

[54] **STAGING AND LOADING DEVICE FOR CHAIR LIFTS**

[76] Inventors: **David J. Dubeta**, 204-1230 Jasper Ave.; **Robert J. Papirnyk**, 11313-103 St., both of Edmonton, Alberta, Canada

[22] Filed: **Apr. 3, 1974**

[21] Appl. No.: **457,651**

[30] **Foreign Application Priority Data**

Apr. 13, 1973 Canada 168748

[52] **U.S. Cl.** 104/173; 104/35; 104/163; 198/25

[51] **Int. Cl.** **B61b 11/00**

[58] **Field of Search** 104/173 R, 173 ST, 163, 104/18, 20, 21, 35, 99, 172 S; 198/25; 272/32, 40, 41, 42

[56] **References Cited**

UNITED STATES PATENTS

840,905	1/1907	Burke	272/32
2,853,955	9/1958	Bishop et al.	104/172 S
2,875,704	3/1959	Yates	104/96
2,888,131	5/1959	Allen	198/25 X
3,125,339	3/1964	Nielsen	272/32
3,339,496	9/1967	Sneller	104/173

Primary Examiner—M. Henson Wood, Jr.

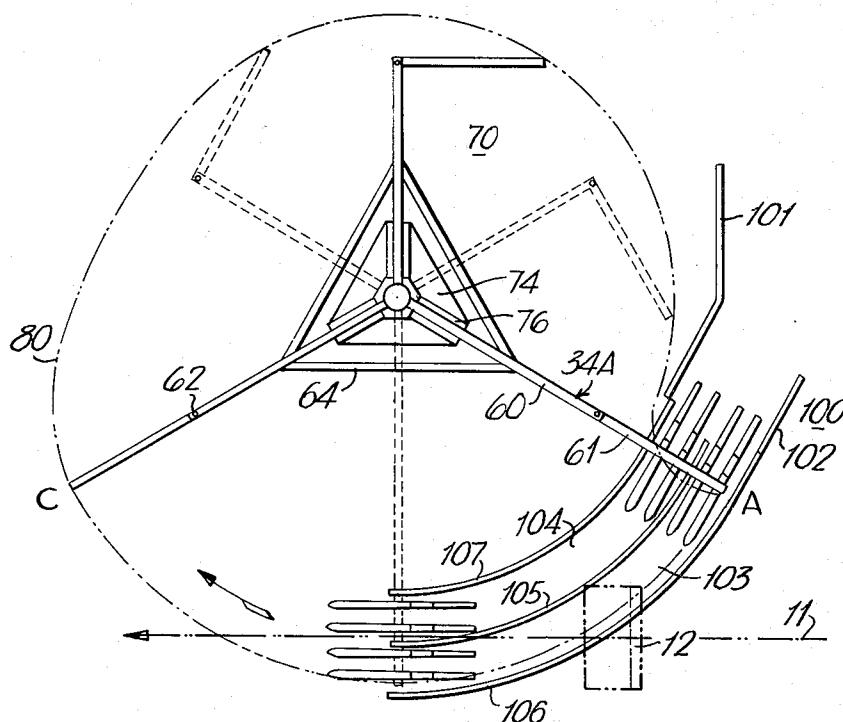
Assistant Examiner—Randolph A. Reese

Attorney, Agent, or Firm—Stanley E. Johnson

[57] **ABSTRACT**

Apparatus for loading skiers from the front of the line onto a ski tow preferably of the cable chair lift type. The loading apparatus is a carousel type consisting of a central post from which one or more arms radiate outwardly and rotate about a vertical axis off-set from the up-hill run of the chair lift tow. The arms rotate in a horizontal plane about a vertical axis and a mechanism is provided such that the arms momentarily stop at each of the skier loading pick-up position and skier drop-off position, the latter position locating one or more skiers in line with a chair of the chair lift as the chair approaches from behind. The arms are driven to rotate in synchronism with the spacing of the chairs on the ski tow cable either by a direct drive from the mechanism driving the ski tow cable or alternatively an individual drive controlled to rotate the arms in unison with movement of the chairs on the ski tow. A gate is also provided permitting orderly entry of one, two or more skiers, depending upon the number of skiers, to be seated on each chair from a line-up position to the pick-up position of the carousel. The gate may be electrically or otherwise controlled to synchronize with rotational movement of the arms.

