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Geyer

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[54] **T-BAR DELIVERY MECHANISM ON A TOW LIFT**

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[21] Appl. No.: **496,139**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 439,971, Feb. 6, 1974, which is a continuation of Ser. No. 277,392, Aug. 2, 1972, abandoned.

[30] **Foreign Application Priority Data**

Aug. 4, 1971 Germany 2138983

[52] **U.S. Cl.** ..... **104/173;** 272/56.5 SS

[51] **Int. Cl.** **B61b 7/04**

[58] **Field of Search** ..... 104/173, 18, 20, 25, 112, 104/115; 198/76, 84, 102; 272/32, 56.5 SS

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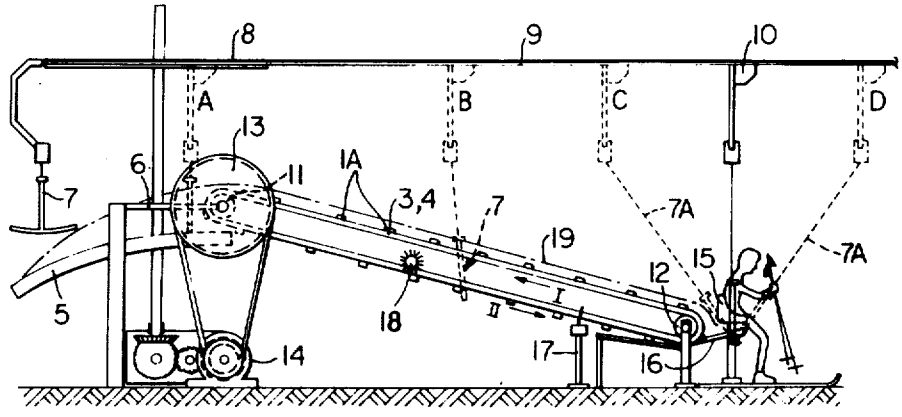
Assistant Examiner—Randolph A. Reese
Attorney, Agent, or Firm—Woodhams, Blanchard and Flynn

[57] **ABSTRACT**

A guide device for supplying a T-bar in the correct position to a skier. In association with a conventional T-bar ski lift, there is provided a guide unit having a pair of parallel conveyor belts whose lower courses travel in the same direction of movement as the adjacent portion of the ski lift. The pair of belts is positioned below and aligned with the lift so that the T-bar can be guided therebetween with the cross-bar of the T being carried along and guided by the lower courses of the belts. The lower course of belts travel at a faster speed than does the lift. The skier waits at the discharge end of the conveyor and the T-bar is thus presented to him in the correct position for engagement of his body and movement up the slope in a conventional manner. The T-bar arrives well before the corresponding position of attachment to the lift cable so that ample time is given to the skier to grab the T-bar. The device can be arranged for the usual two-person T-bar lift or can be arranged for a one-person lift.

17 Claims, 8 Drawing Figures



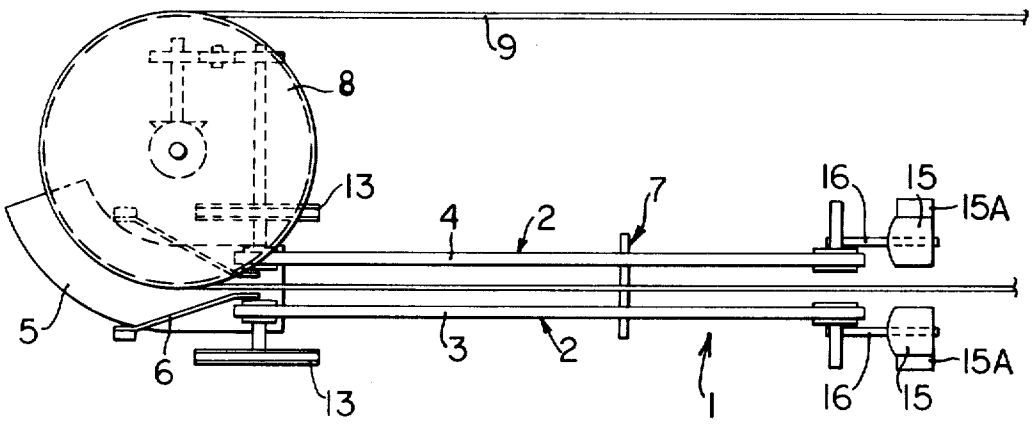

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FIG. 1

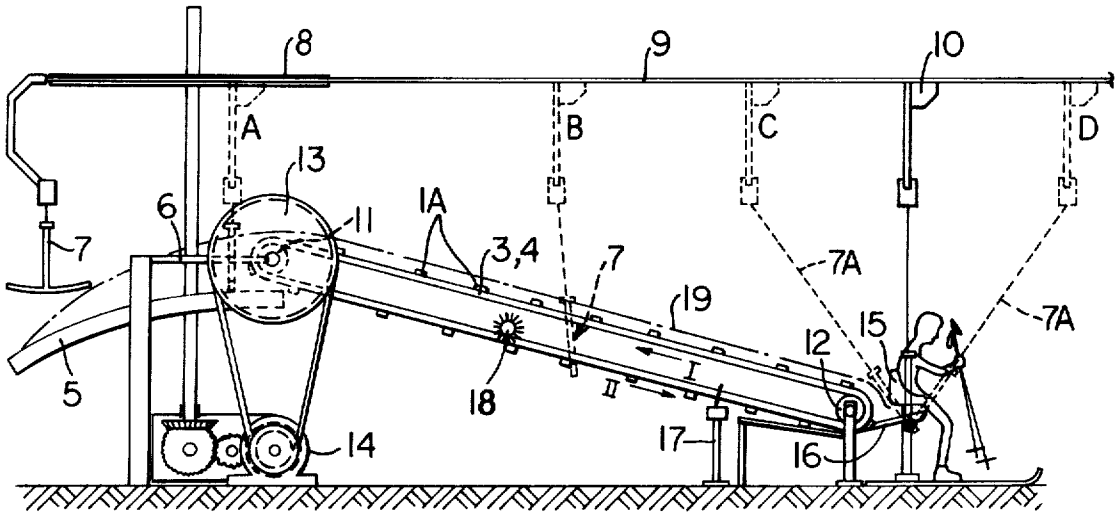
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FIG. 2

