

MAD RIVER GLEN, SINGLE CHAIR SKI LIFT  
62 Mad River Glen Resort Road  
Fayston  
Washington County  
Vermont

HAER VT-38  
VT-38

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
U.S. Department of the Interior  
1849 C Street NW  
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

MAD RIVER GLEN, SINGLE CHAIR SKI LIFT

HAER NO. VT-38

LOCATION: 62 Mad River Glen Resort Road, Fayston, Washington County, Vermont

The Mad River Glen Single Chair Ski Lift is located at latitude: 44.202066, longitude: 72.918656. The coordinate represents the center of the Drive Terminal. This coordinate was obtained on 22 August 2007 by plotting its location on the 1:24000 Mount Ellen, VT USGS Topographic Quadrangle Map. The accuracy of the coordinate is +/- 12 meters. The coordinate's datum is North American Datum 1983. Mad River Glen location has no restriction on its release to the public.

DATE OF CONSTRUCTION: 1947

BUILDER: American Steel and Wire Company

PRESENT OWNER: Mad River Glen Cooperative

PRESENT USE: Recreational ski lift

SIGNIFICANCE: Mad River Glen is the home of the Single Chair Ski Lift, the longest and oldest operating single chair ski lift still in its original location in North America – a historical treasure for the ski industry. The American Steel and Wire Company designed and installed this patented aerial ski tramway. This technology was fundamental to the success of the Vermont ski industry and transformed the rural landscape, making it an important part of the state's industrial and environmental history.

HISTORIAN: John P. Johnson, 2007

PROJECT INFORMATION: The Mad River Glen Recording Project was undertaken by the Historic American Engineering Record (HAER) for the Mad River Glen Cooperative (Jamey Wimble, General Manager) prior to a major rebuilding of the single chair in 2006-07. The drawings were

prepared by Christopher H. Marston, HAER architect, with the assistance of Todd A. Croteau, HAER architect, and interns Adedotun Olugbenle, John Cochran, and Ashley T. Walker of Montgomery College. Jet Lowe produced the large format photography, and John Johnson wrote the history. This recording project was completed at the request of the Preservation Trust of Vermont.

### General Description

The Mad River Glen Cooperative in Fayston, Vermont, is the home of the Single Chair Ski Lift, also known as Chair # 1. The longest operating single chair ski lift still in its original location in North America, it is a historical treasure for the ski industry. The ski area is located on the northeast slope of General Stark Mountain in central Vermont. The tramway division of the American Steel and Wire Company designed and installed the Single Chair Ski Lift, a patented aerial ski tramway, in 1947. At the base of the ski lift is a bottom Drive Terminal (1600' elevation) that drives a wire rope up the mountain to a top Tension Terminal (3570' elevation). The bottom Drive Terminal features a large 10' diameter cast iron bullwheel that pulls the 1 1/8" diameter steel cable. An Allis-Chalmers diesel engine, located in the Vault Motor Room in the basement, drives the bullwheel. The Vault Motor Room is a reinforced concrete and steel structure built into a slope directly below an open, wood frame structure that houses the drive bullwheel assembly. This room contains an Allis-Chalmers diesel engine, a secondary General Motors diesel engine, a belt drive system, reduction gear shafting, a vertical drive shaft set into beveled gears, and a disc brake system, as well as a concrete counterweight connected to an hydraulic brake system located in the rear of the Vault Motor Room.

The Operator's Room is a two-story, wood frame structure located at ground level above the Vault Motor Room, on the south side of the Drive Terminal. The main upstairs Operator's Room contains several instruments used for running the lift drive system. To engage the diesel engine, there is an upper throttle and torque converter switch on the south wall (facing the lift line), which connects to a wire that runs through a magnetic solenoid that can stop the throttle through the emergency brake (e-brake). To run the chairlift, the operator first starts the diesel engine in the Vault Motor Room. He then puts the lift in drive by engaging the torque converter upstairs, and then pulls down the upper throttle, which activates the throttle on the motor.

Several safety features were built in, or added, to the chair lift to protect riders from equipment failure or accidental mishaps. These include motor kill switches, a service brake, a band brake, and a roll-back brake, described in detail below.

1. Motor Kill Switches - Several switches located upstairs and downstairs in the Operator's Room are linked to a magnetic solenoid switch that shuts down the motor during an emergency stop. The switches disengage the torque converter, which stops the rotation of the bull wheel. The system must be reset prior to reengaging the torque converter.
2. Service Brake - The service brake is controlled by red kill switch buttons located upstairs and downstairs in the Operator's House to stop the lift for brief incidents. The buttons are pushed to actuate a disc brake mounted on the reduction gear shaft in the Vault Motor Room. Actuator switches are also located on each tower and can be tripped by cable failures.
3. Emergency Band Brake - The e-brake system can be operated by one of the hydraulic switches mounted upstairs, downstairs, and outside the Operator's

- House. When the switch is turned on, a hydraulic cylinder is actuated to cause a counterweight in the lower level Vault Motor Room to drop several feet. The counterweight is connected to a lever arm in the upper Operator's Room by a wire cable, which draws the brake band tight against the bull wheel to stop its rotation. To release the band brake, the hydraulic cylinder is recharged by the hydraulic brake pump located in the upper Operator's Room and the counterweight is lifted off the floor, thus releasing the pressure on the band.
4. Bullwheel Roll-Back Dog - The bullwheel was retrofitted with a roll-back dog (or brake) that drops in between welded steel cogs to stop any backward movement. When the bullwheel is moving forward, a one-way wheel rolls alongside the cogs, and the roll-back dog stays in the up or open position. Once the bullwheel stops, the dog automatically rotates into the closed position, preventing a roll back.

Directly in front of the Drive Terminal is a loading area for skiers. Suspended from the haul rope by compression grips are 158 chairs, each carrying a single person with skis. The 1 1/8" diameter steel cable ascends and descends the mountain on twenty-one, riveted, steel lattice towers (and one tubular tower), each set in concrete piers, which guides the rope through sets of sheave wheels. The sheaves are made of cast steel with a diameter of 11 19/64", measured to the cable thread. The towers are numbered 1 to 22 from the base to the top, tower 2 is an 18" diameter steel tubular tower added later. Between towers 2 and 3 are two "deadmen", which are t-shaped, 6'-5" x 3'-0" concrete pads with cast iron anchors used for cable tensioning. The deadmen are basically hooks pinned to the hillside used to tie off the cable and are only used when changing out the lift cable, which was last done in 1980.

After beginning his ride on the chairlift at the bottom of the mountain, the skier may get off the chair at the Mid Station or may ride all the way to the top of the mountain, enjoy the views and then ski down one of the many ski trails. The Mid Station (2878' elevation) is located half way up the mountain, between towers 14 and 15. After tower 22 is the Tension Terminal at the ridgeline of the mountain. The Tension Terminal also has a 10' diameter bullwheel, where the rope terminates and turns back down the mountain. The bullwheel is housed in a tension carriage connecting to a separate tension cable supporting a concrete counterweight, which hangs in an adjacent counterweight tower. The single chairs, spaced at 63.8' intervals, travel at 525' per minute and can carry 494 skiers per hour up the mountain.