12 Claims, 6 Drawing Figures



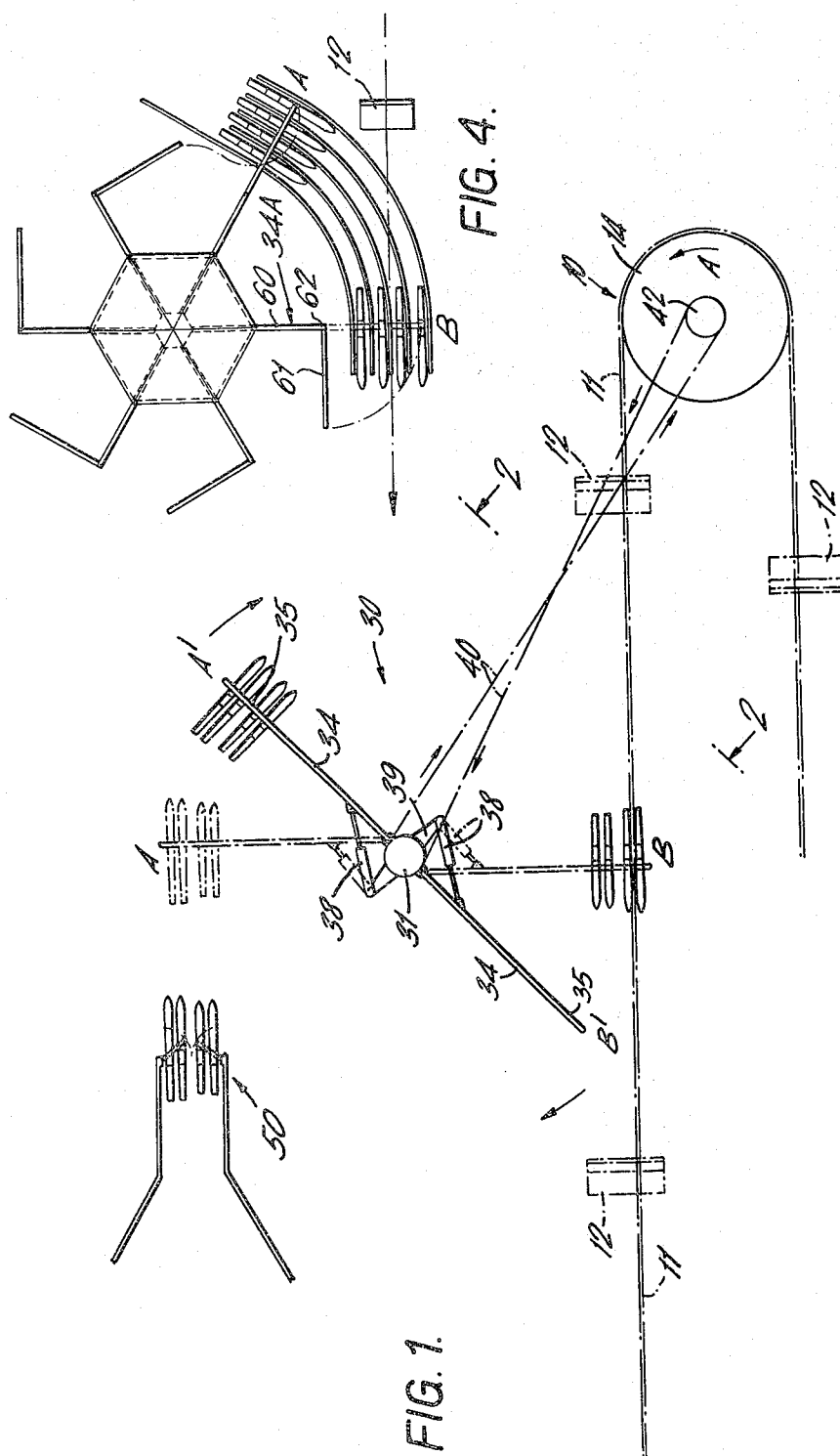


FIG. 2.

