

# THE EIMCO ROCKER SHOVEL LOADER MODEL 12B

HISTORIC MECHANICAL ENGINEERING LANDMARK



MINER'S PLAZA  
PARK CITY, UTAH  
SEPTEMBER 4, 2000



ASME International

## BACKGROUND

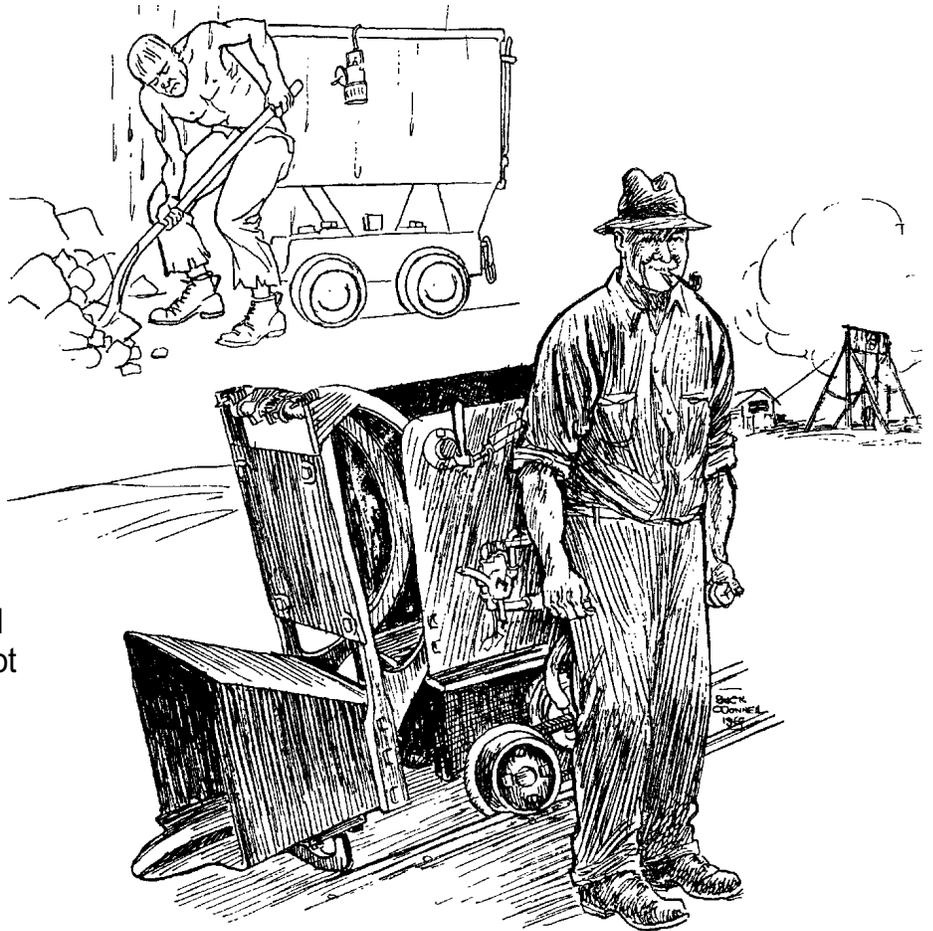
In the recorded history of this world, civilizations have depended upon metals, which had to be extracted from the earth, and processed into useful form. Initially, copper, tin, lead, iron, gold and silver were the desirable products. The method of extraction usually was via hand tools such as picks and shovels in tunnels. Transport to the surface was most likely by manual means or by beasts of burden. Most mine tunnels were cut in rock formations, hence the term “hard rock mining”. Whether the rock was broken for shoveling by pick, or by blasting after drilling, removal of the broken rock, referred to as “rubble” as the tunnel advanced, was by manual labor. The rock had to be shoveled into a rail-mounted mine car, and then taken to a place for final transport to the surface. In the artist’s drawing at the right a laborer is shown removing the rubble with a shovel to a nearby mine car. A lamp hangs from the car, and water drips from the ceiling of the mine.

## A MACHINE IS INVENTED

The manual removal of the rubble had long been recognized as time consuming; back breaking; requiring many laborers; and costly. Many attempts to mechanize the laborer’s movements and work were unsuccessful until a revolutionary design was conceived by Edwin Burt Royle. He and John Spence Finlay developed a machine initially called an “Overshot Loader”, that worked within the confines of low and narrow tunnels. The artist’s drawing at right shows John Spence Finlay and the machine they produced.