### Chairlifts Boost Vermont's Ski Industry

Skiing is Vermont's most important recreational industry and today this winter sport provides recreation, employment and critical tax revenues throughout the state. Another theme of this paper is how ski lift technology was fundamental to the success of the Vermont ski industry, how it transformed the rural landscape and is an important part of the state's industrial and environmental history.

Prior to the development of chairlifts, there were many inventions to meet the challenge of 'getting up the hill.' This challenge for alpine skiing had been solved in Europe with cog railways and aerial lifts. Although there were rope tows in Europe as early as 1908, the first rope tow for skiing was patented in Switzerland in 1931. Based on a successful rope tow installation in Canada during the 1932-33 season, the first in North America, rope tows appeared first on the mountains in Vermont and then spread quickly throughout New England. The 'Ski Way' in Woodstock, Vermont, was one of the first rope-driven ski lifts in the United States. In January 1934 a Model T Ford truck engine pulled skiers up a 900' hill, as they held onto a long loop of continuously moving rope. This was the beginning of an era of invention in getting skiers safely and quickly up the hill that led to early homemade rope tow contraptions at Shrewsbury, Corinth and Putney, Vermont. Unfortunately, learning to handle a rope tow was tougher than learning to ski.

During the 1935-36 season, one of two cable-driven ski lifts in New England was installed on Oak Hill near Dartmouth College in Hanover, New Hampshire. The first continuously operating overhead wire cable life, now called a J-bar, was meant to hook around one's waist. The American Steel and Wire Company (AWSC), a division of the United States Steel Corporation, was well known for manufacturing devices to transport materials by wire cables. AWSC, a New Jersey company, supplied the wire cable, and a local company designed the towers and erected the lift that was used by the Dartmouth Ski Team. Early surface lifts (rope tows, J-bars, and T-bars) all required the skier to stand up with skis on and hold on for the bumpy and perilous ride up the mountain.<sup>1</sup>

The advent of the chairlift, allowing the skier to sit down while wearing skis, was a safe and simple device that the public accepted enthusiastically. It was also the most cost-effective way to transport the expanding crowds of skiers up the mountain. Based on ASWC's engineering work in New Hampshire, the world's first single chair ski lift was designed and installed at Sun Valley, Idaho in December 1936. New England's first single chair lift was constructed in Gilford, New Hampshire at the Belknap Recreation Area (today Gunstock) in January 1938. By eliminating the uphill climb, ski lifts overcame the power of gravity and set in motion enduring expectations that skiing should demand only as much human energy as needed for the downhill run. Chairlifts gave skiers an opportunity to sit down, rest, and save energy for a greater number of ski runs per day.<sup>2</sup>

Forested mountains cover northern New England. The development of ski trails in the modern sense - in contrast to farmer's meadows, logging roads and winter

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<sup>1</sup> For an introduction to early ski lifts in New England, see: Allen Adler, *New England & Thereabouts-A Ski Tracing* (Barton, VT: Netco, 1985), especially Chapter 4, "New England-Vermont: The Green Mountain State," pp. 49-65; E. John B. Allen, *From Skisport to Skiing: One Hundred Years of an American Sport, 1840-1940* (Amherst: University of Massachusetts, 1993), pp. 109-114, 162; Perry H. Merrill, *Vermont Skiing: A Brief History of Downhill and Cross Country Skiing* (Montpelier, VT: Merrill, 1987); Morton Lund and Kirby Gilbert, "A History of North American Lifts," *Skiing Heritage* (September 2003), pp. 19-25. One of the country's first three, single chair ski lifts was originally located in Sun Valley, Idaho, but was relocated to Mount Eyak Ski Area in Cordova, Alaska where it remains in operation.

<sup>2</sup> Allen, p. 113.

tramping trails – was a direct result of the popularization of ski lifts. The Depression also had a significant impact on this development as funds were channeled to the Civilian Conservation Corps (CCC) to cut the first ski trails and roads up the mountains in Vermont. Vermont's Forest Service director, Perry H. Merrill, arranged to have CCC crews cut trails in the summer of 1933 on Mt. Mansfield in Stowe.<sup>3</sup>

Roland Palmedo (1894-1977), an investment banker for the firm of Brown Brothers Harriman on Wall Street as well as a founder (1931) and president for ten years of the Amateur Ski Club of New York, was influential in bringing the first chairlift to Vermont. In 1933, he built a 'ski house' in East Dorset, Vermont.<sup>4</sup> In 1932 Palmedo's skiing interests focused on Mt. Mansfield in Stowe. At Stowe, Palmedo was active in the formation of one of the earliest ski patrols in the United States in January 1936. Commercial operation of the first rope tow began in Stowe in February 1937. By 1938 Palmedo and his friend, James N. Cooke, recognized the potential of the new chair lift technology and began soliciting investors for a 6,000' chairlift up Mt. Mansfield, Vermont's highest peak (4,393') in Stowe. Roland Palmedo was President and James Negley Cooke was the Vice-President of the Mt. Mansfield Lift Inc., which financed construction of the first chairlift in Vermont to the top of Mt. Mansfield for the 1940-41 season. This single chairlift, constructed by the ASWC, was the longest (6,330') in the world at the time and opened in December 1940. It carried eighty-six single chairs and the ascent took less than fifteen minutes. This second chair lift in the East put Stowe on the map as the 'Ski Capital of the East' and launched the recreational skiing industry in Vermont. Fast, overhead, cable-lifted non-detachable chairs welcomed thousands of New Englanders to the exciting sport of alpine skiing.<sup>5</sup>

In 1940 the T-bar, for lifting two people, made its first appearance in North America on Pico Peak near Rutland, Vermont. The T-bar was a Swiss design engineered by the wire rope manufacturers J. A. Roebling & Sons of Trenton, New Jersey. During the next two decades the number of T-bars built far surpassed the number of chairlifts. With so many and varied up-ski devices, a Ski Tow Owners Association was formed to look for technological answers to accommodate the ever-increasing crowds. Before the Second World War, the new Vermont ski industry could boast of its first aerial ski lift, the single chair, as well as rope tows, J-bars, and T-bars.<sup>6</sup>

Following the war, Cornelius Vander Starr financed the installation of a second ski lift at Mt. Mansfield, a 4,000' T-bar lift, which opened in the 1946-47 season. At this time, five business interests had claims on mountain activities with no centralized

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<sup>3</sup> Adler, pp. 54-55; Allen, p. 114; Merrill, pp. 28-29.

<sup>4</sup> The house is still in the family.

<sup>5</sup> Luther S. Booth, "Ski Patrol," *Vermont Life* 2, no. 2 (Winter 1948): pp. 46-47; Adler, pp. 55-59; Merrill, pp. 28-30; Craig O. Burt, *We Lived in Stowe: A Memoir* (Middlebury, VT: Ranch Camp, 2003), pp. 129-134; Blake Harrison, *The View from Vermont: Tourism and the Making of an American Rural Landscape* (Burlington: University of Vermont, 2006), pp. 169-170; John Fry, *The Story of Modern Skiing* (Lebanon, NH: University Press of New Hampshire, 2006), p. 21.

