

# Ditch Witch® DWP Service-Line Trencher

## Historic Mechanical Engineering Landmark

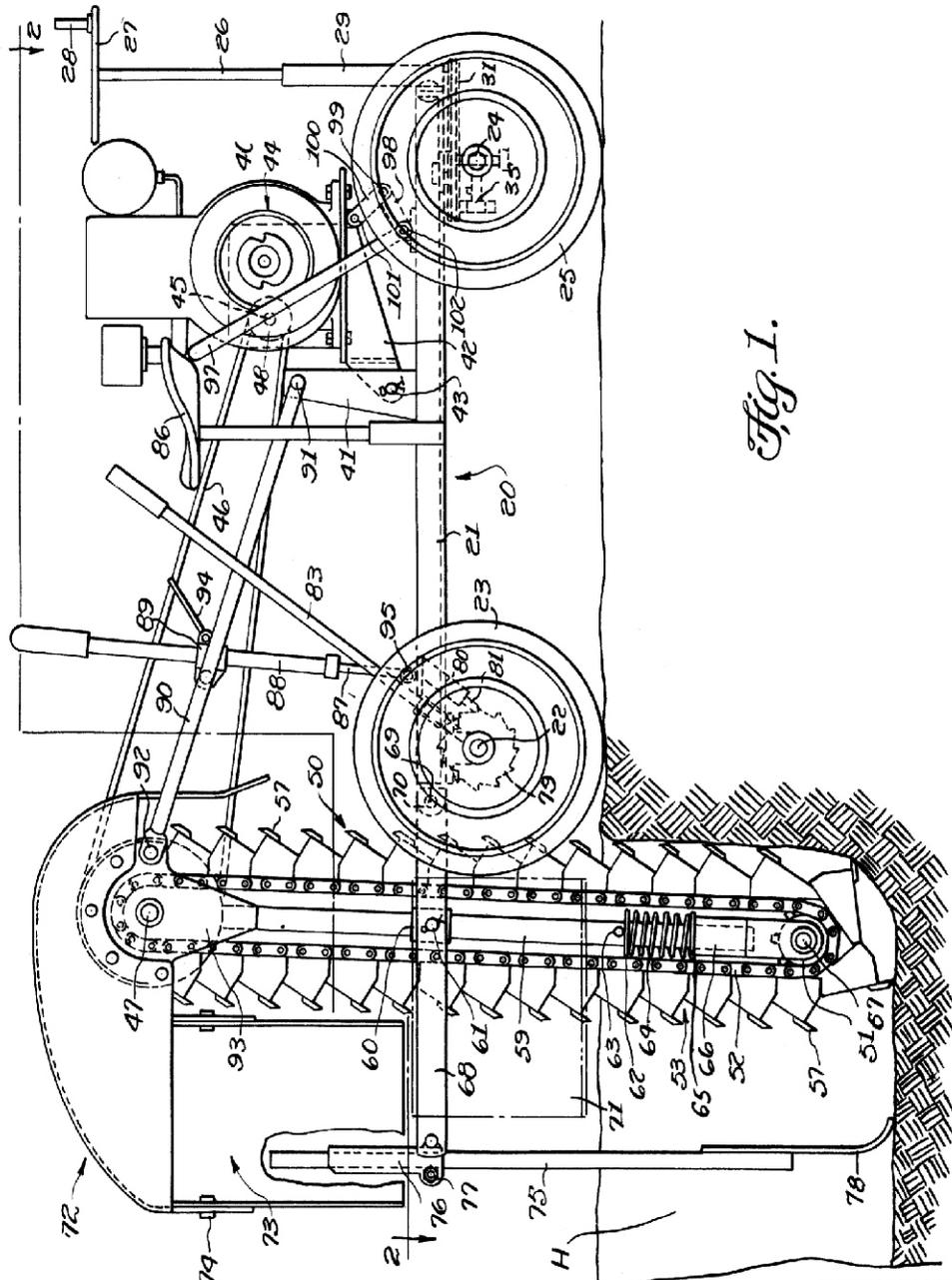


Fig. 1.

