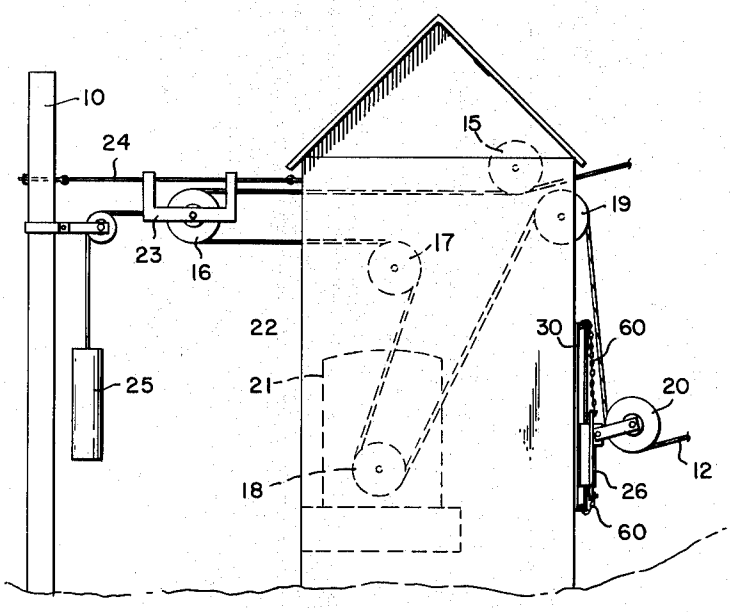
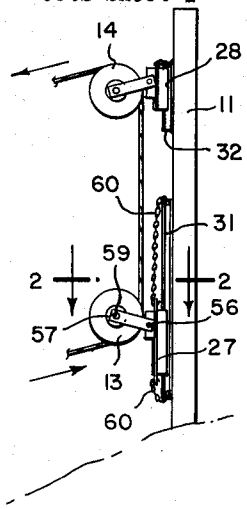
Dec. 7, 1965 R. D. WATT 3,221,667

ROPE TOW

Filed April 13, 1964 2 Sheets-Sheet 1

FIG. 1





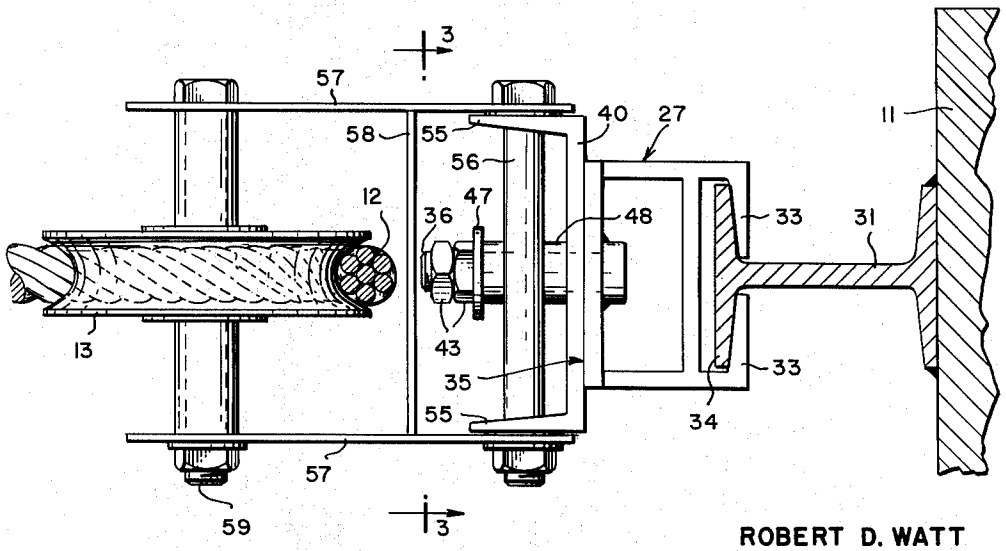


FIG. 2

ROBERT D. WATT
INVENTOR.