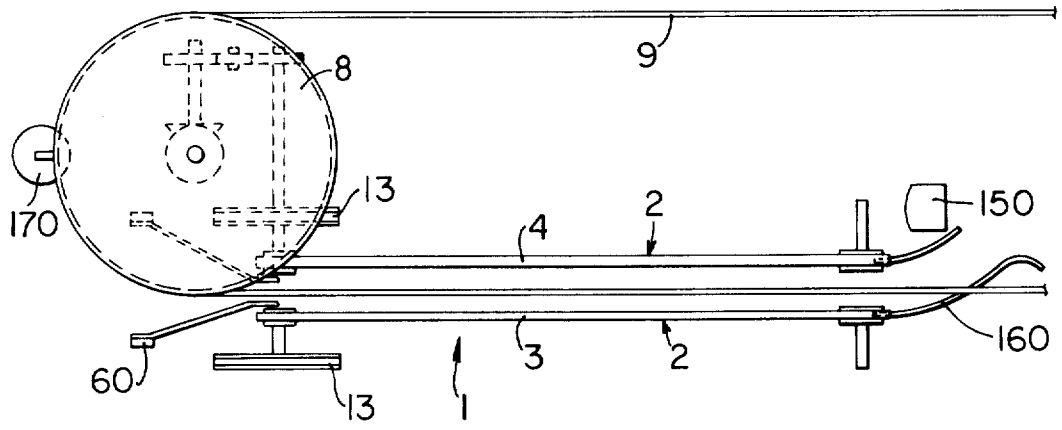
9
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FIG. 3

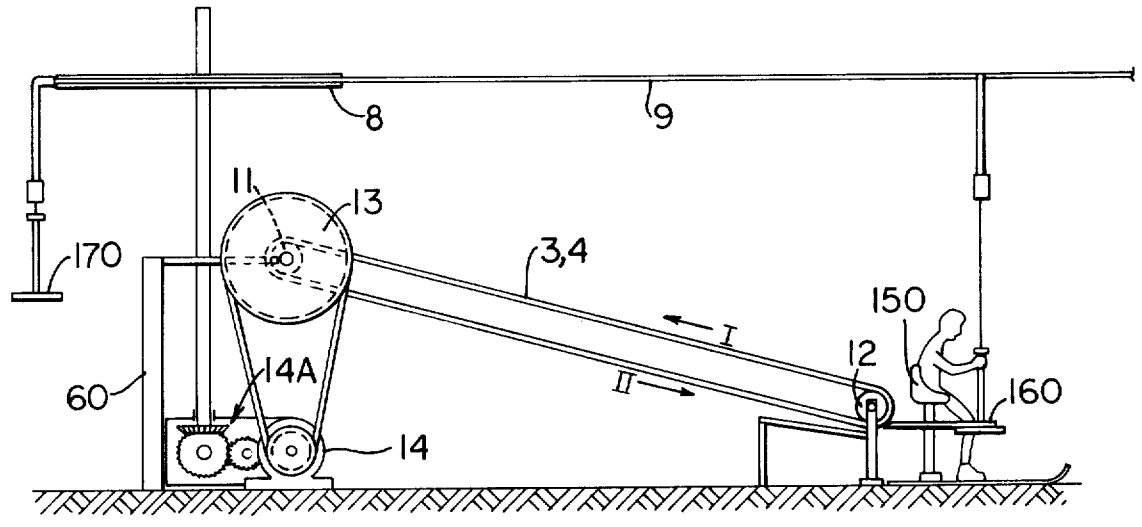
8
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FIG. 4

