Oct. 31, 1967 D. R. PENDER 3,349,720

SKI LIFT

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Fig. 1.

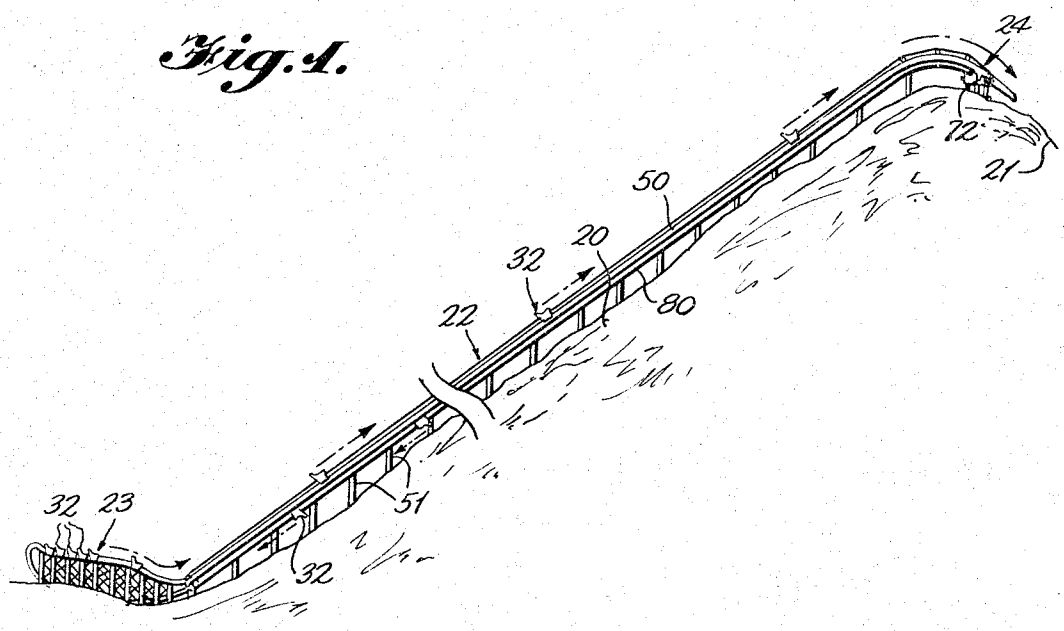
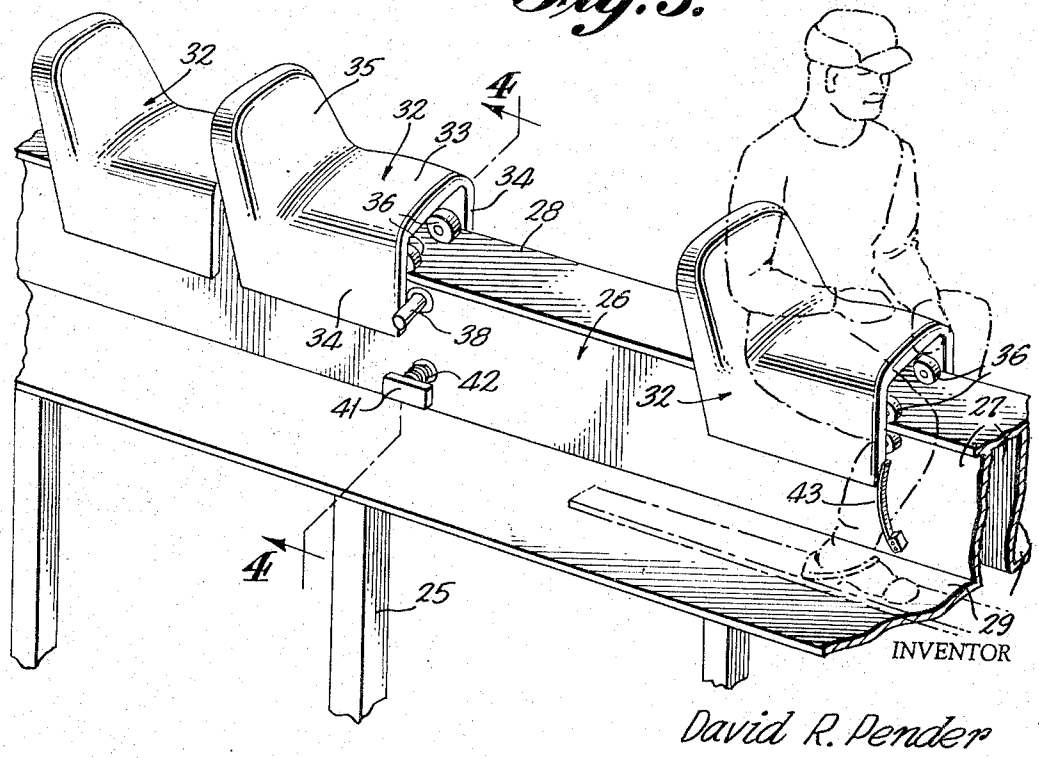


Fig. 3.