BY Seed & Berry

ATTORNEYS

Dec. 7, 1965 R. D. WATT 3,221,667

ROPE TOW

Filed April 13, 1964 2 Sheets-Sheet 2

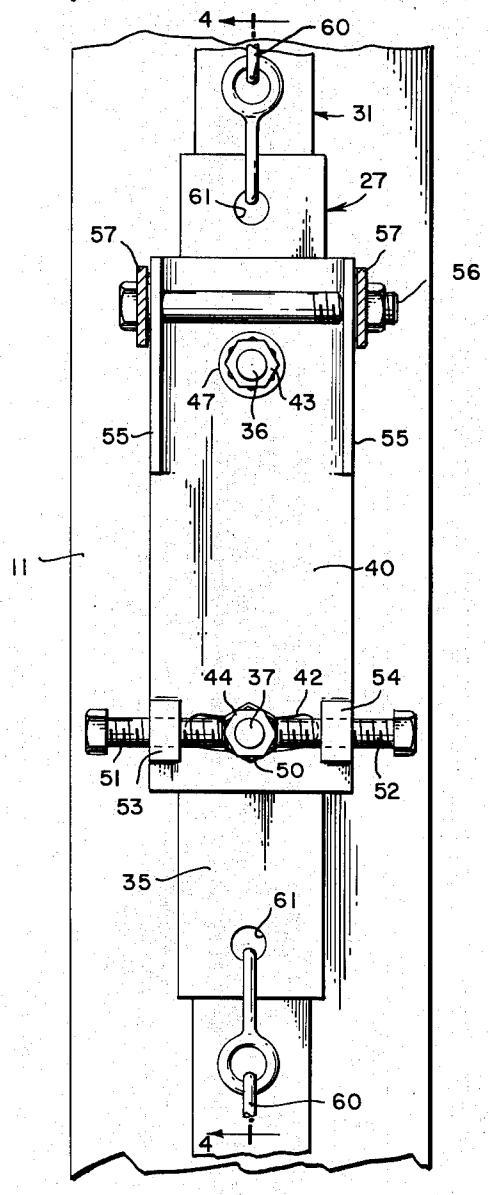


FIG. 3

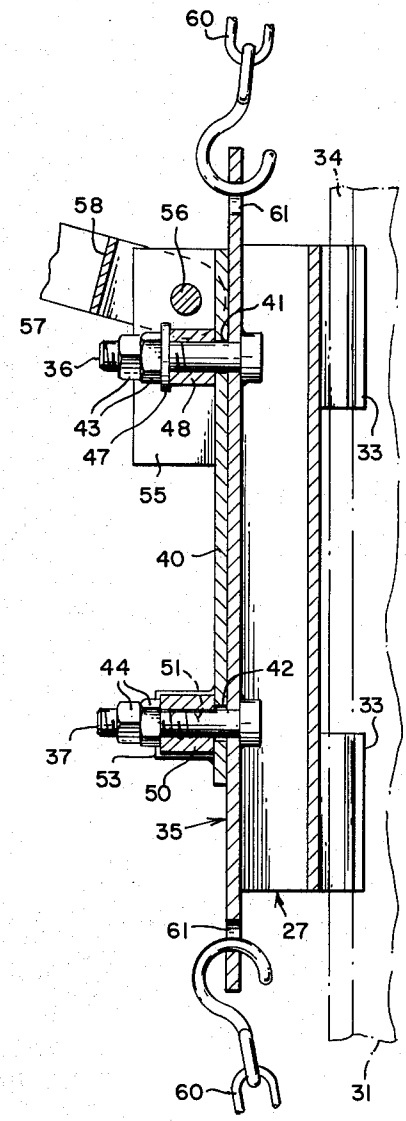


FIG. 4

ROBERT D. WATT
INVENTOR.

BY Seed & Berry

ATTORNEYS

United States Patent Office

3,221,667
Patented Dec. 7, 1965

3,221,667

ROPE TOW

Robert D. Watt, Seattle, Wash., assignor to Electro-Watt, Inc., Seattle, Wash., a corporation of Washington

Filed Apr. 13, 1964, Ser. No. 359,293
9 Claims. (Cl. 104—173)

This application relates to ski tows, and particularly that type of ski tow commonly known as a rope tow. Rope tows are characterized in that the skier grips a bare rope, riding his skis while pulled by such rope up a slope. The rope is endless, passing over a sheave or sheaves at each end limit of the run.

Rope tows as heretofore known have not been acceptable as "approved" equipment in many skiing areas from the fact that the ropes have been subject to twisting. This can be quite dangerous in that a user's wrist strap, glove, or sleeve can become caught between strands of the twisting rope. The twisting is attributable to the reaction of the lays of the rope as the rope bears against a sheave, or more especially a flange of the sheave, in passing over the sheave. For its principal object the present invention aims to provide a rope tow having a perfected sheave assembly so constructed and arranged that twisting of the rope can be substantially obviated. With this and other objects and advantages in view which will appear and be understood in the course of the following description and claims, the invention consists in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIGURE 1 is a fragmentary elevational view of a ski slope equipped with a rope tow embodying preferred teachings of the present invention.

FIG. 2 is a fragmentary horizontal sectional view drawn to an enlarged scale on line 2—2 of FIG. 1.