<sup>6</sup> Allen, pp. 112-114; Adler, pp. 62-63; Lund and Gilbert, "A History of North American Lifts," pp. 19-25.

responsibility. Starr consolidated these competing interests, and by 1953 he was Chairman of the Board of the new Mt. Mansfield Company, Inc. Roland Palmedo and James N. Cooke, traditionalists disenchanted with the commercial growth and competing interests at Stowe, sold their interests in the chairlift operation during Starr's consolidation trend. Palmedo and Cooke looked 28 miles south of Stowe on Route 100 where, with help from the membership of the Amateur Ski Club of New York, they led the development of another ski area in 1946-48.

As skiing became the winter sport of choice for many social and economic classes, the crowds multiplied and the practice of replacing single chair lifts with double (seating two), then triples (seating three) and later quads (seating four) was repeated throughout the New England ski industry. A quad replaced Stowe's first single chairlift in 1989 and left the distinction of the oldest single chair ski lift in Vermont to Mad River Glen.<sup>7</sup>

The success of winter tourism in Vermont depended on the ability of promoters. Fred Harris, from Brattleboro, Vermont, was an early promoter of winter sports. Harris founded the now famous Dartmouth Outing Club and in 1912 wrote the essay "Skiing and Winter Sports in Vermont" to popularize the sport. From the middle of the 1930s forward, engineers and ski entrepreneurs worldwide manufactured an astounding array of ski lifts, trail-grooming technologies, and snowmaking systems, all of which allowed them to create and expand upon a decidedly technological leisure landscape. Ski industry technology was a powerful tool in reworking the landscape of rural Vermont. Writing in 1937, Roland Palmedo observed that "the sport of skiing has reached a certain maturity of development, a recent universality, which makes the present an appropriate moment to record the past and survey the present scene."

Charles Edward Crane's 1941 book *Winter in Vermont* was the most thorough attempt to teach visitors to appreciate winter's moods, beauty and charm. Crane's book helped to construct a scenic identity for winter that rivaled summer and fall. Residents were encouraged to re-envision winter in terms of its economic value through its association with tourism; snow had now become 'white gold.' Skiing spread dramatically in the postwar years along the high, central spine of the Green Mountains, where skiers could find the state's highest rates of snowfall and most challenging terrain. In the decades following World War II, skiing became an important tourist activity. Owners of ski areas used radio, magazines, newspapers and brochures to advertise annual improvements to trails, ski lifts and other services. The sport's popularity boomed when middle-class Americans embraced skiing both as a recreational outlet and as a forum of economic self-expression during a period of national economic prosperity. Vermont emerged quickly as a regional and national leader in skiing.<sup>8</sup>

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<sup>7</sup> A. W. Coleman, "Snow Corner of New England," *American Ski Annual and Skiing Journal* (1949), pp. 91-94; Adler, pp. 60-61; and Merrill, pp. 28-30.

<sup>8</sup> Fred M. Harris, "Skiing and Winter Sports in Vermont," *The Vermonter* (17 November 1912), pp. 677-681; Roland Palmedo, *Skiing: The International Sport* (New York: Derrydale Press, 1937), p. xxi; Charles Edward Crane, *Winter in Vermont* (New York: Alfred A. Knopf, 1941); Harrison, *The View from Vermont*, pp. 145-152, 165-186.

Roland Palmedo and James Negley Cooke distanced themselves from the competing interests and expanded commercial development at Stowe and financed a new ski area after the war. As early as 1945 the State of Vermont conducted a survey to discover suitable locations for a major integrated ski development. In March 1946, Palmedo and Cooke found the site for their dreams on General Stark Mountain in Fayston. Palmedo and Cooke formed the Mad River Corporation in November 1946 and began acquiring land on Stark Mountain. Palmedo served as President while Cooke held the position of Vice-President. They named their project Mad River Glen, after the Mad River that flows in the valley on the Waitsfield side of the mountain.<sup>9</sup>

After surveying twenty-six possible locations, ten factors led Palmedo and Cooke to invest in timberland on the mountain in Fayston. First, Stark Mountain (3570') had a north-facing elevation that was perfect for retaining snow cover throughout the winter; its altitude, exposure and terrain were just about perfect. Second, ski trails and lift line locations could be designed to create a variety of experiences. Third, the site was accessible from the CCC-constructed, year round McCullough Turnpike from the valley. Fourth, accommodations were available in private homes and ski lodges could be constructed on both this highway and Route 100 in the valley. Fifth, there was a village with services and other social attractions in the valley. Sixth, they had the support of the valley's residents. Seventh, they had the available capital from serious investors. Eighth, they had the management skills to plan and operate a ski area. Ninth, they could call on the ASWC to design and install a state-of-the-art single chair ski lift to fit the contours of the mountain. And tenth, Mad River Glen was only 14 miles from the Middlesex station where the 'Montrealer' and the 'Washingtonian' stopped on the mainline of the Central Vermont Railway to bring skiers from urban areas on 'snow trains' to skiing in the Green Mountains. Due to these factors, they predicted an economic success.<sup>10</sup> On January 30, 1946, Roland Palmedo wrote Gordon H. Bannerman, chief bridge and tramway engineer for ASWC: "I hope you will go ahead with orders for critical materials and with your studies. I am making arrangements for a survey, and in this connection should like to have your requirements and instructions." On March 26, 1946, James N. Cooke wrote to Roland Palmedo,

Nancy (his wife), Charlie (Lord) and I are completely convinced that Start is an ideal location ... Charlie will substantiate that the snow is equally as good at every altitude as on Mt. Mansfield, and that the skiing possibilities are much greater than Mr. Mansfield . . . We have a very big advantage in that a \$125,000 road was constructed by the CCC from 'Camp' on your map to the gap, just

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<sup>9</sup> Correspondence, J. N. Cooke, Vice President, Mad River Corporation, to Mr. Diamond, February 27, 1947, Mad River Glen File, Mad River Glen, Office of Marketing; Coleman, "Snow Corner," pp. 91-94; Jeff Leich, "The Genesis of Mad River," *The Echo: The Voice of the Mad River Glen Community*, May 2006, p. 8.

<sup>10</sup> Jan Wilhelm Sissener, *The Ski Lift Business in New England*, Federal Reserve Bank of Boston, Research Report, No. 11 (Boston: Federal Reserve Bank, 1960), p. 15.

south of Little Stark Mountain . . . Our real estate investment would be far less than in Warren, we would own the entire mountain, including the top: we would not have either the State or Federal Government to contend with.”<sup>11</sup>

Vermont Governor Ernest W. Gibson signed a bill in the 1947 legislative session approving the sale of land bordering the A. I. McCullough Turnpike (less the 50' road right of way) to the Mad River Corporation. The Civilian Conservation Corps (CCC) constructed the turnpike in 1933. This road project ran for 4.5 miles from Route 100 in the valley to a parking loop at the new ski area. Palmedo and Cooke believed that the state would vastly improve, as well as maintain, the turnpike (later renamed Route 17) so that the ski area would be accessible throughout the year. Dan Kiley and Associates of Franconia, New Hampshire, specialists in site, recreational and regional planning, were hired to study the development potential of the area. There was no public offering of stock in the Mad River Corporation, rather it was offered to private friends and acquaintances of Palmedo and Cooke. When the offering was made, the corporation had already acquired and had purchase options on 1650 acres or just over 2.5 square miles on General Stark Mountain.