The two men were employees of Anaconda, a mining company. Both worked at the North Lilly Mine in Eureka, Utah in the 1920’s and Early 1930’s.

These two men had devoted spare time, apparently prior to 1931, to develop a mechanized shovel that copied the movements of the human “mucker”, the laborer who removed the rubble (or muck). Their machine had a heavy bucket attached to a rail car by two moveable rocker arms. The car had air-motor powered wheels to move the machine into the rubble. The machine had a second air-motor to raise the loaded bucket and propel it rearward, causing the contents to be thrown into a rail car. Compressed air was used extensively in underground mining. A worker at the side of the machine operated the machine by manipulating two controls. One control operated the air-motor for the wheels, and the other for bucket travel.



DRAWING BY BUCK O. DONNELL, 1967. It had the following written on it. "John Spence Finlay, Superintendent of the North Lilly Mine, Eureka, Utah revolutionized mining with the development of his Overshot Loader. Back in 1931 he built and sold four of these units for \$1,600 each."

## DEVELOPING AND MARKETING THE MACHINE

Royle and Finlay's employer, Anaconda, had invested some money in the invention, but had given it up as a profitable venture. Ingersoll Rand was invited to develop the machine, but they had no interest in developing a costly new product during the Great Depression.

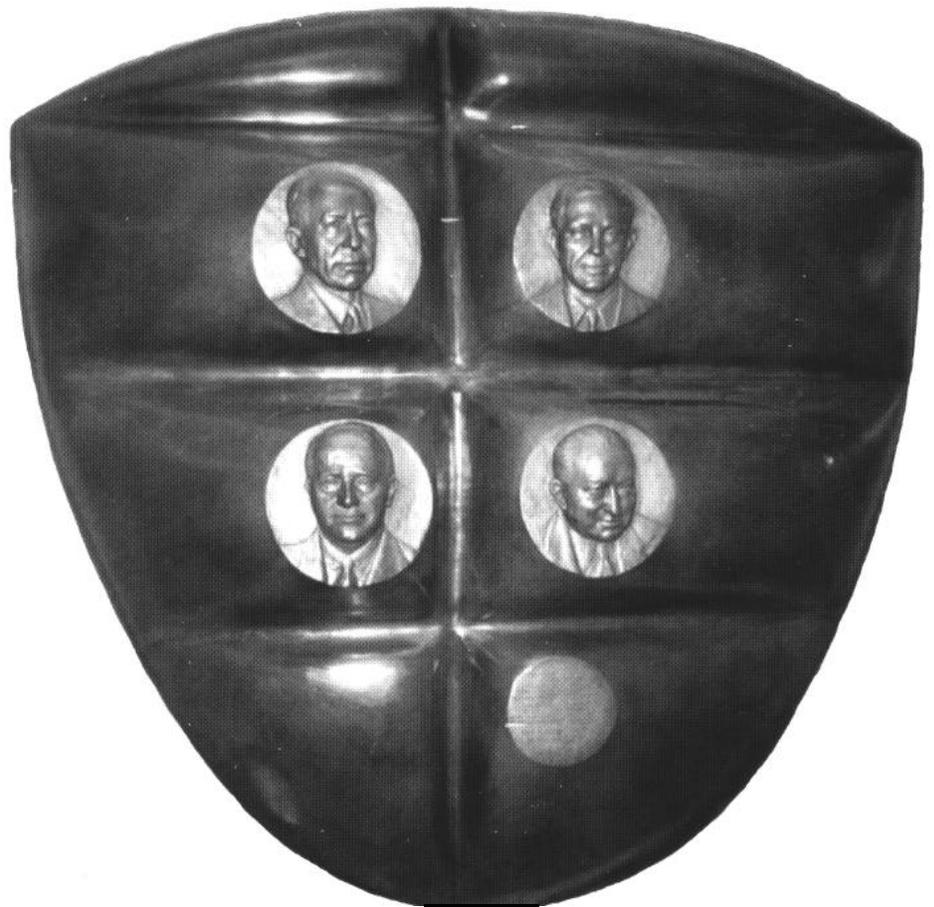
About 1931, Joseph (Joe) Rosenblatt, President of EIMCO Corporation in Salt Lake City, met Finlay and Royle while visiting the North Lilly mine in Eureka, Utah. He was shown the machine, and stated in oral-history interviews in 1980-81 that he was intrigued with its potential.

