travel at the lower portion of the apparatus by means of a frame rail 5 having rollers mounted for free rotation on their pivots and conforming to the trapezoidal profile of the central belt 3' of the crawler 3, as shown in FIG. 5.

Laterally, on either side of the apparatus, are secured footrests 6 in the form of stirrups in which the skis are secured. The footrests 6 are articulated by means of a crank C, in such manner that they are able to move freely in a vertical plane and they can be locked at a selected height with the aid of a pin inserted in an aperture, or alternatively by any other system of locking, in such manner as to enable the skier to adjust the height of said stirrups relative to the apparatus, depending on the state of the snow and track requirements.

The frame rail 5 with the rollers, is dismantleable, so that it becomes possible to reduce the apparatus to a few elements or members of small dimensions, as can be readily transported in a bag provided for that purpose.

The throttle control of the motor 1 is effected, as shown in FIG. 2, by means of a cable contained in a flexible sheath and manipulated with the aid of a small trigger secured to the skier's pole.

Finally, there are provided anti-ice pins, constituted by pointed metallic blades 8 for the purpose of breaking any ice accumulating in the grooves of pulleys 2 and 4.

In the embodiment illustrated in greater detail in FIGS. 6 to 16, the individual tractor is provided with an internal combustion motor 9 secured to a speed-reducing gearing means 10 and constructed in known manner. The motor 9 enables, through the agency of transverse lugs 11 on its block cylinder (FIG. 15), securing of supports 12 arranged diametrically to permit assembly with the aid of bolts or the like of a lateral flange 13 formed with an aperture for the free passage of the block.

The flange 13 is rearwardly prolonged in such manner as to form a securing lug 13^1.

Surrounding the opening in the flange 13 are three bosses which are disposed to permit the securing, by nuts or the like, of transverse rods 14 adapted on the one hand to permit the assembly of an intermediate flange 15 of U-shape, the rear end of which constitutes a securing lug 15^1 (FIG. 14) and also of a rear flange 16 disposed against the outer face of the motor 9 and of the speed-reducing means 10.

Spacer tubes 17, centered on the rods 14, maintain the flanges 15 and 16 with the desired spacing, whereas further spacer members 18 interposed between the intermediate flange 15 and the flange 13 also facilitate assembly and form external bearing faces for the free rotation of rollers 19.

A driving pulley 20, in the form of an annular member, is lodged between the flanges 13 and 15, and is circularly centered for rotation on the rollers 19 which are arranged concentrically relative to the transverse axis of the motor 9, in such manner as to achieve satisfactory equilibrium.

The driving pulley 20 coaxially accommodates between the cheeks thereof a median toothed annulus 21 secured by rivets 22, or in other suitable manner, and the toothing of which emerges circularly and in recessed fashion in the trapezoidal groove 20^1 in pulley 20, which also receives the trapezoidal, central belt of the driving crawler.

An output shaft 23 of the speed-reducing means 10 extends externally of flange 16 and a pinion 24 is mounted on shaft 23 to drive, with a given reduction ratio and through the intermediary of an endless chain 25 and a tensioning roller 26, a toothed wheel 27. The wheel 27 is mounted on a support shaft 28 which extends successively through flange 16 and intermediate flange 15.

This shaft 28 supports a control pinion 28 in the vertical plane of the driving pulley 20, the control pinion 29 driving, through the agency of an endless chain 30, the median toothed annulus 21 of the driving pulley 20.

These oppositely positioned transmission systems arranged on the flanges, enable the achievement of a double reduction ratio for the driving of the driving pulley 20 from the output shaft 23.

It should also be noted that the flanges 15 and 16 enable the mounting between them of a fuel tank R (FIG. 15).

As seen in FIG. 15, the flanges 13 and 15 engage, through the agency of their respective securing lugs 13^1 and 15^1, the lateral faces of a forward element 31 of a frame rail, and bolts 32 and 33 provide for the assembly of the arrangement.

The frame rail comprises two elements 31 and 31^1 disposed in alignment and articulated in end to end relation through the intermediary of a hinge. These similar elements permit, by means of their U-section, the mounting of a plurality of projecting rollers 34 supported for free rotation on respective pivots. The rollers 34 have grooves for receiving and guiding the central belt of the crawler track.

As seen in FIG. 11, the front element 31 is articulated about a shouldered pivot 35 forming a spacer member relative to two lateral plates 36 constituting the hinge and formed in their upper portions with two inclined notches 36^1 (FIG. 9). A transverse bar 37 secured to the upper portion of the end of the element 31 engages, when the elements 31 and 31^1 are aligned, in notches 36^1 and abuts, at the end of travel, in the latter so as to ensure positioning and alignment.