Robert Schwarzenbach, a member of the 1940 U.S. Olympic ski team, surveyed and laid out the first trails on the northeast slopes of General Stark Mountain.<sup>12</sup> There were five trails cut through the forest in the summer of 1947; three expert trails from the top of the mountain and two intermediate trails from the midway station. Charles D. Lord, who had engineered most of the trails on Mt. Mansfield, and Nancy Reynolds Cooke, the former national women's ski champion, assisted Schwarzenbach. A Palmedo biographer would later write that “Mad River Glen, with its tricky but beautiful trails, is a Palmedo creation, pure and simple.” Alexander ‘Sandy’ McIlvaine (1910-1985), an architect from New York City, designed two warming shelters: ‘Stark’s Nest’ at the top and ‘Base Box’ at the bottom of the mountain. The ‘Base Box’ has very large glass windows on the southern elevation for passive solar heating and with several additions is still in operation.<sup>13</sup> McIlvaine would continue a career in designing ski resorts at Squaw Valley in California, Lake Geneva in Wisconsin and Stratton Mountain in Vermont in 1961.

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<sup>11</sup> Roland Palmedo to Gordon H. Bannerman, January 30, 1946, Correspondence, New England Ski Museum Collection, File: Bannerman, Gordon, American Steel & Wire Company, 1987 L. 8.1; J.N. Cooke to Roland Palmedo, March 26, 1946, Correspondence, New England Ski Museum, File: Roland Palmedo Letters, 1987 L.8.1.

<sup>12</sup> None of the team members competed as the 1940 Winter Olympics were cancelled due to World War II.

<sup>13</sup> Correspondence, Dan Kiley and Associates, Architects and Planners to Mad River Corporation, January 6, 1947, Mad River Glen File; Pat Harty, “Vermont’s Top Drawer Ski Center,” *Boston Globe*, October 31, 1948; “\$400,000 Mad River Glen Ski Development Dedicated by Governor Gibson in Vermont,” *New York Times*, December 12, 1948; Fred Hawthorne, “Mad River Glen Ski Project a Tribute to Engineering Feat,” *Boston Herald*, December 15, 1948; Roland Palmedo, “Trails and Mad River,” *American Ski Annual* (1949); Alexander McIlvaine, “Solar Shelter at Mad River,” *American Ski Annual* (1949); Martin Luray, “The Remarkable Mr. Palmedo,” *SKI* (January 1959), p. 65.

In 1947 Mad River Glen contracted with the American Steel & Wire Company to engineer, design, fabricate and partially install a state-of-the-art single chairlift. At this time, single chairs were the only chairlifts available; doubles, triples, and quads would be the preferred choice of large, development-oriented ski resorts of the future. Fortunately, the proposed lift line crossed a short, nearly flat, shelf at about the 2,800' level, perfect for a Mid Station. Construction of the chairlift began in the summer of 1947 but because of an early snow fall, several lift towers were not completed in time for the winter season. Mad River Glen's Chair # 1 is a single chair monocable chairlift with an initial lifting capacity of 200 pph (people/per/hour) and an ultimate capacity of just over 400 pph. The original sixty-nine chairs were spaced at 165' on the wire rope and with the addition of seventy-one chairs in 1955, a capacity of 400 pph was realized. Later, eighteen more chairs were added to bring the capacity up to 450 pph for a current total of 158 chairs. In 1989, twenty of the original chairs were replaced with chairs that had an improved design for the footrest. Since 1947, the Single Chair Ski Lift has had some modifications and in general has had a remarkable operational and safety record for its age of sixty years. A detailed engineering evaluation in 2004 reported other modifications since 1947 to the equipment, towers and electrical system that operate the single chair. Modifications since 1947 included:

1. The Counterweight Tower and Terminal were pulled over during a rigging incident tie off, due to a change of temperature that contracted the haul rope. The rear uphill footing at the Counterweight Tower was pulled out of the ground and the downhill 'A' frame was bent downhill. A new tower (2) was constructed and pinned to rock, as well as a new uphill footing.
2. Tower 9, during a removal of chairs for maintenance, had a chair hang up in the downhill tower and entirely pull down the tower. The uphill pier was entirely pulled out of the ground. The pier and tower were repaired.
3. Tower 16 also had a chair hang up in the tower and twisted the top steel latticework. The twist was not removed, but a new cross arm was welded to the top of the lattice tower.
4. Tower 18 had a chair hang up in the tower and required new alignment and adjustment.
5. Towers 3 and 11 needed the tower base shimmed to realign the haul rope.
6. The bullwheel shaft failed due to fatigue several times at the Counterweight Tower and Terminal.
7. Changes at the Bottom Terminal included: reworked ring gear, new diesel motors, addition of roll-back dog on the bullwheel, a new service brake arrangement, adjustments and other work to remove gearing vibration and fatigue problems, and a new low voltage control system.

The single chair at Mad River Glen was the fifteenth passenger lift constructed by the ASWC. The bottom drive terminal with a large cast iron drive bullwheel, a top tension terminal with cast iron bullwheel and counterweight, twenty-one lift towers (one additional tubular tower was installed in 1958 near the base), and installation of the first sixty-nine chairs had been completed by the fall of 1947. The chairs are suspended on

more than 2 miles of 1 1/8" diameter steel cable. The prime mover was a 140 horse-power diesel motor, the largest ever used for such a purpose. A rack-and-pinion gear system connected the engine directly to the bullwheel that drove the wire cable with the attached chairs up the mountain. The operation required six or seven employees, with the lift moving seven hours a day every day for about 120 days in the winter season. In about twelve minutes the chair carried a skier 1970' vertical in 1 mile, from 1600' at the base to 3570' at the summit. This \$150,000 engineering achievement was the second chair lift in Vermont and placed Mad River Glen as the only rival to the 1940 chairlift at Stowe.<sup>14</sup>

To start the trip up the mountain, the skier steps up to the wooden deck loading platform and takes a seat on a chair as it is carried along the overhead moving cable. The rider closes a safety handle, puts his feet on the footrest and settles back to enjoy a solitary, smooth climb up the mountain. A few minutes later, at the crest of the hill, the rider simply skis off and prepares to ski down one of the trails. At the top of the mountain, Vermont's famous Long Trail runs along the ridgeline and provides breathtaking views west to the Adirondack Mountains of New York and east to the White Mountains of New Hampshire.<sup>15</sup>

Vermont Governor Ernest Gibson joined Master of Ceremonies Palmedo, Cooke, Miss Vermont Jean Peatman, and lift operator, George O'Neill, for the official dedication of Mad River Glen on December 11, 1948. Unfortunately a lack of sufficient snow prevented the assembled dignitaries from enjoying the lift ride up and skiing back down the mountain. About 600 people did take advantage of the free ride up the mountain for the view and all the major Vermont newspapers predicted success for this new \$400,000 ski development in the East. The enterprise was a bold venture; in the winter of 1948-49 skiers had no less than fifty-five ski areas to choose from in Vermont, including Stowe, Bromley, Pico and Ascutney Mountain.<sup>16</sup> The rising profitability and popularity of skiing transformed the meanings and images of snow from a winter liability and a nuisance to an opportunity and a revenue-generating asset.<sup>17</sup>

By late January 1949, there was sufficient snow cover to begin full time operation of the single chairlift at Mad River Glen. Palmedo promoted the trails and ski touring opportunities in the ski industry journals with Mad River Glen's big advantage, a new single chair ski lift. The new ski area was a huge success and by the opening of the second season in December 1949, journalists referred to Stowe and Mad River Glen as the 'Snow Corner of New England.' The Mad River Association, made up of everyone in

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<sup>14</sup> Coleman, pp. 91-94; Cooke to Diamond, Correspondence; Lund and Gilbert, pp. 19-25; Doppelmayr CTEC, "Estimate and Specifications for Chair #1, Retrofit for Mad River Glen," December 9, 2004.