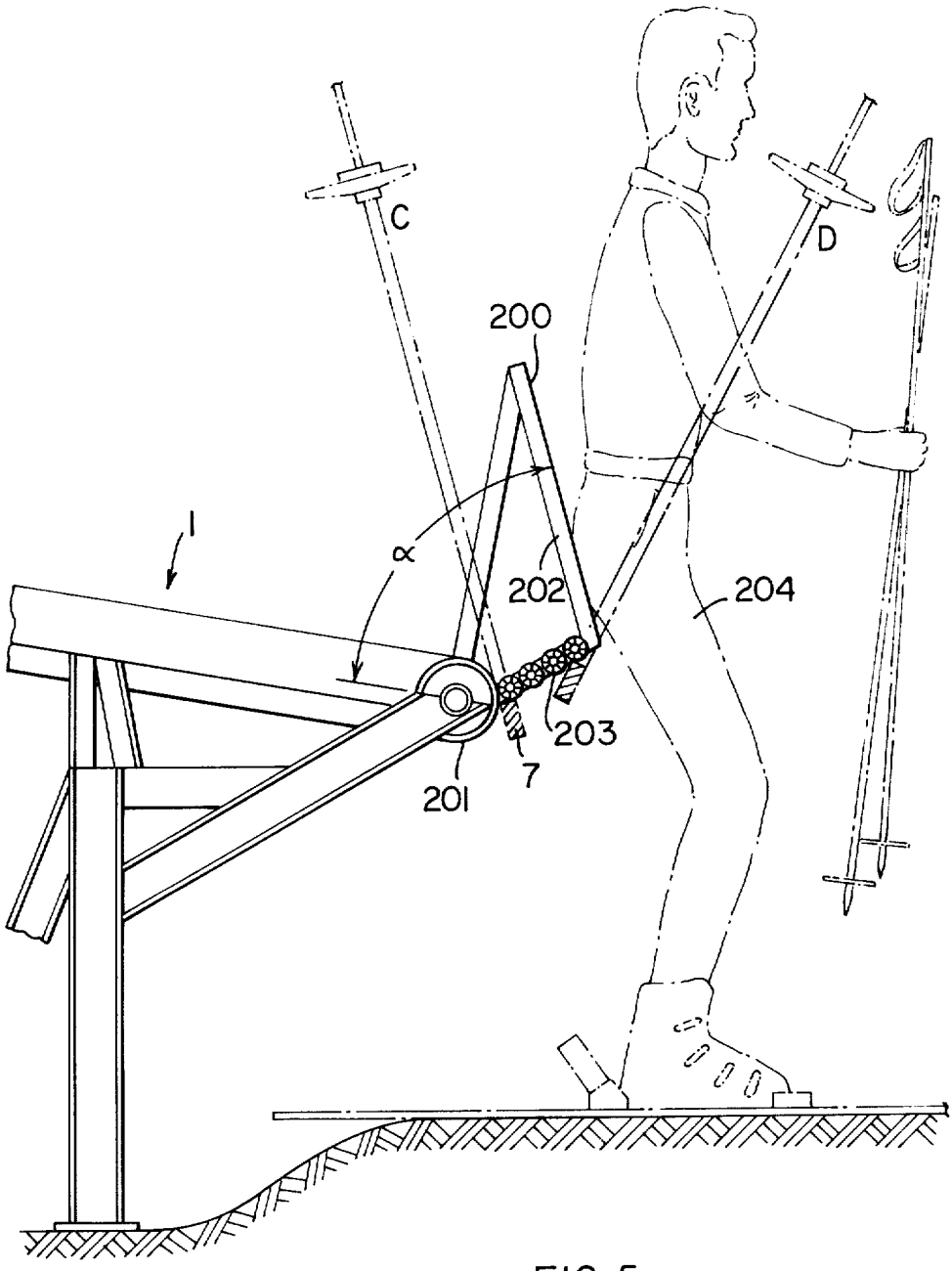

FIG. 5

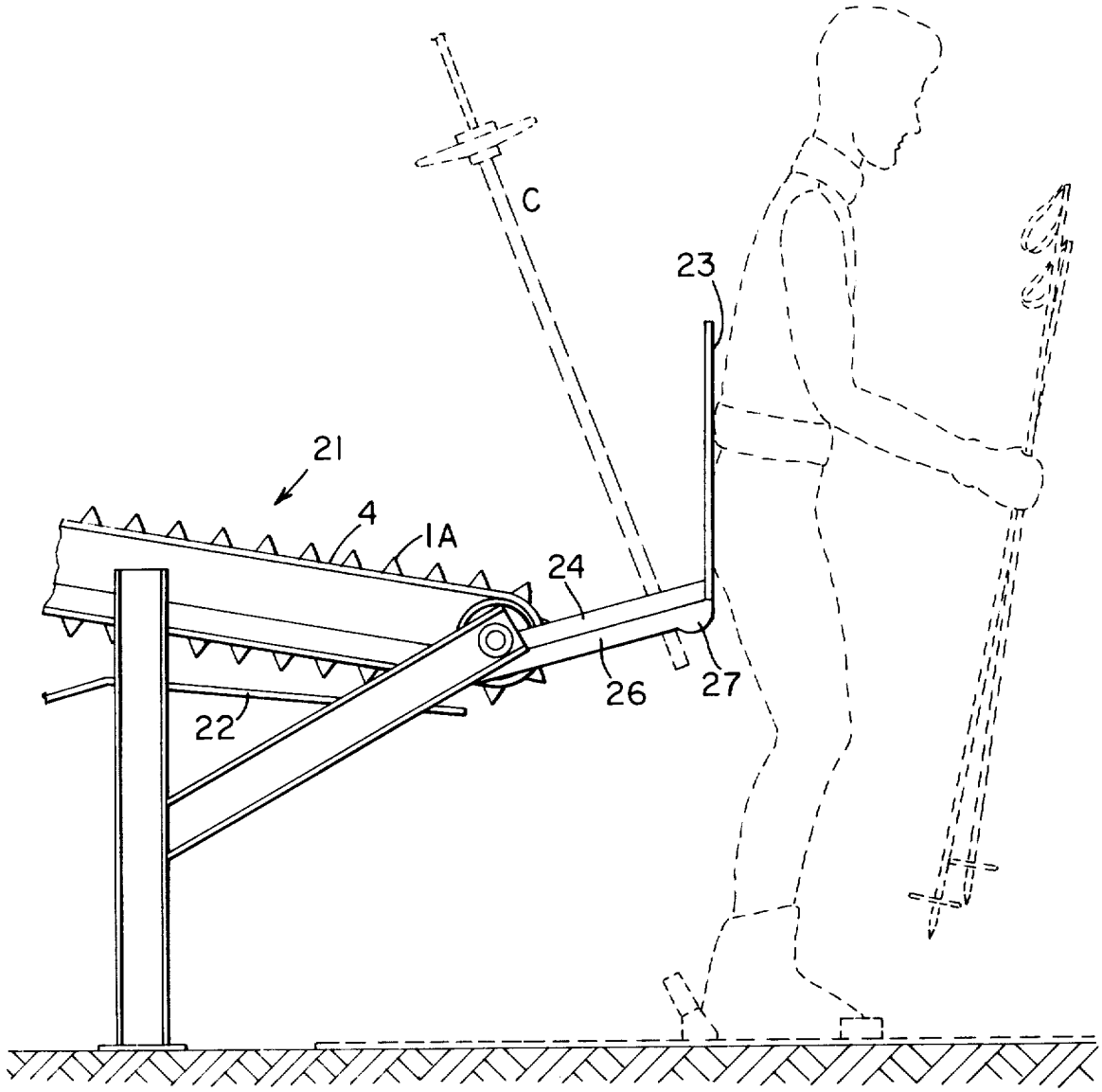

FIG. 6

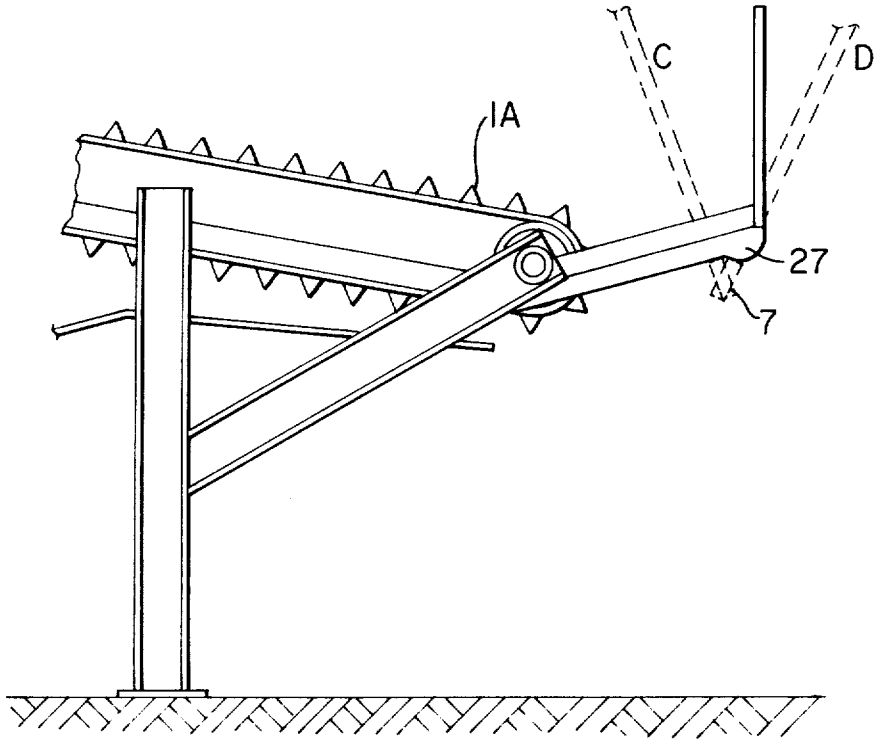

FIG. 7

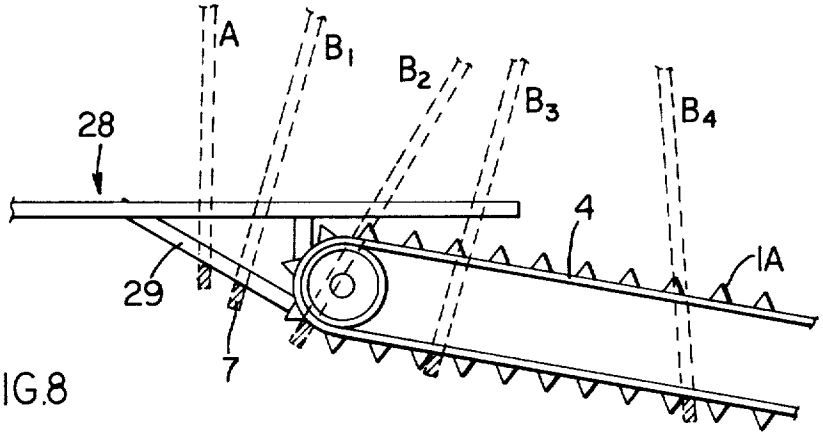

FIG.8

T-BAR DELIVERY MECHANISM ON A TOW LIFT

This application is a continuation-in-part application of Ser. No. 439,971, filed Feb. 6, 1974, which is a continuation application of Ser. No. 277,392, filed Aug. 2, 1972, now abandoned.

FIELD OF THE INVENTION

The invention relates to a T-bar delivery mechanism on a tow or ski lift, wherein a tow bar which is guided over a return roller is movably inclined downwardly into the discharge position by a conveyor belt device which runs in towing direction.