EIMCO, while headed by Rosenblatt, was a family-directed corporation that had its beginning with Joe's father, Nathan Rosenblatt, who emigrated to the United States from Russia at age fourteen. Nathan, after eventually settling in Salt Lake City, was successful in various business ventures, largely relating to the mining industry. EIMCO sold to, and serviced, the mining industry in the western United States. Nathan had three sons: Simon, Morris, and Joseph. All of them worked in the family businesses. Joseph graduated from the University of Utah in law in 1926. He later studied mechanical engineering via correspondence courses. The family decided he should head their Eastern Iron Metals Company. That name was shortened to EIMCO in the early 1930s.

To the right is a photograph of a Cast-bronze shield with reliefs of the four Rosenblatts. Left to right at top are Nathan and Simon. Left to right at bottom are Joseph and Morris.

The shield was on the front outside wall of the EIMCO building at 537 West 600 South in Salt Lake City. It is now mounted on a wall outside the office of the Dean of the College of Mines and Earth Sciences in the William Browning Building at the University of Utah.

A nephew of Joe, Barney Rosenblatt recalls going to Eureka in about 1931 with the Rosenblatt brothers to see the Overshot Loader developed by Finlay and Royle.



CAST BRONZE SHIELD WITH RELIEFS OF THE FOUR ROSENBLATTS

By 1934 the Rosenblatt family had committed itself to invest in developing the machine.

Joseph Rosenblatt later recalled, "the EIMCO Finlay loader was actually the brainchild of Burt Royle, although Royle's name was not identified with the loader (except on the patent). During the early 1930s Royle joined EIMCO Corporation as a consultant and designer. Royle, a quiet unassuming man was considered by some a skilled engineer, although he never received any formal training."

Mr. Rosenblatt also stated, "Development of the loader required much engineering input. It was not a simple machine. A number of patents were required as it was constructed. Also, Burt Royle and John Finlay had fashioned their first working machine from discarded Model T Ford (automobile) parts; crude air motors stripped from a worn out compressor; the sprockets, chains, and drive wheels from a motorcycle, and small wheels from a mine haulage car. Most important, it worked."

The first patent was number 2,134,582 issued October 25, 1938 to Edwin Burt Royle and assigned to EIMCO Corporation. It included a means for side cleanup and then repositioning the bucket for straight rearward discharge motion. That feature was not included in the machine developed by Royle and Finlay.

Mr. Rosenblatt also stated, "The Rocker Shovel Was a tremendous success. EIMCO obtained The manufacturing rights and paid a handsome Royalty to the inventors on the thousands of Machines that we (EIMCO) sold."

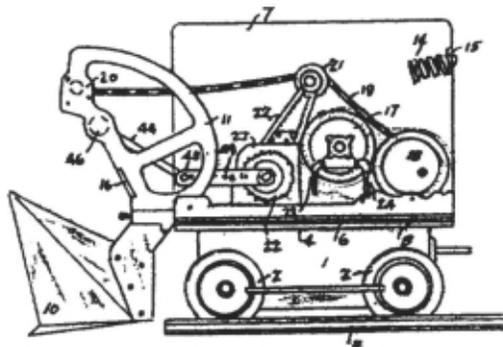
The EIMCO Rocker Shovel Loader, Model 12B when first introduced about 1938 appeared much the same as shown in a photograph on the front page of an EIMCO Rocker Shovel Loader sales bulletin as seen at right.

The bucket, rocker arms, controls and operating platform show clearly in the photograph.