<sup>15</sup> Jane Curtis and Will and Frank Lieberman, *Green Mountain Adventure: Vermont's Long Trail* (Montpelier, VT: Green Mountain Club, 1985), p. 63.

<sup>16</sup> "Ski Vermont, Vermont Ski Areas," *Vermont Life* 3, no. 2 (Winter 1948-1949): p. 53.

<sup>17</sup> Blake Harrison, "Tracks Across Vermont: *Vermont Life* and the Landscape of Downhill Skiing, 1946-1970," *Journal of Sports History* 28, no. 2 (Summer 2001): p. 257.

the valley with a business interest in the new ski area's future, contributed to the success at Mad River Glen.<sup>18</sup>

Roland Palmedo was a pioneer in Vermont's ski industry. He recognized the value of skiing as art, aspiration and achievement due to his personal connection with the nature of the forested mountain. For Palmedo and his successors at Mad River Glen, skiing was a near-spiritual endeavor, not simply weekend recreation, and his successors continued this aesthetic environmentalism. In 1959 Martin Luray wrote a brief biography of Palmedo for *SKI* magazine and said "Palmedo, there is no doubt, is an original." He went on to describe him as a "naval aviator, pioneer flyer, winter sports photographer, writer, mountain climber, ski area developer, world traveler and most recently, white-water kayak expert." Ski industry historian Jeffrey R. Leich recently wrote that Palmedo "was America's Renaissance man of skiing." Roland Palmedo planned Mad River Glen along principles directly opposed to all the major American skiing developments. In the long run Mad River Glen's lean and ascetic approach proved to be powerful branding. Palmedo died in 1977 and his personal library of skiing history became the nucleus of the Palmedo Ski Library at the National Ski Hall of Fame and Museum (1954) in Ishpeming, Michigan. Palmedo was inducted into the National Ski Hall of Fame in 1968 and the Vermont Ski Museum Hall of Fame in 2006.<sup>19</sup>

#### American Steel and Wire Company

The tramway division of American Steel and Wire Company (ASWC) had its beginning in 1887 at the Trenton Iron Company (1847) plant in Trenton, New Jersey. The 'Bleichert' double-rope tramway system, named for German engineer Adolph Bleichert (1845-1901), was patented in the United States in 1888. The country's first builder of aerial tramways, Cooper, Hewitt & Company, who operated the Trenton Iron Works to manufacture tramways for the mining industry, acquired the Bleichert patents. Despite the then dominant hold of single-rope tramways on the western market, the Trenton Iron Company, which manufactured both the rope and the machinery, advertised in mining journals with gratifying results. Within a few months over two hundred companies had asked for particulars and several had signed construction contracts. Although eastern coal mines and quarries provided the majority of early orders, the lure of western profits saw the Trenton Company entering the Rocky Mountain region just as the boom of the early 1890s exploded. Western mine tramways hauled mine products ranging from gold, silver and copper to gypsum and coal. In 1889-1890 the Trenton works completed the construction on two silver-ore tramways at Aspen, Colorado.<sup>20</sup>

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<sup>18</sup> Baird Hall, "Mad River Glen at Fayston—'they did it on purpose'," *Vermont Life* 4, no. 2 (Winter 1949-1950); Roland Palmedo, "Ski Touring From Stark Mountain," *Appalachia* (December 1951), pp. 535-539.

<sup>19</sup> Luray, (December 1959), pp. 28-29, 71-78 and (January 1960), pp. 28-29, 63-67; Jeffery R. Leich, "Amateur Ski Club of New York," *Journal of New England Ski Museum*, Issue No. 67 (Winter 2006-2007), p. 15; Morten Lund, "Mad River Glen: Yesterday Forever," *Skiing Heritage* (December 2006), p. 32.

<sup>20</sup> Robert A. Trennert, *Riding the High Wire: Aerial Mine Tramways in the West* (Boulder, CO: University of Colorado, 2001), pp. 9-13, 24-25, 30-35.

The arrival of the Bleichert design in the United States sparked a contest between advocates of the German double-rope system and the American single-rope system developed by Andrew Smith Hallidie (1836-1900). Like his contemporary John Roebling, Hallidie did not confine his business to the production of wire rope and building bridges. A fascination with aerial transportation led Hallidie to experiment with cable tramways beginning as early as the late 1860s. The construction of single-rope tramways reached a peak during the 1890s. American Steel and Wire remained the “market leader and aggressively sought customers” for the cable technology.<sup>21</sup>

In 1901, the United States Steel Corporation purchased ASWC and operated the company as one of its subsidiaries. ASWC absorbed the Trenton Iron Co in 1905 and began producing steel cable, also known as ‘wire rope.’ ASWC began using the Trenton-Bleichert system of aerial tramways to transport ores, coal, crushed stone, slate, clay, sand and all kinds of raw materials. Motion was imparted to the material carriers by means of a comparatively light endless wire rope, commonly known as a traction rope, to which the carriers were gripped. The system was also well adapted to the conveyance of fruits, cereals, cordwood and sawmill products, manufacturers’ supplies, refuse, materials in process of manufacture and merchandise of all kinds (particularly products requiring careful manipulation, such as explosives, liquids, and glassware). In 1914, the company advertised that “The ruggedness of contour, steepness of grades, and width of valleys or rivers, are no bar to the successful operation of such a line.” The company had developed a ‘locked-coil track cable’ and ‘patent compression grips.’ By 1930 ASWC used the Bleichert system, already in general use in Europe, to design and construct aerial tramways as transportation for sightseers. In 1936 ASWC engineered the installation of the Dartmouth Ski Tramway at Oak Hill in Hanover, New Hampshire on a 5/8 inch steel cable. In 1937-38, the company engineered and erected the first aerial passenger tramway in New England, a ‘cable car’ for twenty-seven passengers, at Cannon Mountain in Franconia, New Hampshire. The company’s 1938 catalog advertised ‘ski tows’ (J sticks) and their patented ‘aerial ski chair ropeways’ that were offered as the “the finest type of equipment in the whole field.”<sup>22</sup>

James Michael Curran (1903-1968) designed an endless conveyor system for United Fruit to load and unload bananas into and out of the holds of ships. Curran attached hooks to a wire rope that ran over a series of pulleys suspended from lattice towers. In 1927, Curran became a draftsman for the Union Pacific Railroad in Omaha, Nebraska. The company planned to develop Sun Valley in Ketchum, Idaho, into a destination ski resort for the expanding and lucrative railroad passenger business. Averill Harriman, president of the railroad, asked James Curran, who had worked his way up to

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<sup>21</sup> Trennert, pp. 24, 30-35, 99-100.