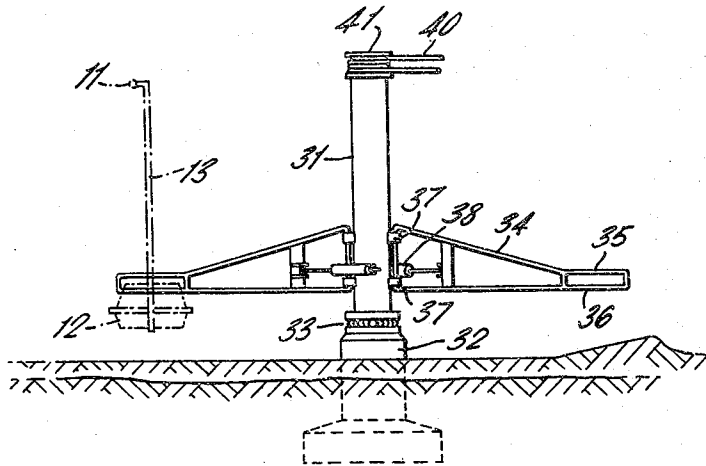
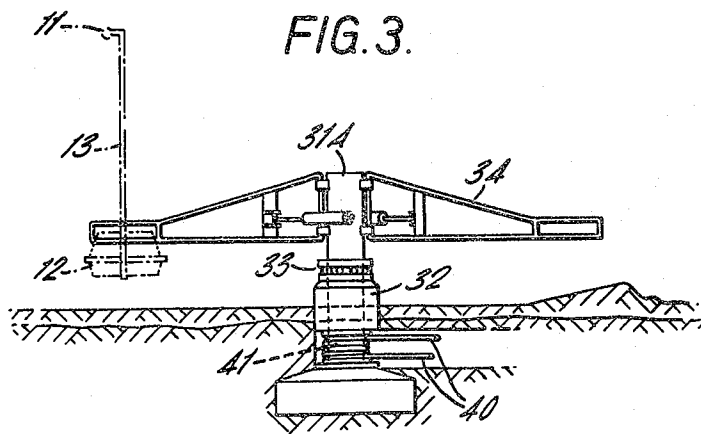


FIG. 3.