At the opposite side, the rear element 31^1 is articulated in the same manner about a spacer pivot 38 connecting the plates 36, whereas its horizontal positioning and abutment are effected by the projecting portions of the articulation pivot 39 of the roller 34 associated therewith and engaging in the vertical notches 36^2.

This double articulation arrangement permits the folding of the elements 31 and 31^1, as shown by the broken lines in FIG. 9, during transport.

The rear element 31^1 supports a grooved pulley 40 at its end, said pulley 40 being mounted for free rotation about a pivot 41 connecting the flanges of an adjustable support 42.

The support 42 is slidably mounted on the element 31^1 by means of bolts 43 extending through longitudinal slots 31^2 formed in element 31^1.

A rotary tensioning means 44 controlled by a pin 45 has ends with threaded bores of opposite pitch which are respectively engaged on the one hand to a screw-threaded rod 46 secured to a yoke 45^1 articulated through the intermediary of a pivot 47 to a lug 48 fast with the upper portion of the element 31^1, and on the other hand, on the opposite rear side to a rod 49 of opposite pitch secured in a block which is articulated about a pivot 50 supported in the flanges of the support 42.

By manually rotating the tensioning means 44, it becomes possible to longitudinally displace the support 42 and the pulley 40 thereon, so as to enable the tensioning of the central belt of the crawler 51 which is designed and mounted as previously indicated.

It should be noted that a plate 52 secured to the upper portion of the support flanges 42 includes a profiled finger 52^1 for engagement in the groove of the pulley 40 in such manner as to break any ice accumulating in the said groove. A similar plate (not shown) is also disposed opposite the groove in the drive pulley 20.

The opposite end of the rear element 31^1 carries, at its upper portion, a support bar 53 mounted longitudinally above element 31^1 through the intermediary of spacer bolts 54. The support bar 53 is transversely perforated with apertures 53^1 to permit the straddling and securing of an adjustable support flange 55 in a selected longitudinal position by the engagement of a bolt 56 through one of the apertures 53^1. The support 55 has a transverse tube 57 secured thereto, preferably by welding.

A footrest is provided at each side of the tractor in the form of a plate 58 having a freely rotating base mounted on a pivot 59 engaged in one end of the transverse tube 57 and maintained in position therein by a stud 60 having a manipulating lever 61.

The said plate 58 has a forward U-shaped section with arms 58^1 sloping symmetrically and being folded at their upper portion in such manner as to form claws permitting the engagement and vertical retention of the sole of a user's boot, whereas the heel abuts rearwardly against adjustable member 58^2 with a flat face, as shown in FIG. 12.

The plate 58 may also be designed to directly receive a ski.

The member 58^2 of each plate 58 forms, on the side opposite arms 58^1, a horizontal flange for rotatably supporting a transverse pivot 62^1 rigid with the end of a stabilizing arm 62 terminating in a profiled palette 62^2 for abutment on the snow.

A coil spring 63, mounted on the pivot 62^1, bears through the agency of one of its arms 63^1 on the arm 62, whereas its opposite arm 63^2 abuts against the member 58^2 in such manner as to permit the establishment of a flexible connection between the plate 58 and the stabilizer arm 62.

Due to this arrangement, when the user is standing in position on the plates 58 and the tractor is driven, any irregularities in the profile of the terrain are "absorbed" by the springs 63 which thus constitute damping means for maintaining the said plates substantially at the same level.

However, in the case of very considerable depression, the sudden upward deflection of each stabilizer arm 62 is limited in its travel through the intermediary of a ratchet wheel 64 secured on the pivot 62^1 and the toothing of which cooperates with an articulated pawl 65 secured with the member 58^2, as illustrated in FIG. 12. This arrangement prevents any pronounced inclination of the boot sole which might cause the user to fall. Furthermore, the pawl 65 may readily be disengaged to permit, if necessary, the folding of the arm 62.

In the variant illustrated in FIG. 17, the motor 66 is disposed at the median portion of the "carriage", whereas the frame rail is constituted by two arms 67 and 68 which are symmetrically opposed and pivoted at their ends to said motor. One of the arms supports, at its end, a driving pulley 69 which is driven through the intermediary of an endless chain 70 or, alternatively, by a belt, cardan rods, a shaft with a deflection pinion, or by any other means. The opposite arm supports guide pulley 71 provided with a means for tensioning the belt of the crawler 51. This arrangement permits the folding, by turning up of the arms 67 and 68, as shown in dotted outline.