<sup>22</sup> William Hewitt, “Bleichert System of Wire Rope Tramways,” (Trenton, NJ: Trenton Iron Company, 1897); Lund and Gilbert, p. 23; American Steel and Wire Company, “Trenton-Bleichert System of Aerial Tramways,” 1914; American Steel and Wire Company, “Aerial Tramways for Passenger Transportation, American-Bleichert and American-Bleichert-Zuegg Systems,” 1930; American Steel and Wire Company, “Aerial Tramways for Passenger Transportation: Ski Tows and Ski Chair Ropeways,” 1938. American Steel and Wire Corporation publications from Bennington Museum, Bennington, Vermont.

bridge engineer, to design a fixed-grip, mono-cable chairlift, similar to the banana conveyor system. In addition to designing the chair, a team of three men also solved the engineering challenges of the cable clamping methods, cable size and speed, tower configurations, drive and return station plans, engine type and horsepower, to name just a few. After Curran designed the prototype for the world's first practical chairlift in 1936, he submitted blueprints to ASWC's engineer Gordon H. Bannerman, and the company was selected to build the first chairlifts at the Sun Valley ski resort.

The three inventors of the country's first Aerial Ski Tramway: Gordon H. Bannerman, (then working at the Worcester, Massachusetts office of ASWC), James M. Curran and Glen H. Trout (then working at the Omaha, Nebraska office of the Union Pacific Railroad) filed a patent application on November 17, 1937. The patent, containing only six small line drawings and two pages of description, was assigned to the ASWC of New Jersey. The patent claimed that the tramway would "carry the skiers in an absolutely safe manner so that regardless of their peculiarities it is practically impossible for them to be injured." The United States Patent Office awarded this patent on March 28, 1939.<sup>23</sup> A copy of this patent is an appendix to this report. The installation at Mad River Glen matches the patent except for the "hand line" to assist skiers onto the moving chair.

The patented Aerial Ski Tramway revolutionized the sport of skiing by designing a relatively simple and moderately inexpensive aerial transport system for comfortably and quickly getting skiers up a mountain. Curran shared a patent for the single chair, and for this engineering achievement, he was inducted into the National Ski Hall of Fame in 2001. The Sun Valley chairlift was replicated in 1940 by ASWC at Stowe, Vermont, for Roland Palmedo. By the 1941-42 winter season, the sixth season after the invention of the chairlift, ASWC had built nine of the eighteen chairlifts in North America.<sup>24</sup>

According to their sales literature, ASWC's aerial chairways transported the skier

... uphill in a relaxed manner, free from muscular effort, thus conserving energy for the strenuous sport of downhill skiing. The skis need not be removed; therefore the skier is ready for his run instantly on arrival at the upper chairway terminal. The uphill ride on a chairway is a pleasant incident in the day's sport, because he is transported high enough above the ground to enjoy the panorama. The chairway is well adapted to year around usage. After the skiing season hikers and vacationists patronize chairways, for both uphill and downhill rides.<sup>25</sup>

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<sup>23</sup> Gordon H. Bannerman, James M. Curran, and Glen H. Trout, "Aerial Ski Tramway," Patent No. 2,152,235, dated March 28, 1939.

<sup>24</sup> Lund and Gilbert, p. 24; Bill Heinzerling, "Bananas, Barbed Wire, and the Brooklyn Bridge," *The Echo: The Voice of the Mad River Glen Community*, Fall 2004, pp. 8-10; Jeff Leich, "Smoothing the Way," *Journal of the New England Ski Museum*, no. 68 (Spring 2007), p. 11.

<sup>25</sup> American Steel and Wire Company, "Aerial Wire Rope Tramways," 1935. It is available at New England Ski Museum in Franconia, New Hampshire.

Before each winter season, Mad River Glen offers foliage rides for leaf peepers for views of the Green Mountains, White Mountains and the Adirondack Mountains.

Passenger safety is a prime objective in this type of ski lift. It is a monocabable tramway with chairs supported on a moving steel traction rope. Rope wear is minimized and metallic contact is provided at one point to enable static electrical charges to be grounded. The chair hanger-heads rest on neoprene (synthetic rubber) sleeves (pulley assemblies), which relieve the rope of wear at these points. Each chair, with a safety bar and footrest, is positioned on the rope by compression grips (clamped under pressure), and tapered neoprene sleeves are vulcanized on the rope to minimize impact of the hanger-head in its passage over the rollers. Hanger-heads are steel drop forgings, chair hangers and chairs are welded steel tubular sections, and “all equipment is rugged.” The prime mover may be an electric motor, a gasoline or diesel engine. Intermediate towers were preferably constructed of fabricated steel with concrete foundations. ASWC had a steelwork department for fabricating the standardized towers and supplied all track cables, traction rope and mechanical equipment. The company also had an engineering and construction team that would erect complete aerial tramway systems or lend a special set of erecting tools and tackle to crews at ski areas along with all the necessary construction drawings. The rope is the defining characteristic of an elevated passenger ropeway. It stretches and contracts as the tension exerted upon it increases and decreases, and it bends and flexes as it passes over sheaves and around the bullwheels. The fiber core contains a lubricant that protects the rope from corrosion and also allows for smooth flexing operation. The rope must be regularly lubricated with castor oil to ensure safe operation and long life.<sup>26</sup>

### Ski It If You Can

As early as 1949, locals and newcomers had formed the Mad River Association, headquartered in the valley. They advertised the availability of 500 rooms in a combination of new hotels, bunkhouses, country inns, and local farmhouses - all in a place that had until recently been a remote and heavily forested area. Historians would later refer to this change in the Vermont landscape as a “sports-landscape ensemble.” New commercial development provided services devoted to tourists along Route 100, the new ‘skier’s highway.’ By the early 1960s economists delighted in calling skiing “Vermont’s fastest growing industry.” In 1964 Vermont author and historian Ralph Nading Hill labeled ski-lift development a “revolution” with repercussions to the Vermont landscape that would reach far beyond the mountains themselves. Vermonters would be faced with a new reality, “the tracks left by skiing do not melt with the coming of spring.” Historian Harrison Blake has written that of all the technological

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<sup>26</sup> American Steel and Wire Company, “Aerial Wire Rope Tramways,” 1948. This catalog lists the advantages of aerial tramway transportation, as well as a list of wire and wire products made by ASWC. It is available at the Bennington Museum in Bennington, Vermont.

developments, “ski lifts have had perhaps the greatest impact on the Vermont landscape.”<sup>27</sup>

In 1955, Roland Palmedo published his nine principles for “How To Plan A Ski Area” that included: terrain, orientation, snowfall, altitude, accessibility, housing, financing, lift types and trail design. In 1957 Palmedo praised the introduction of chair lifts to the ski industry, while at the same time cautioned the industry about constructing too many lifts.<sup>28</sup> Mad River Glen is one of the last preserves of the classic winding New England ski trail that was the norm at ski areas in the 1940s and 1950s. While the rest of Vermont’s ski areas have spent decades ‘upscaling, expanding and transforming,’ Mad River Glen was not planned to be a ‘destination resort.’ Mad River is a refuge for skiers craving diversity with running, steep mogul, and gladed trails that wind through the contours of the forested mountain. Unique among Vermont ski areas, Mad River Glen is on 700 acres of privately owned land.