INVENTOR,  
*Edwin Matzahn,*  
BY *Victor J. Evans & Co.*

ATTORNEYS



ASME International

**HISTORIC MECHANICAL ENGINEERING LANDMARK  
DITCH WITCH MODEL DWP SERVICE-LINE TRENCHER**

FEBRUARY 1952

THE DWP WAS THE FIRST MECHANIZED, COMPACT SERVICE-LINE TRENCHER DEVELOPED FOR LAYING UNDERGROUND WATER LINES BETWEEN THE STREET-MAIN AND THE HOUSE. THIS MACHINE, FIRST PRODUCED IN 1949, REPLACED MANUAL DIGGING, THUS MAKING INSTALLATION OF RUNNING WATER AND INDOOR PLUMBING AFFORDABLE FOR THE COMMON HOUSEHOLD. THE DWP PAVED THE WAY FOR THE CREATION OF A WORLDWIDE TRENCHING-PRODUCTS INDUSTRY, ITS MACHINES USED FOR THE INSTALLATION OF ALL UNDERGROUND UTILITIES INCLUDING TELEPHONE, CABLE-TV AND DATA, AND FIBER-OPTIC CABLES.



THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS-2002



Ditch Witch is a registered trademark of The Charles Machine Works, Inc.

# Introduction

On a warm and sunny Oklahoma afternoon in 1948, Edwin "Ed" Malzahn paused from his usual duties in the family's small-town machine shop. Gazing through a back window in the cluttered metal building, he watched as two sweaty men used picks and shovels to dig narrow service-line trenches leading from a bigger main line that would soon bring utility services to a nearby residence.

Standing idle close at hand were trenching machines with metal scoops on large rotating wheels that had been used to dig the main lines. The wheel trenchers were much too big for service lines, so that job fell to men with strong backs.

It seemed to Ed Malzahn, then 27, there was an incongruity in the scene. Using a big machine to make a big trench made sense. But to produce a small trench, hard manual labor was required. "There must be a better way," he thought. In 1949, just a year later, he had an answer--the DWP Service-line Trencher.

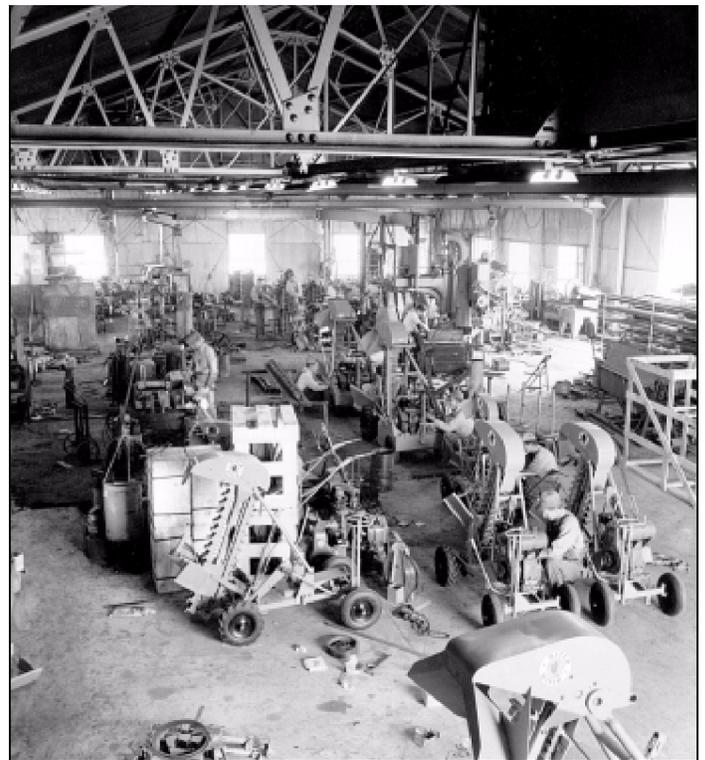
The name, DWP, stood for Ditch Witch trencher - Power, to distinguish it from a companion machine which relied on a ratcheting, manual operation for mobility. To dig narrow trenches, the DWP used a vertical bucket line with an endless conveyor chain to carry off the spoil. It was built in the family machine shop after months of experimentation.