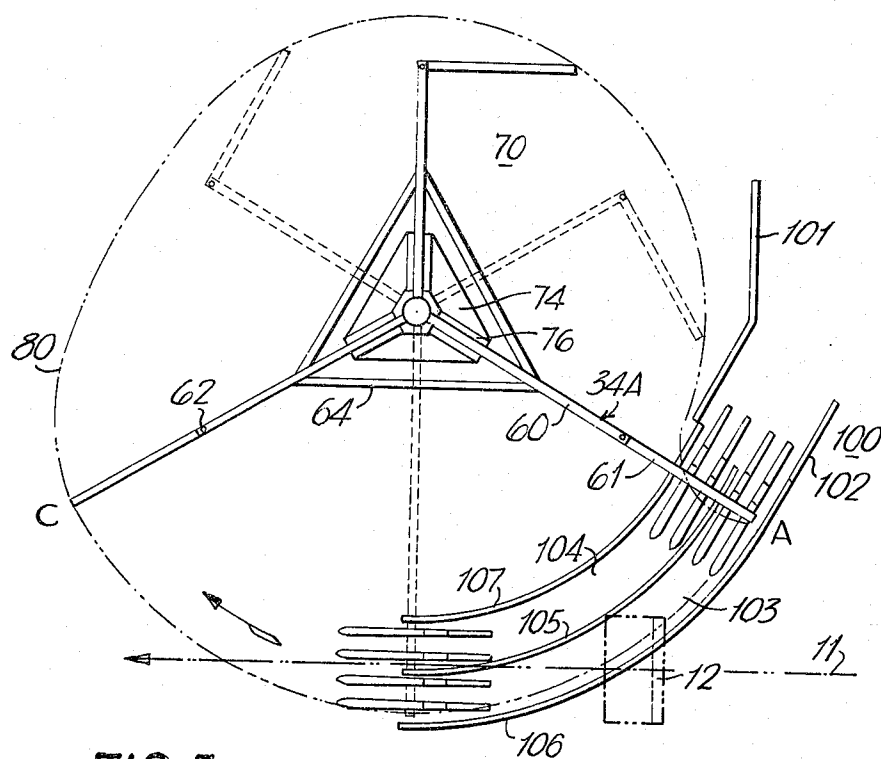


FIG.5.

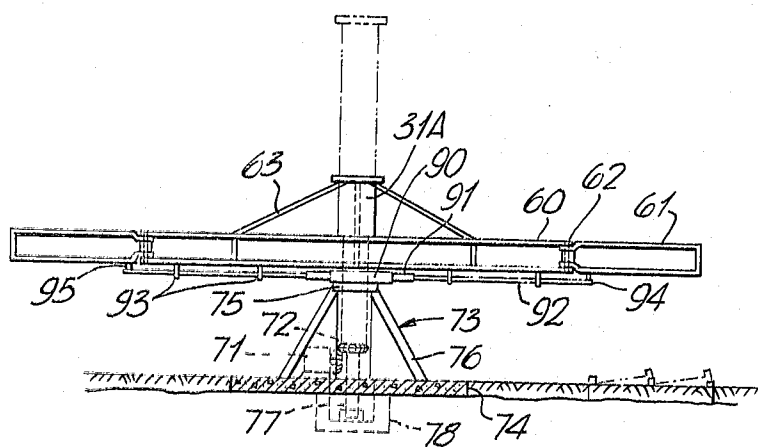


FIG. 6.

STAGING AND LOADING DEVICE FOR CHAIR LIFTS

This invention relates to improvements in a method and apparatus for loading passengers on a ski tow and to a ski tow incorporating such loading apparatus.

Attempts have been made to improve loading of ski tows whereby passengers are loaded in an orderly manner on a moving ski tow having seats spaced substantially regularly along the tow line through the use of a conveyor transverse to the tow line. Reference may be had to U.S. Pat. 3,339,496 issued Sept. 5, 1967 to W. R. Sneller.

An object of the present invention is to provide improvements in a ski tow loading apparatus and a ski tow apparatus incorporating such improvements. The device is designed to increase safety and loading efficiency particularly on chair lifts and also to increase the capacity of both new and existing chair lifts. This is accomplished by using a rotary carousel type unit having arms radiating outwardly from a central post and movable in a circular path intersecting the path of travel of the ski tow. Skiers are moved in sequence by the arms from a position where the skiers line up to approach the tow to a position suitable for loading the tow. The arms are rotated preferably in synchronized relation to movement of the ski tow and also preferably in an interrupted manner such that the arm to be grasped is stationary at each of the skier loading and unloading positions.

Accordingly, there is provided in accordance with the present invention apparatus for moving skiers, located at the front of a line, in sequence from a first pick-up position to a second tow-line loading position comprising a central support, at least one arm radiating outwardly from said central support and movable in a predetermined path about said support, drive means for moving said arm in said predetermined path and means interrupting movement of said arm at said first and second positions to facilitate respective engagement and disengagement of the same by skiers.

The invention is illustrated by way of example with reference to the accompanying drawings wherein:

FIG. 1 is a top plan diagrammatic view of a ski tow loading apparatus in accordance with the present invention;

FIG. 2 is a side elevational view taken substantially along line 2—2 of FIG. 1;

FIG. 3 is a similar view to FIG. 2 showing a modified drive mechanism;

FIG. 4 is a top plan view of a modified ski tow loading apparatus in accordance with the present invention;

FIG. 5 is a top plan view of a loading apparatus similar to that shown in FIG. 4; and

FIG. 6 is a side elevational view of the loading apparatus shown in FIG. 5.