2, 134, 582

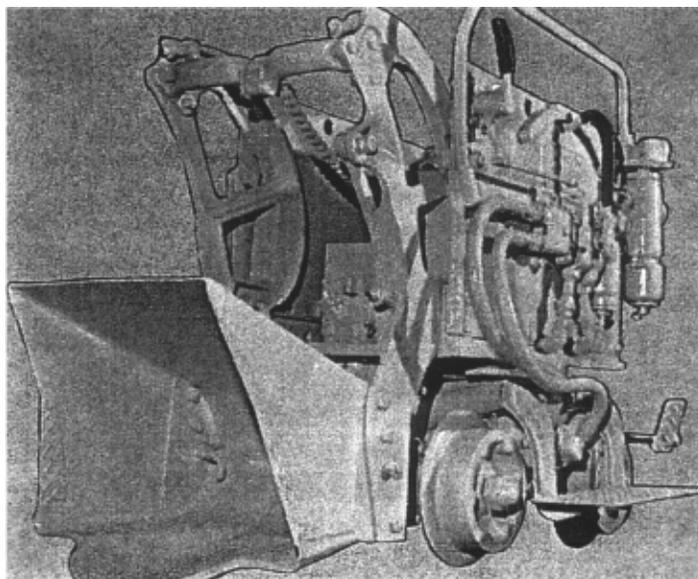
## LOADING MACHINE

Edwin B. Royle, Salt Lake City, Utah, Assignor to  
The Eimco Corporation, Salt Lake City, Utah  
Application May 28, 1937, Serial No. 145,281  
6 Claims (Cl. 214-132)



1. In a loading machine, the combination with a support, a horizontally oscillatable superstructure, a vertically swinging shovel mounted on the superstructure, and means for swinging the shovel, of a central cam member mounted on the support, a rotary drum mounted transversely of the superstructure having a cam-edge, and power transmitting means between the shovel swinging means and said rotary drum.

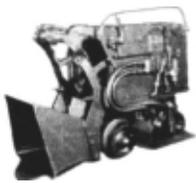
SOURCE: OFFICIAL GAZETTE U.S. PATENT OFFICE. SEP-OCT 1938.



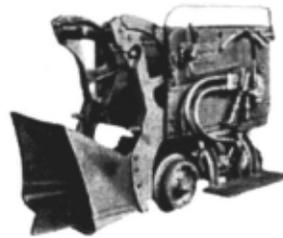
# HISTORICAL SIGNIFICANCE

The EIMCO Rocker Shovel Loader provided the means for a significant boost in mineworker productivity. Its acceptance was instant. Its introduction to the market place was just prior to the start of World War II, and it was in demand to help increase the production of war-related metals. Many mining companies purchased ten or more at a time. Russia ordered approximately eighty machines. In addition to yeoman duty in the mines, the loader was used in non-metal hard rock excavations for bomb shelters and tunnels on Malta and Gibraltar, which significantly fortified Allied installations in the Mediterranean Sea during the war. In the 1950s the government of France honored Joseph Rosenblatt with a merit award for the role of the Eimco Rocker Shovel Loader in the advancement of underground mining in that country.

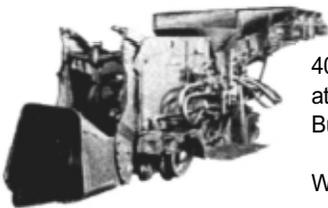
The model 12B design with a bucket capacity of four to six cubic feet allowed loading of twenty to thirty cubic feet of rubble per minute, but it was evident that greater capacities would be required. The design concept was extended to larger bucket sizes. In all, EIMCO would develop five basic sizes of loader accommodating buckets of from four to thirty-five cubic feet capacity. Its application expanded from underground mining to non-mining tunneling and other excavation requirements.



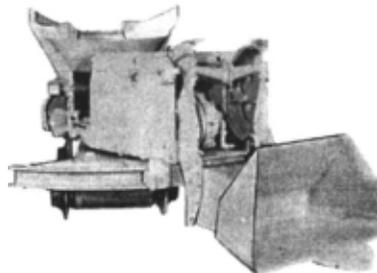
128 Loader  
Bucket 4.5 – 6 cu. ft.  
(0.13-0.17 cu. m.)  
Weight 4,200 lbs.  
(1,905 kg.)



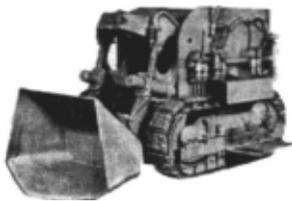
21 Loader  
Bucket 7.5 – 10 Cu. ft.  
(0.25-0.34 cu. m.)  
Weight 7,200 lbs.  
(3,260 kg.)