The first versions of the vertical bucket trencher were hand-built. The original DWP production model was completed in 1949. After a public demonstration in 1950, three units were sold. Five more were sold the following year and in 1952 the first specialist dealer was established in Oklahoma City. As news about the small trenchers spread, a demand for them developed. A marketing department was created in 1953 and in 1958 the company was incorporated. The first international dealership was opened in Australia that same year.

In 1955 the U.S. Patent Office issued patent No. 2,714,262 for Ed Malzahn's "endless conveyor ditch digging machine." By then it was obvious that an entirely new market had been identified and the Ditch Witch underground equipment line was born.

The DWP trencher's compact size and low cost mechanized the process of digging utility service-line trenches. This opened the door for making indoor plumbing affordable worldwide. The industry has evolved from the world's first service-line trencher, the DWP, into today's technologically advanced equipment designed for installation of all underground utilities including telephone, cable TV, and fiber optic communication cables.

The landmark DWP was purchased by Alex Boken of Long Island, New York, on February 2, 1952, at the factory in Perry, Oklahoma. Mr. Boken was a lawn sprinkler system contractor and he used the Ditch Witch DWP trencher until trading it in for a new model in 1969. That DWP has been completely restored to its original condition and is now on display at the Ditch Witch Museum in Perry just three blocks from the plant where it was manufactured.



*The first DWP trenchers were assembled in the Malzahn family's machine shop in Perry, Oklahoma.*

# The DWP Trencher

## General Description

The DWP trencher was a simple, but very unique design that put the endless conveyor digging chain concept used on larger ditch digging machines into a small package. Small two-piece buckets with sharp finger-like edges were mounted on a vertical chain to gouge out chunks of dirt. The buckets were attached in sequence onto an endless moving chain that carried them down a ladder-type mechanism to chew out chunks of soil, then upward to dump the "spoil" in neat piles on the ground as they began the downward descent to bring up more dirt. A four-inch wide trench with a digging depth of thirty inches was the goal.

The operator was seated on a contoured metal seat, facing simple lever controls to raise and lower the digging device. The air-cooled seven-horsepower engine supplying power for the working end also gave the trencher mobility, transferring power through a belt drive. The trencher moved on a welded frame with four small wheels and pneumatic rubber tires, like those used on lawn tractors. It also had a ratchet drive to utilize the operator's arm and shoulder muscle to move the trencher forward and backward.



*Ed Malzahn digs a 4-inch wide trench with the DWP trencher. The spoils are piled neatly to the side of the trench.*

## Technical Description

The Ditch Witch model DWP trencher was a lightweight utility trencher, with various digging chains available in 3.5", 4.5", and 6" widths. While digging, forward motion was provided by a ratchet wheel attached to the rear-driving axle. The operator actuated this ratchet by means of a lever and had control over the forward motion of the trencher. The operator could also adjust the digging speed to fit the soil condition.