Referring now in detail to the drawings, shown in FIG. 1 is a standard chair lift ski tow 10 and loading mechanism 30 arranged and constructed in accordance with the present invention.

The chair lift ski tow 10 consists of a cable 11 having double occupancy chairs 12 suspended therefrom in a conventional manner by arms 13 (see FIG. 2) at intervals spaced longitudinally along the cable. The cable 11 passes over a bull wheel 14 driven to rotate in a direction of arrow A moving the portion of the cable adjacent the loading mechanism 30 to the left as viewed in

FIG. 1 for taking skiers up the hill. The cable 11 passes around an idler wheel at the opposite end at the top of the hill in a conventional manner. Obviously other wheel and cable arrangements for the ski tow may be used.

The ski tow loading mechanism 30 consists generally of a carousel off-set to one side of the up-hill path of the chair tow. The loading apparatus 30 consists of a vertical mast or post 31 journaled for rotation on a support 32 by a bearing 33. One or more arms 34 are attached to the vertical post to rotate therewith and are directed radially outwardly therefrom. In the arrangement illustrated, two arms 34 are provided and located diametrically opposite one another. Obviously additional arms may be used if desired as will be seen from alternative embodiments described hereinafter or alternatively only one arm may be used. Each arm 34 is a weldment of rigid members (tubular pipes or the like) having an upper horizontal grab rail 35 and a lower horizontal grab rail 36 located vertically one above the other at the free end of the arm. The vertical height of grab rails 35 and 36 is chosen to provide, readily grasping the same, respectively by adults and children. The opposite end of the arm is pivotally attached to the mast 31 by a pair of brackets 37 located vertically one above the other. Each arm 34 is pivotally movable back and forth through a selected arc about pivots provided by brackets 37 by a mechanical or hydraulic pause mechanism 38, the purpose of which will become apparent hereinafter.

The mast 31 is driven to rotate about a vertical axis by a cable or chain drive 40 through a mechanism 41 attached to the upper end of the mast and at the opposite end to a mechanism 42 attached to the driven bull wheel 14 of the chair lift. The drive mechanism 41 is preferably a slip clutch or compensator mechanism to avoid injuries to skiers in difficulty holding on to or getting in the way of the grab rail during rotation of the mast 31. The slip clutch also permits readily adjusting synchronization of the arms 34 and chairs 12 should they for any reason not be in the desired phase relationship. This might occur for example through expansion or contraction effects on the cable 11. The cable 40 is located at sufficient elevation as to be overhead of the skiers.

An alternative drive arrangement may be provided, for example, at the base of the mast as illustrated in FIG. 3 wherein a short mast 31A is mounted for rotation about a vertical axis on the base 32 by a bearing 33. The mast 31A projects into the base 33 terminating at the lower end in a drive unit 41 driven by a cable 40 located underground. The cable 40 is driven by a mechanism driving the bull wheel 14 thereby synchronizing rotation of the carousel with movement of the chairs suspended from cable 11. If desired, the masts 31 and 31A may be provided with individual drive mechanisms such as an electric or hydraulic motor with controls therefor to synchronize rotation of the mast with movement of the ski tow cable 11.

The mast 31 is located to one side of the up-hill travel of cable 11 and the length of the arms 34A is such that two skiers, located side-by-side (only the skis are shown), grasping the hand rails 35 or 36 are brought, during rotation of the carousel from position designated A into a chair ski tow loading position designated B wherein they are in alignment with the path of travel of the chair. The skiers form a line behind a gate 50 and

proceed in pairs to an arm located, as shown in phantom, at the pick-up position designated A. In order to facilitate grasping the arms 34 at position A pause mechanisms 38 are arranged such that the arms momentarily stop at position A during rotation of the mast 31 and thereafter accelerate to a position A' wherein the arm rotates with the mast at the speed of rotation of the latter. At position B the arm 34 momentarily stops after which the skier releases his grasp on the arm and thereafter the free arm accelerates to the position B', the pair of skiers being left in an appropriate position at B to sit on the chair as it approaches them from behind.