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Oct. 31, 1967 D. R. PENDER 3,349,720

SKI LIFT

Filed Jan. 11, 1966 5 Sheets-Sheet 2

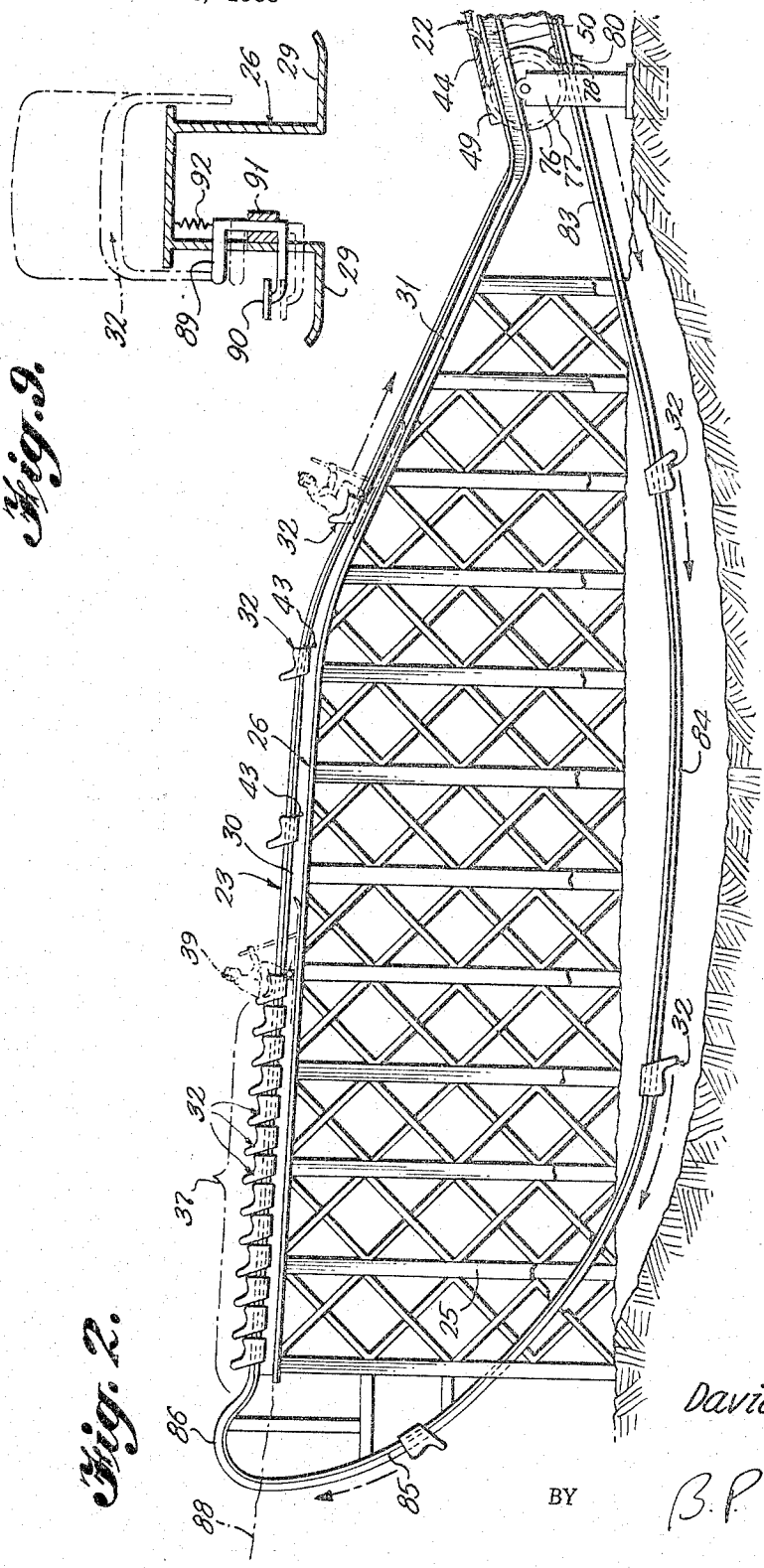


Fig. 2.

Fig. 3.

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Oct. 31, 1967 D. R. PENDER 3,349,720

SKI LIFT

Filed Jan. 11, 1966 5 Sheets-Sheet 3

Fig. 4.

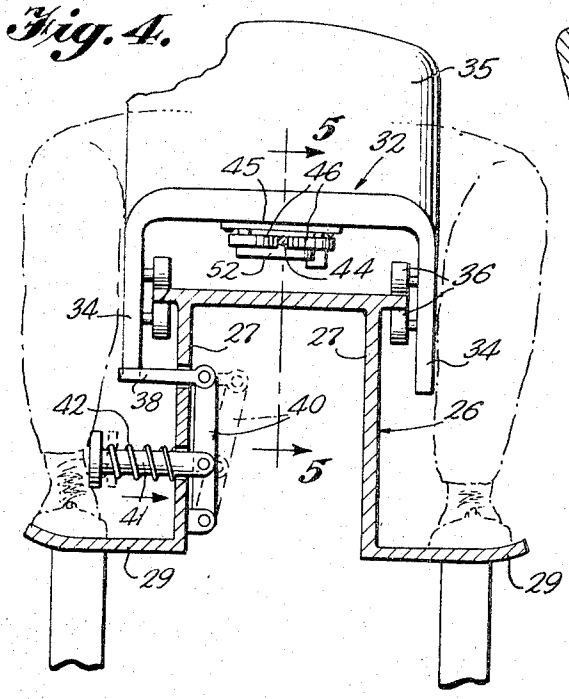


Fig. 5.