BACKGROUND OF THE INVENTION

In a known T-bar delivery mechanism of this type each tow bar is provided with a ferromagnetic member and the conveyor belt device is provided with an electromagnet. Thus each tow bar may be engaged at the upper end of the conveyor belt device and is guided downwardly inclined through a path which is into the discharge position at which point the skier is engaged by the tow bar. This known device is relatively complicated in structure due to the use of an electromagnet and each tow bar must additionally be provided with a ferromagnetic member. This is expensive and later installation on existing tow lifts is not possible. Further the use of an electromagnet is susceptible to mistakes and involves relatively high service expense. A further disadvantage is experienced in that the tow bars are moved to the discharge position along the upper course of the conveyor belt device which causes, for example, when it snows a deposit of snow on the tow bars.

The purpose of the present invention consists in producing a T-bar delivery mechanism of the type mentioned above which has a simple structure, can be installed at any time on an existing tow lift, assures full functional safety during operation and always presents the respective tow bars to the skiers in a constant manner.

This purpose is attained according to the invention in that the tow bar, which is oriented by a guide, can be moved from the lower end of the two-part conveyor belt device into the discharge position at which there is located at least one waiting seat. This results in the advantage that the tow bar is moved mechanically from the retracted position into the extended position. This eliminates the need for additional equipment on the tow bar and any tow lift can be equipped subsequent to installation with the conveyor belt device of the invention. The device is constructed very simply and operates safely under even unfavorable operating conditions.

According to a different characteristic of the invention the guide comprises an inclinedly positioned surface located below the return pulley. This guide assures that the tow bar is placed in an exactly predetermined manner on the conveyor belt device so that it properly engages the two skiers in the conveyor discharge position.

In a further development of the invention it is also possible to construct the guide as a guide channel with a slope inclined to the two-part conveyor belt device. Here too in a simple manner there is obtained an exact adjustment of the movement of the tow bar with respect to the upper end of the two-part conveyor belt device.

At the lower end of the two-part conveyor belt device, according to a further characteristic of the invention, there are arranged guide rails which lead to the waiting seats. These guide rails have the advantage that the T-bar does not hit the skiers with appreciable impact when they are sitting in the conveyor discharge position on the waiting seats.

In a further development of the invention the speed of the two conveyor belts of the two-part conveyor belt device is selected in such a manner with respect to the speed of the T-bars that in discharge position the tow bar is positioned at an angle to the tow cable inclined back away from the skier. A safe distance is maintained in which the bar can be retracted if no skier is positioned at the discharge position so that the T-bar will not be able to contact skiers in the next forward T-bar.

The conveyor belts are provided according to a different characteristic of the invention with cleats which lead the tow bar. Through this, the tow bars are accurately guided along and are properly presented to the skier in the conveyor discharge position.

At a selected distance in front of the lower end of the two-part conveyor belt device, according to a further characteristic of the invention, there is arranged an acoustic signal transmitter which can be operated by the respective tow bar. This signal transmitter is a safety measure so that the skiers are warned immediately by a short buzzing sound that the next tow bar will arrive shortly in the conveyor discharge position.

In the lower course of the conveyor belt device, according to a different characteristic of the invention a cleaning element may be arranged to free the tow bar from dirt or snow.

At a T-bar delivery mechanism for a one-man tow bar, according to a different characteristic of the invention, guide rails located at the lower end of the two-part conveyor belt device guide the tow bar to the lateral discharge position. Thus the skier positions himself only beside the discharge position and here receives the cross-bar, so that again, there is obtained a simple handling of the automatic T-bar delivery mechanism on the ski lift.

In a further development of the above characteristic, a waiting seat can be arranged in the conveyor discharge position so that the skier needs only to sit down in the waiting seat and then clamps the tow bar between his legs when same appears.

A guide rail can according to a further characteristic of the invention lead the tow bar parallel to the running direction which assures that when a given tow bar is not used same is, though empty, properly guided along in running direction up the hill.

According to a further characteristic of the invention, it is possible to heat the waiting seats to thus improve the comfort to the skier of the automatic T-bar delivery mechanism.

The drive of the two-part conveyor belt device is arranged at the upper end and can take place advantageously through an electric motor which drives the two conveyor belts through V-belt pulleys at a uniform speed. This requires only a very simple drive.

SUMMARY OF THE INVENTION

An improvement in a T-bar delivery mechanism for a ski lift having a return pulley mechanism for guiding a cable thereover and which has a tow bar connected thereto through a retractable line mechanism. An in-

clined conveyor is provided for guiding the tow bar downwardly into a discharge position. The conveyor is composed of a pair of laterally spaced parallel conveyor belts with support means being provided for supporting the conveyor belt so that at least one surface thereof is inclined to the horizontal and has a velocity vector component in a direction parallel to the direction of movement of the cable on the ski lift and a vertical velocity vector component perpendicular to the cable. The conveyor includes an orienting mechanism engageable with the tow bar adjacent the upper end of the conveyor belts for orienting the tow bar prior to its engagement with the surface of each of the conveyor belts. A drive mechanism is provided for the pair of laterally spaced conveyor belts and is capable of providing a parallel velocity vector component which is greater than the parallel velocity component of the cable. A tow bar delivery device is provided adjacent the lower end of the conveyor belts and the discharge position for effecting a disengagement of the tow bar from the surfaces of the conveyor belts and delivery of the tow bar to the awaiting skier. The angle of the line connecting the cable to the tow bar is inclined to the vertical and away from the back of the skier when the tow bar is delivered to the discharge position and the skier is positioned adjacent the tow bar delivery mechanism and faces in a direction parallel to the direction of movement of the cable. The angle of the line connecting the cable to the tow bar will subsequently be inclined to the vertical and away from the front of the skier at the moment in time that the skier is drawn from the discharge position by the pull of the ski lift. Thus, ample time is given to the skier to grasp the tow bar and to ready himself for the pull by the ski lift.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described more in detail in connection with the exemplary embodiments illustrated in the drawings, in which:

FIG. 1 is a schematic top view of an automatic T-bar delivery mechanism according to the invention;

FIG. 2 is a side view of the T-bar delivery mechanism of the embodiment of the invention shown in FIG. 1;

FIG. 3 is a top view of a further embodiment of the automatic T-bar delivery mechanism providing a one-man tow bar;

FIG. 4 is a side view of the automatic T-bar delivery mechanism according to FIG. 3;

FIG. 5 is a different embodiment of the waiting seat;

FIG. 6 is a view similar to FIG. 5 except showing a modified tow bar delivery mechanism at the discharge position;

FIG. 7 is a view similar to FIG. 6 but showing the differing positions of the tow bar; and

FIG. 8 is a fragmentary portion of the upper part of the conveyor belts and showing varying positions of the tow bar during its entry onto the conveyor belts.

DETAILED DESCRIPTION

FIGS. 1 and 2 illustrate a T-bar delivery mechanism for tow bars for two skiers. Said T-bar delivery mechanism 1 has a two-part conveyor belt device 2 which has conveyor belts 3 and 4. These conveyor belts 3 and 4 run in direction of the arrows I and II and are provided with cleats 1A (FIGS. 6 to 8). A guide 5 is arranged at the upper end of the two-part conveyor belt device, which guide is constructed, for example, in a channel-shaped manner. Lead-in elements 6 are secured above this guide 5. The T-bar construction 7 is of any conventional type by which the T-portion thereof is drawn automatically upwardly toward the cable during normal transportation thereof and is pulled downwardly to or by the skier when same is being used by a skier for lift purposes. One conventional form thereof is shown in the drawings and consists of a rigid T-unit suspended by a line from a reel. The T-bar unit 7 which is pivoted around the return pulley 8 by means of the cable 9 is oriented by means of the guide 5 and is placed in front of the conveyor belts 3 and 4 through the lead-in element 6 in such a manner that it is positioned perpendicularly to said conveyor belts (position A in FIG. 2). By means of movement of the conveyor belts 3 and 4, the T-bar is now moved between the belts 3 and 4 in the direction of the arrow II and in a plane parallel to the direction of movement of said tow bar from the upper end downwardly to the conveyor discharge position. As the rigid T-unit is moved downwardly, cable is pulled from the reel to accomodate the increased spacing between the cable 9 and the rigid T-unit. Waiting seats 15 are provided adjacent the discharge position. Guide rails 16 are provided between the seats 15 and the lower end of the conveyor belts 3 and 4. The speed of the two-part conveyor belt device 2 is such that in discharge position according to FIG. 2 the tow bar 7 is positioned at C at an angle to the cable 9 inclined back away from the skier. Thus, ample time is given to the skier between positions C and D (FIG. 2) to clutch the T-bar 7 and prepare himself for the ascent up the mountain.

Shortly before the tow bar 7 reaches the discharge position, it activates an acoustic signal transmitter 17 through which a buzzing tone is emitted. The skiers seated in the waiting seats 15 are thus warned that shortly the next tow bar will arrive.

In order to clean the tow bars from dirt or snow, brush elements 18 are provided which are located adjacent the lower course of the conveyor belts 3 and 4. The conveyor belts 3 and 4 can also be provided with cleats 1A to grip the tow bar 7, if necessary.

The conveyor belts 3 and 4 run over rollers 11 and 12 and the rollers 11 are connected to V-belt pulleys 13. Said V-belt pulleys 13 are driven by V-belts by an electric motor 14 which is positioned on the ground.

To increase the comfort to the skier of the conveyor belt device of the invention, the seats 15 can be constructed for heating by a heating device 15A. If the entire device is not needed, a shield 19 can be placed over the two-part conveyor belt device 2 so that each T-bar 7 moves in a conventional manner over the shield and can be grasped by an operator.

The embodiment according to FIGS. 3 and 4 is intended as an automatic T-bar delivery mechanism for a one-man bar. Here the tow bar 170 is moved through lead-in elements 60 to the conveyor belts 3 and 4, which in the lower course travels in the direction of the arrow II and conducts the tow bar to the lower end, that is, to the conveyor discharge position. In the lower end, namely, in the discharge position, guide rails 160 are provided which are arranged approximately parallel to the ground. A waiting seat 150 is provided beside said guide rails 160. A skier can sit down on said seat 150. As soon as a tow bar arrives in the lower zone of the two-part conveyor belt device, the skier takes the stem

portion 7 of the T-structure and clamps same between his legs with which he can be moved up the hill.