The mechanisms 38 controlling the arms 34 are illustrated as consisting of hydraulic or pneumatic cylinders attached at one end to the arm 34 and at the opposite end to an arm 39 projecting rigidly outwardly from the mast 31. The hydraulic or pneumatic cylinders 38 are pressurized and a valving mechanism therefor (not shown) is controlled by a cam rotating with the mast 31 and which controls switches to direct the pressurized fluid alternately from one side of the piston to the opposite side thereby alternately extending and retracting the overall length of the unit 38 to move the arm as required to effect the pause and accelerating feature described in the foregoing. Alternatively, electric motors and reversible thread screw jacks or reversible motors and screw jacks may be used for the same purpose. Still further, the arms may be pivoted by a camming arrangement located in the connection of the arms to the column.

The mechanism 38, irrespective of what it might be, is arranged such that during rotation of the column 31 the arm 34 stops after reaching the position A and remains stationary momentarily during further rotation of the column 31 and thereafter accelerates to the position A'. In order to provide orderly loading at the position A, gate 50 may be timed to open allowing two skiers to pass through simultaneously in timed relation to passing of the arm 34 past the gate and before reaching the position A. This may readily be accomplished by electrically operated gates timed to open and close at appropriate intervals during rotation of the mast 31.

In the foregoing, the arms 34 are illustrated and described as being pivotally attached to the column and wherein the column is rotated continuously along with and in timed relation to movement of the chair lift cable. The arms 34 alternatively may be journaled for rotation on the mast and driven, for example, by an electric motor and drive train again to rotate in timed relation, through suitable controls for the motor, with movement of the chair lift cable. In such embodiment, not illustrated, one or more arms, preferably four, are rigidly secured to a bearing housing or collar rotatably mounted on the mast 31 and radiate outwardly therefrom. A pause mechanism 38 as previously described and which is an extendible and retractable unit is interconnected between the bearing housing having attached thereto the arms and the mast so as to move the collar and thus all of the arms in unison relative to rotation of the centre column 31. This provides the pause and accelerating feature for the free end of the arms at the pick-up position A and unloading position B for each of the arms.

In a still further alternative arrangement, each of the arms are variable in their effective radial length permitting the line of skiers and gate 50 to be located more

closely adjacent the pick-up position A. The arms as they are rotated from the unloading position B to the pick-up position A are retracted to by-pass a line of skiers awaiting and approaching the pick-up position. As the arms by-pass the line of skiers the arm adjacent thereto is extended to pass in front of the two skiers at the front of the line and at which time the arm is also in the pause state facilitating grasping the same by the skiers to be moved from such position to the ski tow loading position B. Changing the effective length of the arms is effected by having the free end portion of the arm pivoted. Each arm in such instance is an articulated unit with the free end pivotally movable preferably in the direction of rotation, shortening the effective radial length the arm extends from the mast in the portion of its path of travel at least while passing the line of skiers approaching position A.

A ski loading mechanism of the latter type having articulated arms is illustrated in FIG. 4. Six arms 34A are illustrated radiating outwardly from a post of the type shown and described with reference to FIG. 3. Each arm 34A consists of an inner portion 60 secured at one end to the post for rotation therewith or, alternatively, a collar journaled thereon as previously described and radiating outwardly therefrom. Each arm 34A has a further outer end portion 61 hingedly connected as at 62 to the inner arm portion 60. The outer end arm portion 61 is pivoted forwardly in the direction of rotation which is clockwise as viewed in FIG. 4 after the momentary pause at station B leaving the skiers in an appropriate position to be seated on a chair 12 approaching from the rear. The end arm portion 61 is pivoted to the full radial extent as it passes the skiers awaiting to grasp the bar at station A. Pivoting of the outer end arm portion 61 may be effected manually by the skiers or, alternatively, automatically by mechanism of any type, for example, hydraulic arms, cam members or the like. Details of one mechanism to effect such operation is described hereinafter with reference to FIGS. 5 and 6.