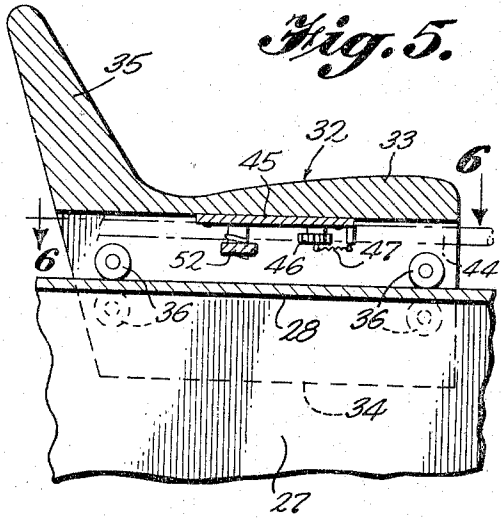


Fig. 6.

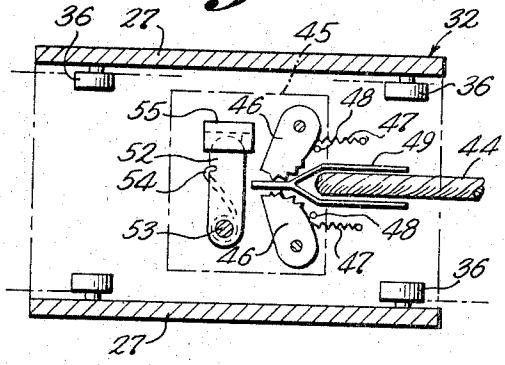


Fig. 7.

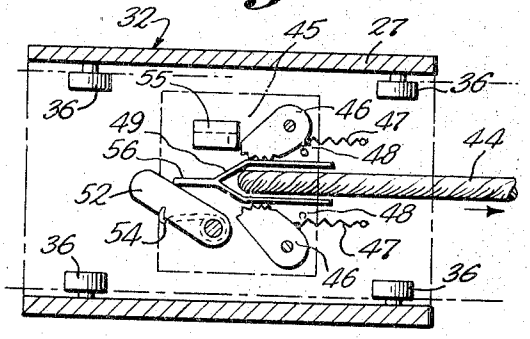
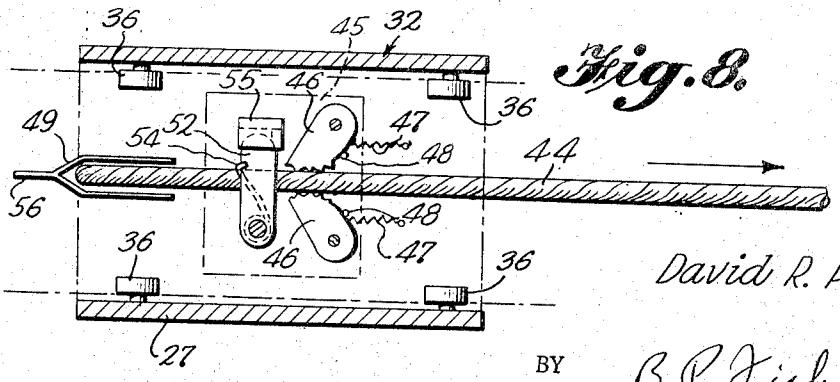


Fig. 8.



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Oct. 31, 1967 L. TAVAN 3,349,724

PANCAKES OR THE LIKE PASTRY AUTOMATIC MAKING MACHINE

Filed June 24, 1965 5 Sheets-Sheet 4

Fig. 7

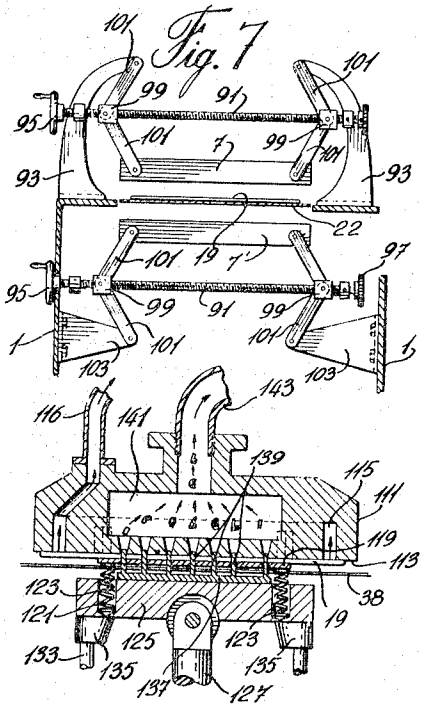


Fig. 8

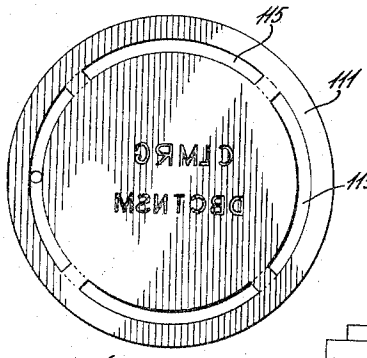
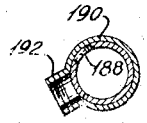