Again the speed of the two conveyor belts 3 and 4 must be selected so that in conveyor discharge position the tow bar 170 is positioned at an angle to the cable 9 (position C) back away from the skier. This device too can be equipped with heated waiting seat 150 with cleaning elements 18, with an acoustic signal transmitter 17 and with additional leadin elements. Further it is possible to cover said two-part conveyor belt device also with a shield and thence convey the T-bars in a conventional manner to the conveyor discharge position.

In place of the trough-shaped guide 5 which serves for adjusting or orienting the T-bars shortly before they enter the upper end of the two-part conveyor belt device, it is also possible to provide shortly before the return pulley 8 an inclined positioned wall which is adjusted to the return roller in the curvature and is made of metal, plastic or wood. The wall is shaped to guide the bar through a small spiral-shaped rotation outwardly. Shortly after passing the return roller, the setup steel plate wall is rotated into the horizontal position. In this manner the tow bar is moved transversely to the tow cable and thus transversely to the conveyor belts 3 and 4. The tow bar meets at the lower end of the conveyor belts a guide positioned at an inclination to the seat and which can be constructed in the same form as the guide rails. This guide is adjustable and prevents the tow bar from engaging the skier with an objectionable impact. Thus the skier still has a few seconds available to hold onto the bar and to prepare himself to go on the lift. The bar will contact the skier in a nearly retracted position from which is obtained a high safety factor for the inventive device.

A further possible embodiment of the invention is illustrated in FIG. 5. A waiting seat 200 is provided which is arranged above the lower end 201 of the conveyor belt device. This seat is constructed as an inclined plane 202 and defines an acute angle α between the running direction of the conveyor belt device 1 and the plane 202. Several cleaning and guide rollers 203 are provided at the lower end of the seat 200, which cleaning and guide rollers 203 lead the T-bar 7, after it was moved downwardly through the conveyor belt device, to the skier, whereby the T-bar is cleaned simultaneously by the brushes of the cleaning and guide rollers 203 and is thus placed clean before the skier.

In the embodiment according to FIG. 5, the skier 204 presses against the inclined plane 202 of the seat 200. This places the skier 204 automatically into the best starting position for the lift travel. The degree adjustment, that is the angle α, is determined at the time of building the lift installation. After cleaning the bar 7 with the cleaning and guide rollers 203, the bar is guided by said rollers and meets the skier 204 exactly in the right zone so that the skier is automatically moved by the bar 7 into the correct position for travel.

In the exemplary embodiments illustrated in FIGS. 1 to 5 it is also possible to use the electric motor 14 as the drive of the return pulley 8 for the automatic T-bar delivery mechanism. For this purpose, a gear system 14A is interconnected between the return pulley 8 and the drive 13 for the belt conveyor device 1, which gearing conducts the rotational movement 8 of the return roller appropriately to the drive 13 of the conveyor belt device and at the same time assures through proper design of the gearing that the speed of the conveyor belt device is faster than the speed of the cable clamp 10 attached to the cable 9. This assures in any case that the T-bar 7 will arrive at the lower discharge point, thus at the waiting seat, before the clamp 10 (position C). Thus, this unit can with great success be installed on each tow lift after the original building thereof without the need for providing additional drive mechanisms. In place of the electric motor 14 for example one can use a Diesel motor driving the tow cable 9, which Diesel motor drives simultaneously with the tow cable 9 also the automatic T-bar delivery mechanism, that is the conveyor belt device 1, wherein due to the use of suitable gearing 14A it is always assured that the speed of the cable 9 is less than the speed of the conveyor belt device 1.

In cooperation with the conveyor belt device, which may for example also be a belt, with the waiting seat the automatic T-bar delivery mechanism operates very safely without requiring an additional operator and yet the bar 7 will lie properly presented to the skier.

Referring now to the embodiment illustrated in FIGS. 6 to 8, the T-bar delivery mechanism 21 has, in addition to the structure mentioned above, a plate 22 which extends in close proximity and almost parallel relation to the lower reach of the belts 3 and 4 to press the tow bar into engagement with the conveyor belts, particularly the lugs 1A thereon so that the tow bar will not slip relative to the conveyor belts near the discharge end thereof. An inclined surface 23 is secured by a bracket member 24 to the discharge end of the support frame for the T-bar delivery mechanism 21. The underside of the bracket member 24 has a plate 26 secured thereto, which plate 26 has a nose 27 adjacent the free end thereof adjacent the bottom edge of the inclined surface 23. The nose 27 extends downwardly from the lower surface of the plate 26. As a result, the T-bar is moved from an engagement with the plate 22 and the lugs 1A on the conveyor belts 3 and 4 out to engagement with the plate 26 and the nose 27 prevents the tow bar from slipping beyond the inclined surface 23.

The upper end (FIG. 8) of the conveyor belts 3 and 4 is secured to a frame 28 which has an inclined member 29 extending downwardly therefrom. The tow bar 7 engages the downwardly inclined member 29 which serves to delay movement of the tow bar 7 into engagement with the lower reach of the conveyor belts 3 and 4. The downwardly inclined member 29 also serves to orient the tow bar so that the laterally extending portion of the tow bar extends generally perpendicular to the longitudinal axis of each of the conveyor belts 3 and 4 as best indicated in FIG. 1.

OPERATION

Although the operation of the device embodying the invention has been indicated somewhat above, said operation will be described in detail hereinbelow for convenience.