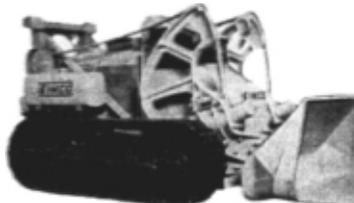
40H Loads onto an  
attached conveyor.  
Bucket 12 cu. ft.  
(0.35 cu. m.)  
Weight 18,700lbs.  
(8,482 kg.)



40W Same as  
40 H except  
designed for  
cleanup in wide  
tunnels.



630. Electric or air  
operated Designed  
for trackless mining.  
Bucket 8–14 cu. ft.  
(0.27-0.39cu. m.)  
Weight 10,350 lbs.  
(4695 kg.)



105. Tractor Mounted as  
excavator or equipped for  
steel mill cleanup.  
Bucket 35.3 cu. ft.  
(1.0 cu. m.)  
Weight N/A

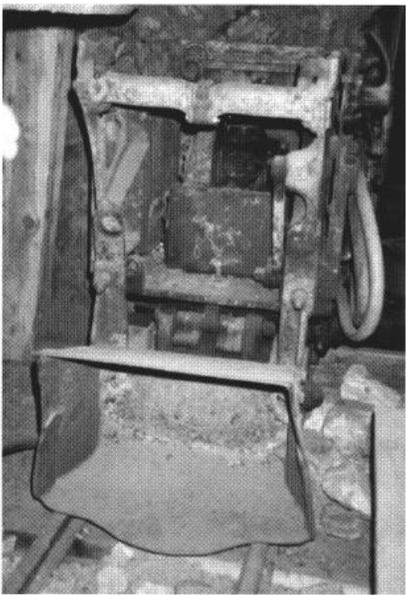
Park City Municipal Corporation decided to place this EIMCO Rocker Shovel Loader, Model 12B with its commemorative ASME plaque in Miner's Plaza. Miner's Plaza is a small park in historic old Park City that serves as a reminder of the major role the mines played in Park City history. There are approximately 1200 miles (1931.2 kilometers) of mine tunnels under Park City. Most of that tunneling was mucked with a model 12B loader obtained by the mine in the 1940's. This Loader is the same model as the machine used for the tunneling.

The success of the Rocker Shovel Loader was a boost to Salt Lake City where in 1957 there were nineteen hundred employees at the EIMCO facilities. Manufacturing rights were licensed to companies in Great Britain, India, South Africa, and Japan. Sales and service offices outside the

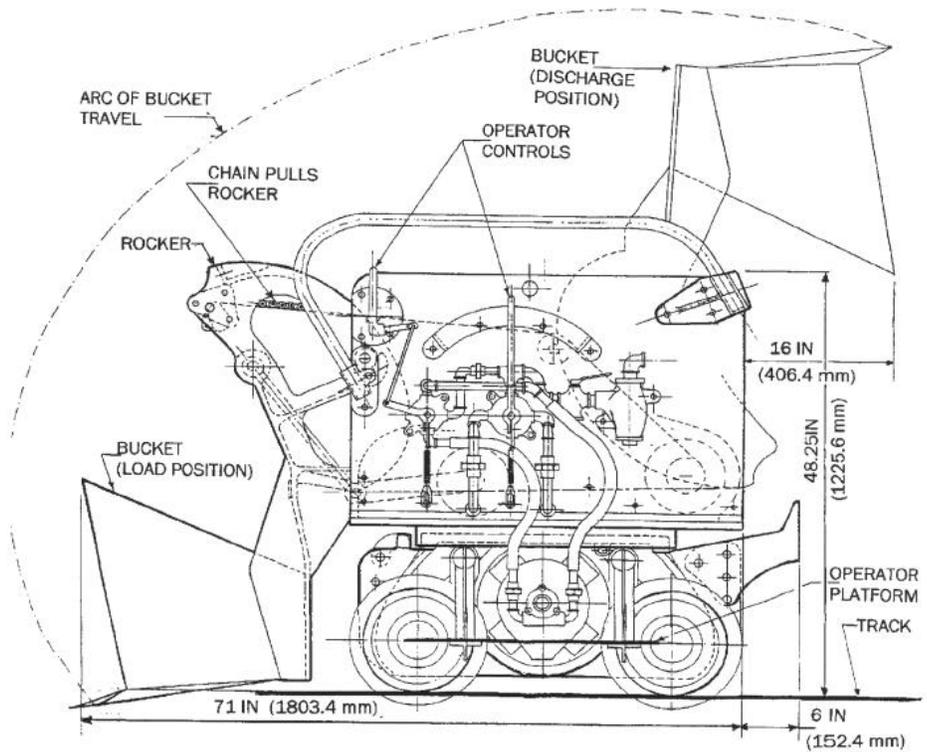
United States were located in Australia, Canada, Chile, France, Mexico, Spain and Zambia. By 1969, twenty-nine thousand Rocker Shovel Loaders had been sold.