In a second variant illustrated in FIG. 18, the motor 72 directly supports sheath 73 receiving the stabilizing assemblies, as described, and the frame rail is constituted by a plurality of short elements 74 joined end to end as shown in FIG. 19 and secured by pins, bolts or the like.

The advantages of this individual, crawler or track-laying tractor for skiers are quite clear from the description and special emphasis is directed to the facility for dismantling the block motor relative to the frame rail and also the stabilizer assemblies. Furthermore, the frame rail is foldable, thus facilitating transport.

I claim:

1. A tractor adapted to be straddled by a skier, comprising a motor, a driving pulley driven by said motor and mounted

thereon, an endless crawler belt in driving engagement with said driving pulley; said endless crawler including a lower portion adapted for contacting the ground; an articulated frame rail supported from said motor and extending longitudinally of the tractor, a plurality of rollers on said frame rail for guiding a lower run of the crawler belt; an adjustable support mounted rearwardly of the frame rail, a guide pulley on said adjustable support engaging said belt; tensioning means for displacing the support to tension the belt, a transverse support bar mounted above the frame rail, and a footrest on either side of the belt supported from said support bar for pivotal movement about a transverse axis between selected fixed positions; the footrest being vertically spaced from said lower portion of said endless crawler to permit the skier to exert his weight toward one or the other of the footrests for tilting and thereby steering the tractor.

2. A tractor as claimed in claim 1 comprising stabilizer arms extending rearwardly from said footrests and springs means between said stabilizer arms and said footrests whereby the stabilizer arms are urged towards the ground for both stabilizing and steering the tractor.

3. A tractor as claimed in claim 1 comprising pivots on each footrest, a transverse tube mounted on said support and receiving said pivots, and means for removably securing said pivots in said tube.

4. A tractor as claimed in claim 1, wherein said motor is centrally located in said tractor, said frame rail including first and second portions pivotably connected to said motor and extending in opposite directions therefrom, said driving pulley being mounted on one of said portions, and means for driving the pulley from the motor.

5. A tractor as claimed in claim 1, wherein said support bar is directly supported from said motor, said frame rail comprising a plurality of dismantleable elements interconnected in end-to-end relation.

6. A tractor as claimed in claim 1 comprising spaced flanges secured to said motor, rollers supported from said flanges in circular array around the motor, said driving pulley being an annular member encircling said motor and rotatably carried on said rollers.

7. A tractor as claimed in claim 6, wherein said flanges are secured to said frame rail.

8. A tractor as claimed in claim 6, wherein said motor includes speed reducing means with an output shaft, a drive shaft supported by said flanges in concentric relation relative to said circular array of rollers, first transmission means coupling said output shaft and said drive shaft and second transmission means coupling said drive shaft and said driving pulley.

9. A tractor as claimed in claim 8, wherein said first and second transmission means include respective gears and chains with respective speed-reducing ratios, said driving pulley having a groove therein and a recessed toothing in said groove for drivingly engaging the chain of said second transmission means.

10. A tractor as claimed in claim 1, wherein said frame rail includes first and second sections hingeably joined together in axial alignment, said sections being foldable for transport and including means axially aligning and securing the sections together when they are unfolded.

11. A tractor as claimed in claim 10, wherein said adjustable support is mounted on one of said sections for axial displacement therealong, said tensioning means engaging said support and said one section.

12. A tractor as claimed in claim 11, wherein said tensioning means comprises a block having opposite ends with threads of opposite pitch therein, first bolt means secured to said adjustable support and threadably engaged with one of the threads in said block, said second bolt means secured to said one section and threadably engaged with the other of the threads in said block whereby turning of the block will produce relative movement of the adjustable support and the said one section.

13. A tractor as claimed in claim 1, wherein each said footrest comprises a profiled plate with a forward portion of U-shape for retaining the boot of a user and a rear member with a flat face against which the back of the boot can rest, a pivot on the back of said rear member, a stabilizer arm rotatably mounted on said pivot on the rear member and extending rearwardly thereof, spring means between said footrest and said stabilizer arm for urging the latter against the ground, and means for limiting upward movement of said stabilizer arm.

14. A tractor as claimed in claim 13, wherein said means for limiting upward movement of said stabilizer arm comprises a ratchet wheel mounted on said pivot and a pawl on said footrest engaging said ratchet wheel.