FIG. 3 is a fragmentary transverse vertical sectional view on line 3—3 of FIG. 2; and

FIG. 4 is a fragmentary longitudinal vertical sectional view on line 4—4 of FIG. 3.

In said drawings, and first having reference to FIG. 1, the numerals **10** and **11** denote mounting posts the former located at the down-hill end and the latter located at the up-hill end of a ski slope. An endless power-driven tow rope **12** extends between the two poles, being trained about sets of sheaves to provide a lower-level tow run and an upper-level return run. As here shown, the up-hill set is comprised of two vertically spaced sheaves **13** and **14**. The down-hill set is comprised of six sheaves **15, 16, 17, 18, 19** and **20**. The sheave **18** is a live sheave driven from a power plant **21** sheltered by a house **22**. Each of the other sheaves is free-running.

Generally considered, the several sheaves all occupy a common vertical plane, with the sheaves of the lower-level set so placed that the return run of the rope **12** first passes under the sheave **15**, and thence takes successive bights about the sheaves **16, 17, 18** and **19** before passing downwardly to and about the sheave **20**. Sheave **16** is carried by a carriage **23** mounted upon a guide rod **24** for slide movement in a direction endwise to the ski slope, and is tensioned, so as to maintain the rope in a taut condition, by a weight **25**.

For a purpose which will hereinafter appear, the down-hill sheave **20** and each of the two up-hill sheaves **13** and **14** receive their support from respective brackets, as **26, 27** and **28**, which are attached to respective I-beams **30, 31** and **32**. They are each so mounted that the plane in which the respective sheave lies can be canted within prescribed limits in either direction from center, and set at any selected point within the permitted range of this prescribed movement. The individual mounting is much the same for each of said three sheaves and a detailed

description of the sheave **13** will thus suffice for the sheaves **14** and **20**.

I-beam **31** lies perpendicular to the ground and is welded or otherwise rigidly secured to the post **11**. Bracket **27** is or may be a fabricated structure and at the back provides vertically spaced claw-feet **33** arranged to be slipped onto the outer flange **34** of the I-beam. The exposed front face **35** of the bracket is vertically elongated and flat, and occupies a plane normal to the plane in which the two runs of the rope lie. Two threaded studs **36** and **37** are made rigid with the bracket and project forwardly beyond said face **35**, one adjacent the upper end and the other adjacent the lower end thereof.

A swing-plate **40** seats upon the face **35**, having at its upper end a pivot-hole **41** to fit over the upper stud **36** and at its lower end an arcuate slot **42** developed about the drill-hole as a center and fitting over the stud **37**. Holding the swing-plate to the bracket are sets of jam-nuts **43** and **44**, with the former being applied to the stud **36** and bearing through a washer **47** upon a spacer **48**, and the latter being applied to the stud **37** and bearing upon a cross-head **50**. Set screws **51** and **52** threadably carried by lugs **53** and **54** located beyond the two ends of the slot bear upon diametrically opposite flats of the cross-head to permit said cross-head to be set at a selected adjusted position between limits prescribed by the slot.

Upstanding cheeks **55** project forwardly from the swing-plate at opposite sides of the pivot-hole **41**, and drilled through such cheeks on a coinciding transverse axis lying normal to the plate's major axis and preferably placed so as to give little more than bare clearance relative to the spacer **48** are holes accommodating a cross-pin **56**. Pivoted from this cross-pin is a yoke having its arms **57** rigidly connected by a cross-bar **58**. The sheave **13** is received between said arms of the yoke, being journaled upon a spindle **59** for free rotation about an axis paralleling that of the cross-pin **56**.

The brackets for the two sheaves **20** and **13** are each slidably adjustable upon the related I-beam, being set in the desired position by means such as the indicated chains **60**. Inner ends of these chains are hooked in eyes **61** which are provided at the upper and lower ends of the bracket. Outer ends of the chains engage suitable catches provided at the upper and lower ends of the I-beam. The purpose of this adjustment is to place the lower or tow run of the rope at a desired elevation above the snow level. Substantial changes in the snow level require compensating vertical adjustment of the brackets for the two lower sheaves. Should it be desired, the bracket for the upper sheave **14** can be welded in place in that this sheave does not require vertical adjustment.

An operator in adjusting the rope tow so as to obviate the objectionable twisting, first backs off both set screws from the cross-head of the upper sheave **14**. This allows the swing-plate for such sheave to "hunt", so to speak, as adjustment is being made to the two lower sheaves **20** and **13**. It has been found that this "hunting" positions sheave **14** in its proper plane as an automatic consequence of the lower-level adjustment. When the latter adjustment has been completed, the set screws for the upper sheave are set against the cross-head.