Fig. 10

Fig. 13



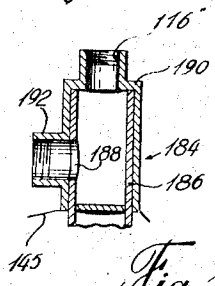


Fig. 12

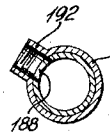


Fig. 14

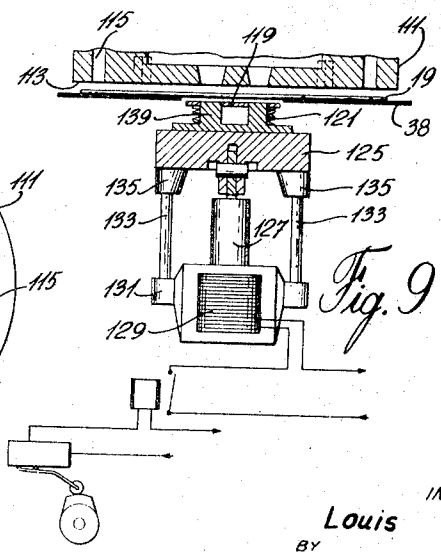


Fig. 9

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Oct. 31, 1967 D. R. PENDER 3,349,720

SKI LIFT

Filed Jan. 11, 1966 5 Sheets-Sheet 5

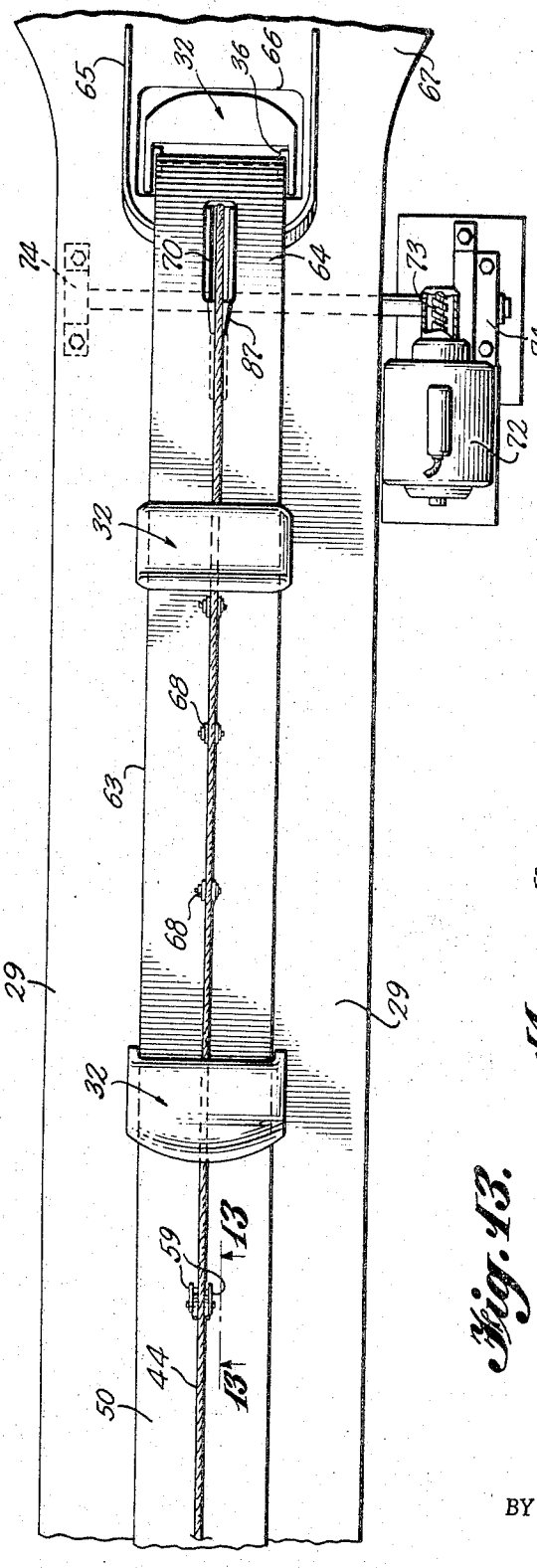


Fig. 12.

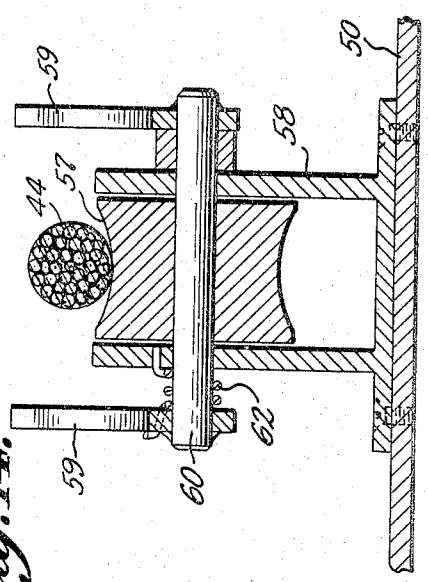


Fig. 14.