Referring to FIG. 5, there is illustrated a ski tow loading mechanism 70 having three arms 34A secured to and radiating outwardly from a driven mast 31A. The mast is driven from the bottom by an electric motor 71 drivingly connected to a mechanism 72 secured to the lower end of the mast 31A. The mast 31A is mounted for rotation in a support 73 consisting of a foundation slab 74 and an upper bearing plate 75. The plate 75 is supported on the slab 74 by three or more strut members 76. The post 31A is journaled in the bearing plate member 75 and also at the lower end 77 in a box-like member 78 depending from the slab 76.

Each arm 34A has an inner portion 60 and an outer portion 61 hingedly interconnected by a pin 62. The arm portion 60 is rigidly secured to the mast 31A and is reinforced by a strut member 63. Adjacent arms 34A are further interconnected by strut members 64. Rotation of the mast 31A effects movement of the arms 34A in unison about the vertical rotational axis of the mast. During rotation of the mast the outer free end of the arms 34A follow a path illustrated in phantom and identified by the reference numeral 80. The respective arms 34A are fully extended at the position designated A and which is the pick-up position and remain in such fully extended position until approaching a position designated C. At or about position C the outer end portion 61 pivots about pin 62 effectively folding the arm in the direction of rotation to decrease the distance the

outer end of the arm projects from the mast. This allows the free end of the arm to pass by a line of skiers awaiting to be picked up at position A. Pivotal movement of the outer end portions of the arms 61 is effected by a cam member 90 secured to the bearing plate 75 and which is engaged by a cam follower 91 for respective ones of the arms 34A. The cam follower is secured to a push rod 92 slidably mounted in brackets 93 mounted on the arm portion 60. The opposite end of the cam rod designated 94 pivotally receives a pin 95 secured to arm portion 61 and offset from the pivot axis of pin 62. Movement of the push rod 92 accordingly effects pivotal movement of the arm outer portion 61 about the pivot pin 62. The shape of the cam member 90 is designed such as to effect pivotal movement of the arm portion 61 about pin 62 whereby the outer free end of the arm follows approximately the path designated 80.

Suitable controls in the drive motor 71 are provided to effect a pause in the rotation of the post 31A when an arm is at the position designated A and again when the arm is at the position designated B. As previously described, this facilitates the skier's grasping of the arm 34A and releasing the same at the position designated B.

The cam follower 91 may either positively follow the surface of cam member 90 so as to effect a push-pull operation in push rod 92 or, alternatively, the outer end portion 61 of the arm may be spring biased to the fold position pressing the cam follower against the cam surface of cam 90. The arms 34A illustrated in FIG. 5 have the outer end portions 61 disposed perpendicularly to the portion 60 in an arm folded position. This requires pivotal movement of the outer end portion 61 about pin 62 through an arc of approximately 90°. This arc can, if desired, be increased such that during rotation of the post with the arm in a folded position the outermost point of arm 34A is the interconnection of the arm portions 60 and 61.

In FIG. 5 there is illustrated a staging area 100 wherein skiers approach the loading position A. The staging area 100 has a wall or fence 101 keeping the approaching skiers away from the moving arms 34A. An outer wall or fence 102 is spaced from fence 101 and provides effectively a corral area for appropriately lining the skiers up to approach the loading position A. From the loading position A to the unload position B there is provided two banked ski surfaces 103 and 104. The banked surfaces are separated from one another by a wall 105 and further walls 106 and 107 are provided respectively on opposite outer edges of the ski surface. Accordingly, there is provided effectively a banked ski guide for each skier from position A to position B. The ski surface may be an artificial ski surface or natural snow surface.

In the foregoing, there is provided a staging and loading device for ski tows preferably of the chair lift variety. The purpose of the device is to assist skiers, novice or experienced, in loading onto a chair lift. The purpose also is to provide a more efficient loading of the skiers onto the ski tow and thereby effectively increasing the loading efficiency and capacity of a normal ski tow in both new and existing installations.