When the tow bar is presented for engagement by the conveyor belts 3 and 4, the laterally extending portion of the tow bar 7 is brought into engagement with an orienting device 5 (FIG. 2) or the downwardly inclined member 29 (FIG. 8). These members assure that the laterally extending portion of the tow bar 7 extends generally perpendicular to the longitudinal axis of each of the conveyor belts 3 and 4. During this period of time, however, the cable 9 continues to move at its nor-

mal speed. As a result, the tow bar 7 will assume the positions A, B1, B2, B3 and B4 as illustrated in FIG. 8. The position B4 corresponds to the position B illustrated in FIG. 2. The reason for this particular movement of the tow bar is that the conveyor belts 3 and 4 are driven at a rate of speed which is faster than the movement of the cable 9. That is, the lower reach of the conveyor belts 3 and 4 each have a velocity vector component which is both parallel to the axis of movement of the cable 9 as well as downwardly perpendicular thereto. The velocity vector component which extends parallel to the cable 9 is greater than the corresponding velocity vector for the movement of the cable 9. As a result, the tow bar 7 will quickly catch up with the position of attachment 10 of the tow bar to the cable 9 and essentially change the orientation of the tow bar relative to the cable 9. When the tow bar 7 is delivered to the discharge end of the conveyor belts 3 and 4, the tow bar is first in a position C illustrated in both FIGS. 2 and 7 wherein the cable 7A is inclined away from the back of the skier when the skier is facing up the hill. Since the tow bar is located at the discharge position, the skier can easily grasp the tow bar and place the tow bar in a position which will facilitate the skier's movement up the hill. During this period of time, the cable 9 will continue to move so that the position of the tow bar at the moment the skier begins to move up the hill is in position D wherein the cable 7A is inclined away from the front of the skier. Thus, ample time has been given to the skier to manipulate the tow bar into the proper position for movement up the hill.

Although particular preferred embodiments of the invention have been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, lie within the scope of the present invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a T-bar delivery mechanism for a ski lift having return pulley means for guiding a cable thereover which has a tow bar connected thereto through a retractable line mechanism, first drive means for said cable and inclined conveyor means for guiding said tow bar downwardly into a discharge position, the improvement comprising:

a pair of laterally spaced parallel conveyor belts defining said conveyor means;

support means for supporting said conveyor belts so that at least one surface of each conveyor belt is inclined to the horizontal and having velocity vector components in a direction parallel to the direction of movement of said cable on said ski lift and perpendicular thereto, said conveyor means including orienting means engageable with said tow bar adjacent the upper end of said conveyor belts for orienting said tow bar prior to its engagement with said surface of each of said conveyor belts;

second drive means for driving said pair of laterally spaced conveyor belts, said second drive means including means for providing a parallel velocity vector component which is greater than the parallel velocity component of said cable; and

tow bar delivery means adjacent the lower end of said conveyor belts and said discharge position for effecting a disengagement of said tow bar from said surfaces and delivery of said tow bar to an awaiting skier, the angle of said line connecting said cable to said tow bar being inclined to the vertical and away from the back of said skier when said tow bar is delivered to said discharge position and said skier is positioned adjacent said tow bar delivery means and facing in a direction parallel to the direction of movement of said cable, the angle of said line connecting said cable to said tow bar being inclined to the vertical and away from the front of said skier at the time said skier is drawn from said discharge position by the pull of said ski lift so that the time between the arrival of said tow bar at said discharge position and the pull of said skier by said ski lift is sufficient for said skier to properly position said tow bar before being pulled by said ski lift away from said discharge position.

2. The improvement according to claim 1, wherein said tow bar delivery means includes means defining a waiting seat.

3. A T-bar delivery mechanism according to claim 2, wherein said waiting seat is planar and arranged above the lower end of said conveyor belts.

4. A T-bar delivery mechanism according to claim 3, wherein said plane of said waiting seat and the running direction of the conveyor belts define an acute angle (α).

5. A T-bar delivery mechanism according to claim 3, including means defining cleaning and guide rollers for cleaning the tow bar, said cleaning and guide roller means being arranged below the waiting seat.

6. The improvement according to claim 1, wherein said conveyor means is positioned below said return pulley means.

7. The improvement according to claim 1, wherein said orienting means comprises a guide channel having a slope inclined to said conveyor belts.

8. The improvement according to claim 1, wherein said tow bar delivery means includes at least one guide rail arranged at the lower end of said conveyor belts.

9. The improvement according to claim 8, wherein said guide rail guides said tow bar parallel to the direction of movement of said tow bar.

10. The improvement according to claim 8, wherein said tow bar delivery means further includes means defining a waiting seat located adjacent said guide rails whereby said guide rail guides said tow bar to said waiting seat.

11. The improvement according to claim 1, wherein the conveyor belts are provided with cleats for engaging and guiding said tow bar.

12. The improvement according to claim 1, wherein said tow bar delivery means includes means defining an acoustic signal transmitter positioned at a distance in front of the lower end of said conveyor belts and operable by a passing tow bar.

13. The improvement according to claim 1, including cleaning elements arranged adjacent the lower end of said conveyor belts.

14. The improvement according to claim 1, including shield means for covering said conveyor belts.

15. The improvement according to claim 1, including heating means for heating said waiting seat.

16. The improvement according to claim 1, wherein said second drive means for said conveyor belts is arranged on one of the ends of said conveyor belts.

17. The improvement according to claim 16, wherein said second drive means is a motor which drives the two conveyor belts through V-belt pulleys and wherein said first drive means comprises gear means for coupling the output from said motor to said return pulley means.

* * * * *