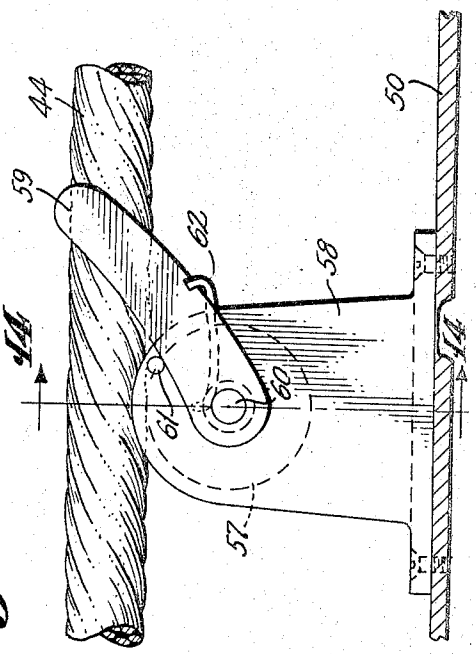


Fig. 13.

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3,349,720

SKI LIFT

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Filed Jan. 11, 1966, Ser. No. 520,012
14 Claims. (Cl. 104—173)

This invention relates to a ski lift or conveyor.

The main objective of the invention is to provide a ski lift of increased safety, speed and capacity, as compared to conventional types of lifts presently in use.

More specifically, according to the invention, skiers may mount seats or saddles while the same are at rest and then travel down a gravity lift entrance ramp, gradually gaining in momentum until contact is made with a continuously moving conveyor element. This arrangement permits a substantial increase in conveyor speed without sacrifice of safety. Similarly, at the discharge end of the ski lift, the skier is enabled to leave the relatively fast moving conveyor element and seat by actually skiing off of the lift while the seat disappears from beneath him. There are no obstructions and no need for the skier to hold any hand support structure. The skier can be poised in a natural skiing position to slide or ski off the exit ramp portion of the lift which slopes downwardly at the end of the lift so as to lead directly into a natural ski slope. The above features allow safety as well as increased speed and capacity for the lift, which are the main objectives above-stated.

Other objects and advantages of the invention will become apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

FIGURE 1 is a fragmentary general side elevation of a ski lift embodying the invention on a greatly reduced scale and with small parts omitted;

FIGURE 2 is an enlarged side elevation of an entrance ramp section of the ski lift;

FIGURE 3 is a fragmentary perspective view of a portion of the entrance ramp section;

FIGURE 4 is an enlarged fragmentary transverse section taken on line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary longitudinal vertical section taken on line 5—5 of FIGURE 4;

FIGURE 6 is a horizontal section taken on line 6—6 of FIGURE 5;

FIGURES 7 and 8 are sectional views, similar to FIGURE 6, showing progressive stages of operation of mechanism for coupling a seat to the continuously moving cable or conveyor element;

FIGURE 9 is a transverse vertical section through a modification of the foot operated seat release means on the entrance ramp section;

FIGURE 10 is an enlarged fragmentary side elevation of the discharge end of the ski lift;

FIGURE 11 is a transverse vertical section taken on line 11—11 of FIGURE 10;

FIGURE 12 is a fragmentary plan view of that portion of the ski lift shown in FIGURE 10;

FIGURE 13 is an enlarged fragmentary vertical section taken on line 13—13 of FIGURE 12; and

FIGURE 14 is a vertical section taken on line 14—14 of FIGURE 13.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, attention is directed first to FIGURE 1 showing a rather steep natural hill or slope 20 which must be ascended by skiers in order tor each the natural downward ski slope 21 on the other side of the hill. As shown in FIGURE 1, the invention ski lift comprises a main lift or conveyor section 22

on the slope 20, extending substantially from the bottom to the crest of the slope. The ski lift additionally comprises an unpowered gravity entrance ramp section 23 at the bottom of the slope and also a skier discharge section 24 at the top of the slope from which the skier slides directly onto the downward ski slope 21.

Referring now to FIGURES 2 through 8, primarily, the entrance ramp section 23 comprises a supporting structure or scaffold 25 of any suitable type. In lieu of the structural scaffold 25, a small natural hill or artificial hill might be utilized to attain the proper elevation of the entrance ramp. Suitably rigidly mounted upon the top of the scaffold 25 is a main support track 26 of hollow-I cross section as depicted in FIGURE 3, including vertical webs 27, a top horizontal flange 28 projecting outwardly of both vertical webs and rather wide bottom horizontal flanges 29 upon which the skis are rested as shown pictorially in the drawing. The ski supporting flanges 29 are preferably covered or coated with low friction material which may include natural snow, if available. As shown in FIGURE 2, the track 26 includes a generally level but slightly inclined top portion 30, leading into a much more steeply inclined portion 31, which in turn leads to the inlet of the conveyor or lift section 22.