We claim:

1. A ski tow system including

- a. a ski tow for moving skiers in sequence up-hill from one position to another by members spaced

from one another and movable in sequence along a selected path; and

- b. transport means for positively moving the skiers in sequence from the leading end of a line of skiers located at a predetermined pick-up position to a tow line loading zone,

said transport means comprising a central support having at least one arm radiating horizontally outwardly and rotatable about a vertical axis horizontally offset from said predetermined path and positioned to intersect such path in a tow line loading zone, drive means for rotating said arm about said vertical axis, and means momentarily interrupting movement of said arms at each of said skier pick-up position and tow line loading zone during each revolution of the arm about said vertical axis.

2. A ski tow system as defined in claim 1 including means synchronizing rotation of said arms about said vertical axis with movement of the ski tow members along said predetermined path.

3. A ski tow system as defined in claim 1 including means retracting the radial extent of each arm to bypass skiers at and approaching the leading end of the line of skiers, and means extending the radial extent of the arm immediately in front of the skiers at the leading end of said line.

4. Apparatus for moving skiers in sequence from the front of a line from a first pick-up position to a second tow line loading position comprising:

- a. a central support;
- b. at least one arm radiating horizontally outwardly from said central support and rotatable about a vertical axis to intersect the path of travel of a tow line;
- c. drive means for rotating said arm about said vertical axis;
- d. means interrupting movement of said arm in timed relation to rotation of the same during each revolution thereof about said vertical axis at each of said first and second positions to facilitate respective engagement and disengagement of the same by skiers at said first and second positions; and
- e. means varying the radial extent of each arm at pre-selected positions during each revolution thereof about said vertical axis.

5. Apparatus as defined in claim 4 including means pivotally mounting said central support on a base for rotation about a vertical axis and wherein said arm is secured to said central support for rotation therewith.

6. Apparatus as defined in claim 4 including means pivotally mounting said arms on said central support for movement through a selected arc.

7. Apparatus as defined in claim 4 wherein each of said arm is an articulated member having an outer end portion movable to vary the radial extent the free end of the arm projects from the central support.

8. In combination with a ski tow having members spaced apart from one another and movable in sequence along a predetermined path for moving skiers in sequence up a hill from a tow loading zone and transport means adapted to move skiers in an upright skiing position in sequence from the front of a line-up of skiers awaiting the ski tow to the ski tow loading zone in said predetermined path, said transport means comprising one or more horizontally extending arms rotatable about a vertical axis horizontally offset from said predetermined path, said arms having free outer end

portions passing through said ski tow loading zone during rotation thereof about said vertical axis, means retracting the radial extent of each arm to bypass skiers at and adjacent the leading end of the skiers, means extending the radial extent of the arm immediately in front of the skiers at the leading end of said line of skiers, and drive means for rotating said arms about said vertical axis for movement in the loading zone in a direction corresponding to the direction of travel of the ski tow members.

9. The combination as defined in claim 8 wherein said arms are rotated about said vertical axis in timed relation to movement of the members on the ski tow.

10. The combination as defined in claim 8 including means temporarily interrupting movement of said arms at each of the skier pick-up position and tow line loading zone during each revolution of such arm about said vertical axis.

11. The combination as defined in claim 8 including a ski guide for each skier extending from adjacent the skier pick-up position to adjacent the ski tow loading

zone.

12. A method of loading skiers on a ski tow having members spaced from one another and moving in sequence along a predetermined path passing through a ski tow loading zone comprising rotating an arm about a vertical axis horizontally offset from said loading zone and positioned such that a free end portion of the arm moves through the loading zone during rotation of the arm, reducing the radial extent of said arm from said vertical axis at a predetermined position of the rotation and thereafter extending said arm across in front of the leading end of a line of skiers at a second predetermined position spaced from said loading zone, one or more skiers grasping said extended arm and being moved thereby in an arcuate path from said second position to said loading zone and rotating said arm in timed relation to movement of said ski tow members, the direction of travel of the skier in the arcuate path adjacent the loading zone being in the same direction of travel as the members on the ski tow.

* * * * *

25

30

35

40

45

50

55

60

65