EIMCO had expanded into other product lines, and the Loader Division eventually became EIMCO Mining Machinery International. In approximately 1980, EIMCO Mining Machinery International was sold and it is now a part of The Sandvik Group (Sandvik AB) headquartered in Sandviken, Sweden, under the name of Tamrock Loaders. A large number of EIMCO Rocker Shovel Loaders are known to be operating in South African gold mines and elsewhere in the world, and parts are occasionally ordered for them. Used Model 12B machines occasionally are advertised on the Internet.

## DESCRIPTION AND OPERATION



Front view showing of bucket and rocker arms



Drawing with major components identified.

EIMCO Rocker Shovel Loader Model 12B

The above photograph and descriptive drawing will be used to describe function and operation of the EIMCO Rocker Shovel Loader. The photograph has been sized to approximately the same scale as the drawing. In both the photograph and the drawing the bucket of the loader is shown in the "digging" position and resting on the rails. The bucket is also shown in the "discharge position" on the drawing.

The model 12B machine weighs 4200 pounds. (1905 kg.) The required air pressure is 60-125 pounds per square inch (413-861 kPa). Air consumption is 250 cubic feet (7.1 cu. m.) per minute. When the bucket is loaded with rubble, the operator actuates the bucket drive motor, which exerts force on the rocker pull chain, which is attached near the outer end of the rocker arms, and the rocker arms commence to roll toward the rear of the machine. The bucket is attached to the

rocker arms in a manner that provides maximum initial lift force on the bucket. As the arms roll, the geometry causes the bucket, with its contents, to travel upward and rearward. During the bucket travel, its vertical velocity decreases, and its horizontal velocity increases until the rocker arms strike shock absorbing stops on the frame. When the bucket stops, its contents continue to travel into a mine car attached to the Loader. The magnitude of the forces required to lift and throw the contents is substantial, and the machine was designed to withstand them repeatedly. Cables are attached to the rocker arms and to the frames to prevent the rocker arms from coming out of the machine.

One set of the cables may be seen in the photograph below that shows a loader in operation in a typical small mine tunnel in which the machine was designed to operate.



This photograph is seen from the front with the bucket in the discharge position.

United Park City Mines Company formerly owned the machine on display at Park City. It was purchased new in the 1940's by a mine that was part of Silver King Mines. Silver King Mines became a part of United Park City Mines Company. They have donated it to Park City Municipal Corporation for display at Miner's Plaza on Main Street.

## UNITED PARK CITY MINES COMPANY

United Park City Mines Company, Park City, Utah is a Delaware corporation formed in 1953. United Park's principal business is currently the lease, development, and sale of real property located in or near Park City, Utah. United Park acquired mining properties in the Park City Area upon its formation in 1953. Prior to 1982, United Park's principal business was the mining of lead, zinc, silver, gold and copper ores from these properties or the leasing of these properties to other mine operators. United Park now conducts no active mining operations and has no agreement to sell or lease its mining properties. The mining company also performs mine and tunnels maintenance for other entities on a contract basis. United Park also leases land for skiing to the operators of the Park City Mountain Resort and the Deer Valley Ski area.

## TEXT OF THE EIMCO ROCKER SHOVEL MODEL 12B PLAQUE

HISTORIC MECHANICAL ENGINEERING LANDMARK  
EIMCO ROCKER SHOVEL LOADER, MODEL 12B  
PATENTED OCTOBER 25<sup>TH</sup> 1938

THIS MACHINE REPRESENTS THE FIRST SUCCESSFUL DEVICE TO REPLACE HUMAN LABOR IN REMOVING THE RUBBLE RESULTING FROM BLASTING IN UNDERGROUND HARD-ROCK MINES. IT IS OPERATED ENTIRELY BY COMPRESSED AIR. AS THE LOADER MOVED FORWARD ITS BUCKET DUG INTO THE RUBBLE. WHEN FULL. THE BUCKET LIFTED, AND WITH A SNAP, THREW THE RUBBLE REARWARD INTO A MINE CAR FOR REMOVAL.