Mounted upon the track 26 is a multiplicity of skier seats or saddles 32, the details of which are depicted in FIGURES 3–5, for example. Each set 32 is of the straddle-type including an inverted U-shaped body portion 33 having depending vertical sides 34 located just outwardly of the sides of track flange 28. Each seat further embodies an upstanding somewhat inclined back rest 35 so that the skier cannot slide rearwardly while ascending the slope 20. As will become apparent, the seats 32 serve to push the individual skier upwardly along the conveyor section 22, as distinguished from a pulling operation. The seats 32 should be strong and are preferably molded from fiberglass and plastic or some similar material.

Each seat 32 is equipped on the interior of its sides 34 with pairs of guide rollers 36 engaging above and below track flange 28, as indicated clearly in FIGURE 4. FIGURE 5 shows the disposition of the pairs of rollers 36 near the forward and rear ends of each seat for maximum stability.

The entrance ramp section 23 includes a rear seat stacking zone 37 where the individual seats, after completing their return travel, are closely stacked in a stationary position and held in this position by a retractable seat stop pin 38. This pin engages the forwardmost or leading seat in the stack. In advance of the stacking zone 37 is a seat mounting area, FIGURE 2, where the skier 39 mounts the forwardmost stationary seat in preparation for movement to the inclined launching portion 31 of the ramp section 23.

In order to release the forwardmost stationary seat for movement, the release mechanism shown in FIGURE 4 is employed. The previously-mentioned stop pin 38 is connected pivotally to a vertically swingable lever 40 on the interior of track 26. This lever is caused to swing inwardly by a leg operated plunger 41, resisted by a coil spring 42, so that the skis need not be elevated from the support flanges 29 in order to release the seat. Inward movement of the plunger 41 causes retraction of the stop pin 38 and release of the forwardmost seat 32 from the stacking zone. The pin 38 returns automatically to its active position upon release of the leg operated plunger.

After release, as described, the particular seat 32 with the skier mounted thereon will begin to move slowly down the ramp toward the more steeply inclined launching portion 31. In order to maintain proper spacing of the seats in the mounting area, a number of spaced retarding leaf springs 43, FIGURE 3, may be employed on one or both sides of the track 26 to simply engage the front edge

of the seat sides 34, as shown. These springs are easily overcome by the movement of the seat and skier and do not block the normal movement.

Upon reaching the launching track portion 31, the seat and skier begin to coast more rapidly toward the powered conveyor section 22 and will gain the necessary momentum under the influence of gravity to pass smoothly onto and into connection with the fairly rapidly and continuously moving cable conveyor element 44.

Referring again to FIGURES 4 through 8, a jamb cleat mounting plate 45 is fixedly secured to the bottom surface of each seat portion 33 and pivoted to the mounting plate 45 in opposing relation are a pair of toothed jamb cleats or grippers 46 adapted to grip the moving cable 44 so that the particular seat will be positively conveyed thereby with the skier up the slope 20. The jamb cleats 46, FIGURE 6, are biased by retractile springs 47 against fixed stop elements 48 on plate 45. When so positioned, the jamb cleats are angled somewhat rearwardly in converging relation with their teeth spaced apart slightly. When the seat 32 reaches the lower end of the upwardly inclined lift section 22, a fixed jamb cleat spreader 49 on the section 22 is engaged by the cleats to spread them apart so that they may straddle the moving cable 44, FIGURE 7, as the seat approaches the cable and moves in the same direction as the cable.

It should be mentioned here that the long lift section 22 also includes an inclined extension 50 of the main supporting and guide track 26, previously described. The jamb cleat spreader 49 is actually fixedly anchored near the lower end of track section 50 just beyond the launching portion 31, FIGURE 2. The track section 50 may be supported on any convenient leg structure or scaffold 51 or the like.

When the particular seat 32 passes further onto and over the top run of upwardly moving cable 44, FIGURE 8, the cleats 46 have moved beyond the spreader 49, and their springs 47 urge them inwardly into gripping engagement with the cable 44. The movement of the cable in the direction of the arrows causes the eccentric jamb cleat to firmly resist any retrograde movement of the seat 32 with respect to the cable, and the seat is securely and safely pulled up the slope by the continuously moving cable while its guide rollers 36 continue to engage the flange 28 of the section 50 of the main guide track.

Additionally, as an added safety feature, a cable retainer 52 is pivoted at 53 to mounting plate 45 slightly rearwardly of jamb cleats 46 and is urged by a spring 54 to an active or retaining position in contact with a fixed keeper 55, FIGURE 6. Again, as the seat 32 moves on to the cable, FIGURE 7, the retainer 52 is pivoted rearwardly by a nose extension 56 of spreader 49 and the spring 54 yields at this time. When the seat progresses to the cable gripping position of FIGURE 8, the cable retainer 52 has moved beyond the element 56 and its spring 54 returns it to the closed or active position wherein the retainer 52 underlies the cable 44 and prevents separation of the cable downwardly from the seat by sagging. The seat itself continues to be stabilized at all times by the rollers 36.