To handle the increasing crowds at Mad River Glen a double chair ski lift, called the ‘Sunnyside Chair’ was installed in 1962, and another double chair named the ‘Birdland Chair’ was installed in 1967. In the practice area near the base of the mountain, a rope tow was installed in 1950 and a T-bar in 1958; both have been replaced. A third double chair, named the ‘Practice Slope Chair’ was installed in 1972, and Callie’s Corner Handle Tow was operational in 2000; both are still in service. Because of the owner’s determination to preserve the character of Mad River Glen’s skiing experience, the historic Chair # 1, the single chair ski lift, was in operation until the 2006-2007 winter season.

In 1972 Roland Palmedo decided to sell Mad River Glen to a group of investors who shared his vision, and in 1974 Truxton Pratt became Chairman of the Board and President of the McCullough Corporation. ‘Trux’ was followed in 1975 by his widow Betsy Pratt with Ken Quackenbush as President. Quackenbush held that position until 1983 when Betsy Pratt became President and sole owner of Mad River Glen. According to Betsy Pratt, “Ken Quackenbush is the genius behind Mad River because he designed most of the trails.” Betsy Pratt continued in the spirit of the original vision by maintaining the original low-development, low-impact environmental agenda. In January 1987, a bronze plaque was installed on the wall of the Drive Terminal to honor the first ski lift operator George Neill “in appreciation of 40 years of service and dedication.” In 1991 Vermont ski industry historian Jules Older published a comprehensive guide to skiing in Vermont. Older raised the question,

How can a determinedly low-tech, no package, no hotel, one restaurant,  
one ski lodge, hayseed ski area that still runs a single chair to the summit

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<sup>27</sup> Hall, p. 32; Ralph Nading Hill, “Came the Revolution,” *Vermont Life* (Winter 1964), pp. 10-11; Harrison, “Tracks Across Vermont,” p. 255, 267; Blake Harrison, “The Technological Turn: Skiing and Landscape Change in Vermont, 1930-1970,” *Vermont History* 71 (Summer/Fall 2003): pp. 203, 209.

<sup>28</sup> Roland Palmedo, “How to Plan a Ski Area,” *SKI* (March 1955), pp. 17-23; Roland Palmedo, “Too Many Lifts,” *SKI* (December 1957), pp. 40-45.

survive when it's right next door to Sugarbush and down the road from Stowe? The answer is that there are enough purist, old-fashioned and/or hotshot skiers out there to support it – who wouldn't have it any other way. Most Mad River Glen skiers would bitterly resent wide trails, perfect grooming and 'apres-bloody-ski nightlife.' Mad River Glen is a skier's mountain, pure and simple.<sup>29</sup>

In 1995 skiers formed the Mad River Glen Cooperative with the goal of buying the ski area. By selling individual shares in the cooperative, they raised \$2.5 million, and Mad River became the first (and still the only) co-operatively owned ski facility in the United States.<sup>30</sup> The Mad River Glen shareholders' mission is '*...to preserve and protect the forests and mountain ecosystem of General Stark Mountain in order to provide skiing and other recreational access and to maintain the unique character of the area for present and future generations.*' The co-op paid off its mortgage in 1999, and now it owns the mountain, the ski lifts and buildings on 700 acres. The co-op is committed to preserving the undeveloped nature of the mountain and Chair 1, the historic single chair ski lift. A hired staff, under the direction and leadership of the Board of Trustees elected by the shareholders, manages the ski area.<sup>31</sup> In 1996, Mad River Glen adopted the slogan '*SKI IT IF YOU CAN*', which has proved to be a marketing success. Skiers love the single chair, not only because it is historic and the last of its kind, but also because its low capacity means that once they get up to the summit, they are virtually alone to experience skiing the way many feel it was 'meant to be' in New England. In July 2002, the Vermont Advisory Council on Historic Preservation declared the single chair ski lift eligible for the National Register of Historic Places.<sup>32</sup>

In 2004 a detailed engineering evaluation proposed modifications to the top tension terminal, towers, bottom drive terminal, line equipment and electrical circuits that constitute a 'restoration' of the single chair ski lift. These modifications will bring the lift into compliance with new industry-mandated safety requirements and prolong the life of the system. The lift will be maintained in its present location and modifications for the estimated \$1.5 million 'restoration' will not detract from the 'historic integrity' or the 'historic significance' of the ski lift.

At the April 2005 annual meeting, 81 percent of the shareholders approved an expenditure of \$1.4 million for the 'Single Rebuild' and in May, the Board of Trustees authorized the creation of a Single Chair Finance Committee to develop the detailed financial plan. The historic significance of the single chair was a contributing factor in

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<sup>29</sup> Jules Older, *Ski Vermont: A Complete Guide to the Best Vermont Skiing* (Montpelier, VT: Vermont Life, 1991), pp. 46-47.

<sup>30</sup> "Mad River's Safety Program Good Example for Ski Resort Operators," *American Ski Annual*, 1957; Bill Sypher, "Pratt is Mad About the Mountain," *Business Digest* (January 1986); David Goodman, "Doin' the Wild Thing," *Boston Magazine* (November 1989), pp. 155-157, 166-170.

<sup>31</sup> David Goodman, "Mad River Glen: Buy It If You Can," *Yankee* (March 1994), pp. 124-131; Nathaniel Reade, "Back to the Future at Mad River Glen, VT," *SKI* (February 2005), pp. 72-77, 118.

<sup>32</sup> Eric Friedman, "The National Historic Register & MRG," *The Echo: The Voice of the Mad River Glen Community*, February 2004, pp. 1, 4-5.

the shareholders decision to rebuild the ski lift. The Preservation Trust of Vermont offered advice on private sector fundraising and suggested that the Historic American Engineering Record (HAER) document the Single Chair Ski Lift prior to restoration. In October 2006, a HAER recording team consisting of Washington-based architects Christopher Marston and Todd Croteau, and photographer Jet Lowe, along with Vermont historian John Johnson, visited Mad River Glen to document the site as it existed in October 2006.

The Preservation Trust of Vermont and the Stark Mountain Foundation accepted tax-deductible donations and single chairs were sold at auction and by raffle to partly finance the rebuilding project. *Vermont Life* magazine reported that \$270,000 was raised by selling all of the single chairs.<sup>33</sup> Beginning in April 2007, the entire ski lift was dismantled in preparation for the reconstruction by a crew from Doppelmayr CTEC to meet Vermont and American National Standards Institute (ANSI) safety codes.<sup>34</sup> Recently skiing historian Morten Lund wrote that the “re-engineered Mad River single will help preserve the only living, breathing, totally interactive classic eastern American resort of 50 years ago, a proud reminder of what the sport once required and still does, if only at Mad River”.<sup>35</sup>

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<sup>33</sup> Paul McMorris, “Lifted Spirits,” *Skiing Heritage* (December 2004), pp. 27-28; Jay Appleton, “View from the Chair—Single Chair Financing,” *The Echo: The Voice of the Mad River Glen Community*, Fall 2005; three articles by Eric Friedman: “Mad River Glen Co-op Reaches Agreement with Partners to Save the Single,” “Single Chair Campaign Kicks Off,” and “Single Chairs for Sale—Buy Them if You Can!,” all in *The Echo: The Voice of the Mad River Glen Community*, Fall 2006; Mark Bushnell, “Staying Single,” *Vermont Life* 61, no. 2 (Winter 2006-2007), pp. 38-41; Editor, *Vermont Life* (August 2007), p. 5.