The lower-level swing adjustment is perforce made by taking up on one or the other of the two set screws **51** and **52**, responsively canting the plane of the concerned sheave in a direction such as to impose upon the rope, from the flanges of the sheave, a pressure which will work counter to any twist which the rope exhibits. The twist, working back along the run of a rope from a sheave over which the rope is trained, can be in either a clockwise or a counter-clockwise direction depending upon which of a sheave's flanges imposes dominating pressure upon the

"lays" of the rope. Trial and error allows an operator to ascertain the particular degree of cant, in one direction or the other from center, necessary to neutralize flange pressure.

It is believed that the invention will have been clearly understood from the foregoing detailed description of my now-preferred illustrated embodiment. Changes in the details of construction may be resorted to without departing from the spirit of the invention and it is accordingly my intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. In a rope tow, a set of sheaves including two pairs of guide sheaves one pair for the up-hill end and one pair for the down-hill end of a ski slope, individual mountings providing rotary journals for the two guide sheaves of each pair and placing the two sheaves one above another in longitudinal vertical planes which generally coincide, an endless power-driven tow rope of the twisted character trained over said set of sheaves and in its travel over the guide sheaves tracing a generally rectangular course first working downwardly from the upper to the lower sheave of the down-hill pair, thence progressing on a lower-level tow run to the lower sheave of the up-hill pair, and then working upwardly to the upper sheave of said up-hill pair before making an upper-level return run, the mountings for at least the lower sheaves in said two pairs of guide sheaves being each carried for adjusting swivel motion about a respective horizontal axis located normal to the concerned journal axis, and means for setting said adjustable mountings at selected points within a permitted range of swivel motion.

2. A rope tow according to claim 1 in which the mounting for the upper sheave of said up-hill pair is also carried for adjusting swivel motion about a horizontal axis normal to the concerned journal axis.

3. A rope tow according to claim 1 in which the mountings for said lower guide sheaves are vertically movable, and have means for setting the same at selected points within a given range of permitted vertical movement.

4. A rope tow according to claim 3, standards being provided at the up-hill and down-hill ends of the ski slope, said standards each providing a vertical slide-way, the adjustable mountings comprising brackets carried for slide motion by the slide-ways.

5. A rope tow according to claim 1, standards being provided at the up-hill and down-hill ends of the ski slope, said standards each providing a vertical slide-way, the adjustable mountings comprising brackets carried for slide motion by the slide-ways and each having a stud rigid therewith and extending horizontally inwardly of the course in the approximate plane of the rope tow, a respective yoke for each sheave having the sheave journaled for rotation in the space between the arms of the yoke, and a respective plate to which each yoke is attached pivoted for swing motion to the stud of the concerned bracket, the means for setting said mounting comprising: a second stud rigid with the concerned bracket and located in offset paralleling relation to the pivot stud and working in a slot provided in the swing-plate and developed on an arc having the pivot stud as its center, a cross-head fitting over said second stud, and opposing set screws carried by the swing-plate at opposite sides of the second stud and bearing against flats provided by the cross-head.

6. A rope tow according to claim 5 characterized in that the attachment of each yoke to its swing-plate places the rotary axis of the concerned sheave in close proximity to the horizontal plane in which the pivot-stud lies.

7. A rope tow according to claim 5, the attachment of each yoke to its swing-plate being a pivot attachment allowing vertical swing motion of the yoke about a horizontal axis located in close proximity to the pivot-stud.

8. A rope tow according to claim 5 in which the yokes position the concerned sheaves so that the plane which each sheave occupies contains the swing axis of the related swing-plate.

9. In a rope tow, a set of sheaves including two pairs of guide sheaves one pair for the up-hill end and one pair for the down-hill end of a ski slope, individual mountings providing rotary journals for the two guide sheaves of each pair and placing the two sheaves one above another in longitudinal vertical planes which generally coincide, an endless power-driven tow rope of the twisted character trained over said set of sheaves and in its travel over the guide sheaves tracing a generally rectangular course first working downwardly from the upper to the lower sheave of the down-hill pair, thence progressing on a lower-level tow run to the lower sheave of the up-hill pair and then working upwardly to the upper sheave of said up-hill pair before making an upper-level return run, the mountings for at least the lower sheaves in said two pairs of guide sheaves being each carried for adjusting motion permitting the sheave to be placed so that the longitudinal vertical plane which it occupies lies either parallel with or canted in either lateral direction from the longitudinal vertical plane which the related upper sheave occupies, and means for setting said adjustable mountings at selected points within a permitted range of said adjusting motion.

No references cited.

MILTON BUCHLER, *Primary Examiner.*