When the particular seat 32 reaches the top of the lift section 22, whose length may vary in accordance with the size of the hill or slope, the seat begins to approach the discharge section 24 of the apparatus, FIGURES 10 and 12. Along the length of the lift section 22, however, the top run of the moving cable 44 is supported at spaced intervals by guide rollers 57, carried by brackets 58, fixedly mounted on the top face of track section 50. These rollers 57 prevent the cable from sagging unduly. Some or all of the guide rollers 57 have cable retaining arms 59 mounted on their shafts 60 and biased upwardly against stops 61 by torsion springs 62. The arms 59 prevent the cable 44 from shifting appreciably laterally and completely disengaging the guide rollers. It is thought to be sufficient to equip every second or third guide roller unit along the track section 50 with the cable retaining arms 59, although all of the guide rollers may be so equipped, if desired, for added safety.

The top or discharge section 24 of the ski lift embodies a curved terminal extension 63 of the main guide track which continues to have the same basic cross section throughout the entire length of the apparatus, FIGURES 3, 4 and 11. Beyond the curved portion 63 or peak of the guide track, a short downwardly inclined discharge extension 64 is provided having a bifurcated shield 65 fixedly secured thereto. Within the confines of this shield 65 is an opening 66 through which the seats 32 may travel on their return runs. Beyond the bifurcated shield 65, the main guide track ends in a smoothly inclined exit ramp 67 for the skiers which is positioned so as to run out substantially tangent to the down-hill ski slope 21, whereby the skier may travel in a natural skiing posture from the ski lift onto the downhill ski slope. The exit ramp 67 will accommodate both skis and is in effect a continuous extension of the originally-described ski supporting flanges 29 which are present along the full length of the ski lift apparatus. That is to say, the skier has his skis in supported engagement with the flanges 29 at all times after mounting the seat on the entrance ramp section and until he disengages the exit ramp 67 and moves onto the actual snow covered ski slope in a natural skiing posture.

On top of the curved track extension 63 are several rather closely spaced guide rollers 68 which assist the cable 44 in bending smoothly. Similar rollers 69 are provided on the bottom or return portion of the main track, FIGURES 10 and 11. At the terminal end of track extension 64, cable 44 engages around a main driving pulley 70, journaled on a cross shaft 71, driven by an adjacent motor 72 through a worm gear drive 73 or a like means. The motor 72, shaft 71 and shaft bearings 74 may be supported upon any convenient structure 75 as dictated by the terrain at the particular installation.

At the bottom of inclined lift section 22, FIGURE 2, another pulley 76 for the endless cable 44 is mounted upon bearing means 77, as shown. The lower or return cable run 78 may be supported at intervals by suitable support rollers 79 as depicted in FIGURE 10, these rollers being secured to the return track structure 80 for seats 32.

As shown in FIGURE 10, the guide flange 28, originally described in connection with FIGURES 3 and 4, joins adjacent the pulley 70 a downwardly reversely curved return track portion 81, leading into a substantially level return track flange or portion 82, in turn joining the inclined return track flange 83 for the individual seats 32 whose rollers 36 continuously engage these flanges. Finally, beyond the bottom of lift section 22, the return track 80 includes a gradually curved loop portion 84 having a rather steeply inclined end section 85 terminating in an abrupt top loop 86 which joins back into the main guide track 26 originally described on entrance ramp section 23, see FIGURE 2. It should be understood in connection with the drawings that upon disengagement of the seats 32 and the cable 44 adjacent the driving pulley 70, the seats travel on their return path solely by coasting under the influence of gravity and they are entirely free of the cable 44. The coasting movement is slowed by the return track portions 85 and 86 and the seats come to rest in the stacking zone 37 after they have completed an entire circuit of the ski lift.

Another fixed jamb cleat spreader 87, FIGURES 10 and 12, is provided immediately above the driving pulley 70 and immediately in advance of the opening 66 through which the disconnected seats 32 pass downwardly to begin their coasting return travel. The spreader 87 spreads the jamb cleats 46 and disengages them from the cable 44 and also releases the pivoted retainer 52 so that each seat is entirely free from the cable immediately in advance of the downwardly curved track portion 81 and opening 66. Therefore, as the skier skis off of the exit ramp 67 onto the

ski slope, the saddle-type seat **32** which he has been straddling during the ascent moves automatically downwardly and away from his body without any interference. The skis and legs pass on opposite sides of the bifurcated safety shield **65**.

It is now believed to be apparent, without any further description, that a ski lift is provided which is safe, fast and of high capacity. It differs markedly from conventional ski lifts where customarily the skier must connect himself in some way with a moving carrier and then disconnect himself therefrom at the top of the lift. Dangerous falls and injuries frequently result from this. By contrast, with the present invention, the skier merely mounts a straddle-type seat and then coasts safely onto the moving conveyor cable and then is propelled safely by this cable to the top of the ski lift, after which the skier in a natural skiing position moves directly onto the slope **21** as the seat moves automatically out from under him. There is no jumping or dropping from the lift or abrupt jerking connection therewith. The special seats **32** safeguard the skier against sliding rearwardly while being elevated. The apparatus is simplified, sturdy, and relatively easy to build.

With reference to FIGURE 2, a natural or artificial approach elevation mound **88** will eliminate the need for a ladder leading up to the top of the entrance ramp section **23**, whereby the skier will not have to remove his skis at any time.