THE LOADER, DESIGNED BY EDWIN BURT ROYLE AND JOHN SPENCE FINLAY, WAS DEVELOPED, MANUFACTURED, AND SOLD INTERNATIONALLY BY EIMCO CORPORATION, SALT LAKE CITY.



### THE HISTORY AND HERITAGE PROGRAM OF ASME INTERNATIONAL

The History and Heritage Landmarks Program of ASME International (The American Society of Mechanical Engineers) began in 1971. To implement and achieve its goals, ASME formed a History and Heritage Committee initially composed of mechanical engineers, historians of technology and the curator (now emeritus) of mechanical engineering at the Smithsonian Institution, Washington, D.C. The History and Heritage Committee provides a public service by examining, noting, recording and acknowledging mechanical engineering achievements of particular significance. This Committee is part of ASME's Council on Public Affairs and Board on Public Information. For further information please contact Public Information at ASME International, Three Park Avenue, New York, NY 10016-5990, 1-212-591-7740.

### DESIGNATION

Since the History and Heritage program began in 1971, 211 landmarks have been designated as historic mechanical engineering landmarks, heritage collections or heritage sites. Each represents a progressive step in the evolution of mechanical engineering and its significance to society in general. Site designations note an event or development of clear historic importance to mechanical engineers. Collections mark the contributions of a number of objects with special significance to the historical development of mechanical engineering.

The Landmarks program illuminates our technological heritage and encourages the preservation of the physical remains of historically important works. It provides an annotated roster for engineers, students, educators, historians and travelers. It helps establish persistent reminders of where we have been and where we are going along the divergent paths of discovery.

The 125,000 member ASME International is a worldwide engineering society focused on technical, educational and research issues. ASME conducts one of the world's largest publishing operations, holds some 30 technical conferences and 200 professional development courses each year, and sets many industrial and manufacturing standards.

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#### REFERENCE INFORMATION

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USE OF STEEL CASTINGS IN MINING EQUIPMENT. An illustrated technical paper by Donald N. Rosenblatt, Chief Metallurgist, the EIMCO Corporation, presented at the Pacific Southwest Mineral Industry Conference, American Institute of Mining Engineers, Reno, Nevada, April 5, 1957.

SHRINKAGE AND STOPAGE WITH MECHANICAL LOADING by P. S. Cross, MINE AND QUARRY ENGINEERING, March 1957.

MECHANICAL LOADING vs. SLUSHING AT UNITED MONTAUBAN by T. C. Hewitt, CANADIAN MINING JOURNAL, April 1954.

## ACKNOWLEDGEMENTS

UNITED PARK CITY MINES COMPANY: Hank Rothwell, Chief Executive Officer, for the donation of the EIMCO Rocker Shovel Loader to Park City Municipal Corporation, and Richard Martinez, Sr. an employee of United Park City Mines Company, who, years ago, was an operator of the Rocker Shovel Loader in the mines for his efforts in making possible the ASME designation and display of that machine.

PARK CITY MUNICIPAL CORPORATION: Mayor Bradley Olch; Council members Fred Jones, Peg Bodell, Candace Erickson, Roger Harlan, and Shauna Kerr; as well as Denise Payne for coordination of the designation ceremony in conjunction with the annual Park City's Miner's Day activities.

PARK CITY ROTARY CLUB for its efforts in furthering the success of the designation ceremony as part of the Park City Minor's Day activities.

Wayne L. Dowdey, formerly Vice President of Sales for EIMCO and President of the American Institute Of Mining Engineers, 1978.

Donald N. Rosenblatt and Barney Rosenblatt for product and family information.

Lars Olavson, former EIMCO employee for assistance in obtaining historic information.

Berne A. Schepman, President of EIMCO Corporation succeeding Joseph Rosenblatt, for information on operating Rocker Shovel Loaders at present.

Randy Fridulin of Tamrock Loaders, Burlington, Ontario, Canada, for historic product information.

Jewel M. Weston, formerly secretary for EIMCO Legal Services.

Park City Historical Society, Sandra Morrison.

Utah Section of ASME for sponsoring the Landmark designation.

Donald L. King, brochure preparation.



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