<sup>34</sup> American National Standards Institute, Section 4, “Fixed Grip Aerial Lifts,” in *American National Standard for Passenger Ropeways-Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors-Safety Requirements*, ANSI B-77.1-1999 (Washington, DC: ANS, March 11, 1999).

<sup>35</sup> Lund, “Mad River Glen,” p. 29.



Patented Mar. 28, 1939

2,152,235

## UNITED STATES PATENT OFFICE

2,152,235

### AERIAL SKI TRAMWAY

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James M. Curran and Glen H. Trout, Omaha,  
Nebr., assignors to The American Steel and  
Wire Company of New Jersey, a corporation  
of New Jersey

Application November 17, 1937, Serial No. 175,164

3 Claims. (Cl. 104-180)

This invention is an aerial ski tramway intended to convey skiers from the bottom of snowy hills to the top so that they can ski back down again. One of the objects is to transport the skiers back up the hill in a manner involving as little effort on the part of the skiers as is possible. Another object is to carry the skiers in an absolutely safe manner so that regardless of their peculiarities it is practically impossible for them to be injured. Other objects may be inferred from the following disclosure of a specific example of the invention.

Referring to the accompanying drawing:

Figures 1 and 2 are top views of the opposite ends of the tramway, respectively;

Figures 3 and 4 are side views of the ends shown by Figures 1 and 2, respectively; and, Figures 5 and 6 are enlargements showing details.

The tramway includes a plurality of posts 1 which, through suitable rollers 2, carry an endless rope 3, powered structures 4 at each end of the tramway serving to carry the end loops for the rope 3 and to impart continuous motion to the same.

Swivel members 5 are clamped to the rope 3 at spaced intervals, these swivel members each mounting a depending bar 6 in such manner that the bars are fixed against longitudinal movement along the rope 3 but can swing laterally, and so that the rope 3 may rotate with respect to the bars. In each instance a chair 7 is supported by the bottom of the bar 6, the latter being bent as at 6<sup>a</sup> and otherwise constructed to bring the center of gravity of the chair 7 into vertical alignment with the rope 3. Also, the bar 6 is pivoted, as at 6<sup>b</sup>, so that it can swing longitudinally of the rope 3, this, in conjunction with the action of the member 5, permitting the bar to swing in any direction. The chair 7 has an open front, and a leg rest 8 depends from the front end of its seat, a suitable back rest 9 extending upwardly from the other end. The leg rest 8 is characterized by being adjustable and by having its adjustable range so limited that a skier riding the seat cannot bring his legs back under him to such an extent as to permit the toe end of the skis tied to the skier's feet digging into the snow over which the chair is traveling. In this manner even incautious skiers are prevented from throwing themselves out of the chair due to their carelessness with their skis. The back rest, of course, keeps them from falling backwards out of the chair and also provides them with something to grasp. Furthermore, due

to the fact that the rope 3 can turn with respect to the bar 6, twisting of the rope during service will not swing the chair so as to dismount its rider. Generally speaking, the only way a skier can be injured is to be so incautious as to fall sideways.

The reason chair arms are not desired is because of the mode of seating of the skier contemplated by the invention. At each end of the tramway the ground is leveled off, as at 10, the height of the rope and the length of the bar 6 being such that the chair travels along the level portion at such a height that a skier standing in its path of travel and facing away from the advancing chair will be automatically seated without any effort on his part whatsoever. That is to say, the skier just stands in the way of the chair and is automatically carried up the hill. If the chair were provided with arms there would be a possibility of causing personal injury to the skier in case he misjudged the proper position for him to stand to effect registration with the seat.

In case the skiers are of impatient temperaments they may demand relatively high transportation speeds, and in such instances they might receive unpleasant shocks due to becoming seated too rapidly. Therefore, the invention contemplates the use of a hand line 11 which is fixed to the rope 3 by means of a swivel member 5<sup>a</sup> having the same characteristics as the swivel member 5, this hand line extending back to the bar 6 and being releasably fixed to the latter by means of a hook 12. With this arrangement, attendants at the end of the tramway may release the hand line 11 as the chair approaches the skier, hand the line to the skier and, providing the skier has possession of reasonable facilities, it becomes possible for him to put himself in motion and thus relieve the shock as he contracts the seat advancing towards him. Some of the features described herein are not necessary in the case of skiers possessing normal intelligence and agility. However, they should ordinarily be provided in the case of most skiers.

It is to be understood that the rollers 2 are of the flanged type, the flanged peripheries being separated sufficiently to permit passage of the swivel members 5 and 5<sup>a</sup>, but insufficiently to permit the rope to leave the rollers.

We claim:

1. An aerial ski tramway including a traveling rope and a chair suspended from said rope, means for supporting said rope, means for driving said rope, said chair being suspended at such

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5 a height from the ground as to permit skiers to become seated thereon by standing in front of the same, and said tramway including a hand line depending from said rope in front of said chair so it can be grasped by the skiers, whereby the latter may start themselves in motion to relieve them from the shock of becoming seated on said chair with uncomfortable speed.

10 2. An aerial ski tramway including a traveling rope and a chair suspended from said rope, means for supporting said rope, means for driving said rope, said chair being suspended at such a height from the ground as to permit skiers to become seated thereon by standing in front of the same, said chair having a depending leg rest  
15 arranged to positively hold the legs of skiers seated thereon at such angles as prevent the skis they are wearing from hooking into the ground and unseating them.

20 3. An aerial ski tramway including an elevated traveling rope, means for supporting said rope, means for driving said rope, a bar depending from said rope, swivel means for fixing said bar to

said rope to hold it against longitudinal movement respecting said rope while permitting rotary movement of the latter and swinging of said bar, an open chair carried by said bar at such a height from the ground as to cause skiers standing in its line of travel to become seated thereon, said bar being bent to bring the center of gravity of said chair into vertical alignment with said rope and said tramway including a hand line depending from said rope in front of said chair so it can be grasped by the skiers, whereby the latter may start themselves in motion to relieve them from the shock of becoming seated on said chair with uncomfortable speed, said chair having a depending leg rest arranged to positively hold the legs of skiers seated thereon at such angles as prevent the skis they are wearing from hooking into the ground and unseating them.

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GLEN H. TROUT.

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ADDENDUM TO:  
MAD RIVER GLEN, SINGLE CHAIR SKI LIFT  
62 Mad River Glen Resort Road  
Fayston  
Washington County  
Vermont

HAER VT-38  
*HAER VT-38*

COLOR TRANSPARENCIES

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