While the lift section **22** for simplicity has been shown to be straight, it can be constructed feasibly to follow the contours of the ground or the natural sag of the cable, within the scope of the invention.

FIGURE 9 shows a modification of the foot-operated release means previously-described in FIGURE 4. In FIGURE 9, the stop element **89** corresponding to pin **38** is integrated with a vertically shiftable foot pedal **90** held in a fixed guide **91** on track **26**. The pedal and stop element are biased upwardly to the seat stopping position by a retractile spring **92**. In all other respects, the construction of the apparatus remains the same as previously described in connection with the other figures.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. A ski lift comprising a continuous guide track, means to support the guide track above ground level, the guide track having a central seat guiding section and lower lateral ski supporting flanges, straddle type seats movably engaging said seat guiding section, whereby skiers may mount the seats and straddle the seat guiding track section while their skis rest upon said flanges, said supported guide track including an inclined hill ascending section, an entrance ramp downwardly inclined coasting section and an upper skier discharge downwardly inclined section which is substantially tangent to a ski slope, a continuously upwardly moving conveyor element on said inclined hill ascending section, automatic coupling means on each seat engageable with said conveyor element when each skier and seat coasts onto the hill ascending section, and a return coasting track for the seats at the skier discharge section leading downwardly therefrom, whereby each skier may ski off of said discharge section and onto the ski slope in a natural skiing posture as the seat moves downwardly beneath him.

2. The invention as defined by claim **1**, and wherein said central seat guiding section of said track has a pair of upper laterally projecting flanges, and coacting pairs of rollers on each seat engaging above and below said flanges to rollingly support and stabilize each seat.

3. The invention as defined by claim **1**, and wherein said moving conveyor element is an endless flexible element extending along said inclined hill ascending section, said automatic coupling means on each seat including an opposed pair of spring-urged jamb cleats, and fixed jamb cleat spreader elements at the top and bottom of said inclined hill ascending section to spread the jamb cleats into engaging relation with said flexible element at the bottom of the hill ascending section and to spread the jamb cleats at the top of said section so that they are released from the flexible element.

4. The invention as defined by claim **1**, and wherein said entrance ramp coasting section includes a generally level guide track portion for stacking a plurality of said seats, and a skier operated releasable stop device on the entrance ramp section engageable with the leading seat in said stack to restrain forward movement of the stack.

5. The invention as defined by claim **4**, and wherein said stop device comprises a pin element in the path of movement of the leading seat in said stack, and a leg-operated release mechanism on the guide track for retracting the pin element so that the leading seat is released to coast toward the hill ascending section.

6. The invention as defined by claim **5**, and plural spaced seat retarder springs on the guide track between said stop device and the lower end of the hill ascending section.

7. The invention as defined by claim **3**, and a pivoted retainer element on each seat near said jamb cleats and adapted to be engaged by said spreader elements and engaging beneath said endless flexible element while in an active retaining position, and a spring connected with said retainer element urging it to the active retaining position.

8. The invention as defined by claim **1**, and wherein the guide track has an opening at said skier discharge section through which each seat passes downwardly onto said return coasting track, the return coasting track being a reverse continuation of said guide track and underlying the guide track so as to form a continuous elongated loop of track.

9. The invention as defined by claim **1**, and wherein each straddle type seat comprises a substantially inverted U-shaped seat body portion and an upstanding back portion at the rear end of said body portion to prevent backward slippage of the skier on said seat as he is propelled up an incline.

10. The invention as defined by claim **1**, and wherein said return coasting track for the seats leads back to the entrance ramp section and terminates in a steeply inclined loop to retard the movement of each seat as it returns to said entrance ramp section.

11. The invention as defined by claim **1**, and wherein said upwardly moving conveyor element is an endless cable, and cable guide and retainer means at spaced intervals along the inclined hill ascending section.

12. A ski lift apparatus comprising a guide track including a downwardly sloping entrance ramp portion, a connected upwardly inclined lift portion and a top downwardly inclined discharge portion, said guide track being continuous and having a central seat guiding section and side horizontal ski engaging flanges, straddle type skier seats having rollers engaging said central seat guiding section for free movement therealong, a return seat guiding track beneath said guide track and extending from said discharge portion back to said entrance ramp portion, said seats coasting freely on the return seat guiding track, a continuously upwardly moving conveyor element on the upwardly inclined lift portion, and automatic conveyor element grip and release means on each seat engageable with the conveyor element upon movement of each seat by gravity from the entrance ramp portion onto the inclined lift portion.

13. The invention as defined by claim **12**, and power means connected with said conveyor element to drive it continuously, said conveyor element being an endless flexible element, and a pair of spaced pulleys on the inclined lift portion of the guide track substantially at the top and bottom of the lift portion.

14. The invention as defined by claim 12, and a ski engaging discharge ramp terminal portion on the upper extremity of said guide track arranged substantially tangent to a ski slope and from which the skier may ski directly onto said slope, said ramp having an opening for the downward movement of each seat beneath the skier, and a bifurcated shield extending around the rear of said opening and on opposite sides thereof.

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