## Technical Data

- Trench Size - 3.5", 4.5", and 6" width bucket line; Hydraulic depth control from zero to 30"
- Power Unit - Wisconsin 7 hp air-cooled engine
- Feed - Power feed attachment allowed operator to feed the machine by power or by hand
- Steering - Chain reduction
- Boom Elevator - Cable connected to hydraulic cylinder and hand pump
- Frame Construction - Rigidly welded formed steel and tubular frame
- Bearings - Self-aligning sealed ball bearings
- Tires - 4.00 x 8" pneumatic; Rear: Traction grip, Front: Regular tread
- Bucket Line - Closed bucket with positive action cleaning kicker plate; Replaceable tool steel teeth
- Bucket Line Drive - V-belt drive connected engine to head shaft; Designed to slip under overload, eliminating shear pins and overload clutch
- Spoil Conveyor - Reversible chute type spoil conveyor for depositing spoils on either side of trench
- Foot Sprocket - Sealed ball bearing idler roller was adjustable and spring loaded for uniform spring tension
- Net Weight - Approximately 600 lb
- Dimensions - Height: 62", Length: 72", Width: 36"

# Ed Malzahn

From a young age, ideas swirled in Ed Malzahn's mind. His education after graduating from Perry High School in 1939 included a bachelor's degree in mechanical engineering from Oklahoma State University in 1943 and practical training in the machine shop most of his life. All of that led to the invention of a machine that inspired an entire line of underground construction equipment now known in the trade by the Ditch Witch brand name. It created a new industry and converted The Charles Machine Works, Inc., from a shop specializing in oil field and farm repair services to a major manufacturer and marketer with independent dealer outlets throughout the world.

Ed Malzahn grew up in his family's machine shop, working side-by-side with a handful of employees. The family's business evolved from a blacksmith shop established in 1902 in Perry, Oklahoma Territory by Ed's grandfather, Carl Frederick Malzahn, a German immigrant who came to Perry to escape the harsh Minnesota winters. Later, the family business was passed down to Ed's father, Charlie Malzahn, and named Charlie's Machine Shop. From there, it became The Charles Machine Works, Inc.

Working together, Ed and Charlie Malzahn produced the first production DWP trenchers in 1949. Those were the forerunners of a range of machines that now are known worldwide for durability and reliability in a large array of difficult digging jobs.

None of today's trenching products bear much resemblance to Ed Malzahn's first efforts, but even those early models lowered installation costs for plumbers, telephone companies, other underground contractors and the customers they served.

Ed Malzahn shuns exclusive rights to the devices and elements that made possible the Ditch Witch trencher because he worked closely with his father in the early stages of development and design. Charlie Malzahn died in 1959, shortly after the company that bears his name moved from downtown Perry to its current location west of town.



*Ed Malzahn prepares for the installation of a water line. The DWP allowed small diameter pipe to be installed without using manual labor to dig the trench.*

# Ditch Witch Museum

The Ditch Witch Museum, part of the Heritage Center, is dedicated to the historical development of products manufactured by The Charles Machine Works, Inc. At the museum, visitors can view photographs, product literature, and displays of some of the earliest Ditch Witch equipment. The museum is open to the public without charge, but prior arrangements should be made by calling 580-336-4402.

The Heritage Center, opened in September 2000 and managed by The Charles Machine Works, Inc., stands as a reminder of the struggles and successes, the hopes and dreams, and the determination and spirit of the first settlers of Perry, Oklahoma. The Malzahn family restored these buildings for the people of Perry as a token of their gratitude for what the Perry community means to them. In addition to the Ditch Witch Museum, the Heritage Center houses the Heritage Center Theater and the Anvil Room Conference Center.



The Ditch Witch Museum, located in the Jones Produce building, is the home of the Landmark DWP trencher.

## Acknowledgments

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## About the Author

Fred G. Beers served as a copy editor on the news staff of *The Stars and Stripes* while serving in the Army during World War II. After the war, he was managing editor of *The Perry Daily Journal* for 25 years before managing corporate communications for The Charles Machine Works, Inc. Following his retirement in 1989, he resumed writing a twice-weekly column for the Perry newspaper and has authored four books. His family includes his wife, Laura, their two daughters, and four grandchildren. He is a member of the Cherokee Strip Historical Society, the Oklahoma Historical Society, and is listed in the Marquis book, *Who's Who in America*.

## 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, 221 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.

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