

Justus Roe & Sons Makers of Steel Tape Measures since 1876

by Louise Muse

In 1876, Justus Roe of Patchogue, New York, decided to go into the business of manufacturing steel tape measures. The company he founded is still in business in the small town where he had his first factory, and it still specializes in steel tape measures, making it possibly the oldest company in the world still producing them (Figure 1).

The first long steel tape measure with etched graduations was developed in 1842 by James Chesterman working in Sheffield, England. He riveted short steel strips using flat wire that he had developed for crinoline skirts. However, the main use for this wire was the fashion industry, and in 1853 Chesterman developed a process for heat-treating continuous lengths of wire, making them stronger and longer. The market for crinoline wire was exploding, and between 1854 and 1865 Sheffield foundries met this demand by producing over 200,000 pounds of this wire.

In 1860, crinoline skirts, which used sixty yards of wire, began to get slimmer, and by 1865 only two bottom hoops were being used. The Sheffield factories were still in full production when the market disappeared. The foundries found themselves with excess steel blades and were selling the wire for fencing or scrap.

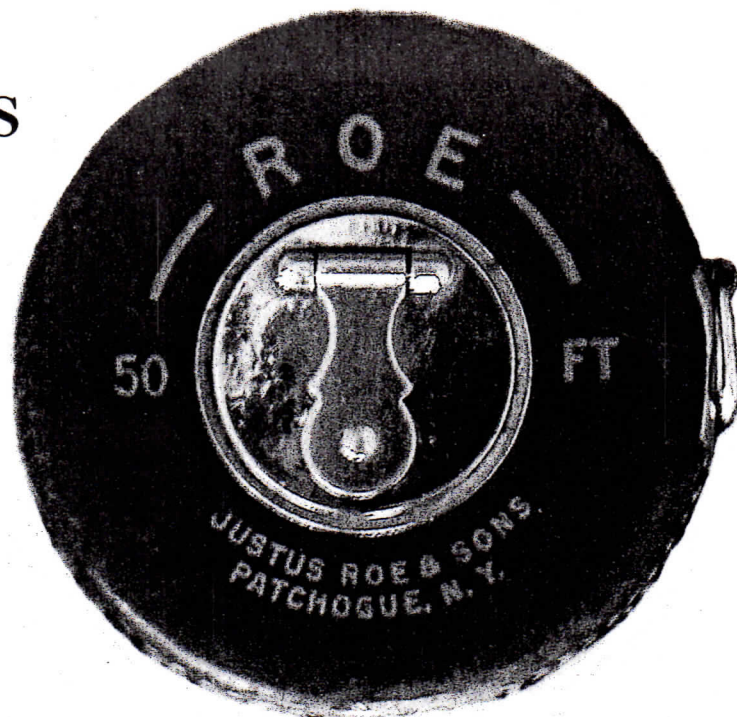


Figure 1. A Justus Roe & Sons tape, circa 1950. The company began in 1876 and continues today as U.S. Tape.

James Chesterman was able to adapt his plant to use the surplus wire to make measuring tapes for engineers and surveyors, to replace the land chains that were currently being used, the land chains being heavy and awkward (Figure 2). He advertised his new measurement tool

as a "Steel Band Measuring Chain" and claimed that "compared with a chain, it has equal strength, greater correctness, is easier to clean, and to coil and uncoil, and is very much lighter and more compact." He exported tapes to the United States, which were sold through outlets such as W. & L.E. Gurley's, Albany, New York, as early as 1871. But the Chesterman tapes, which sold for \$17, were very expensive, forcing even Gurley to acknowledge that their great cost prevented general use. William Paine

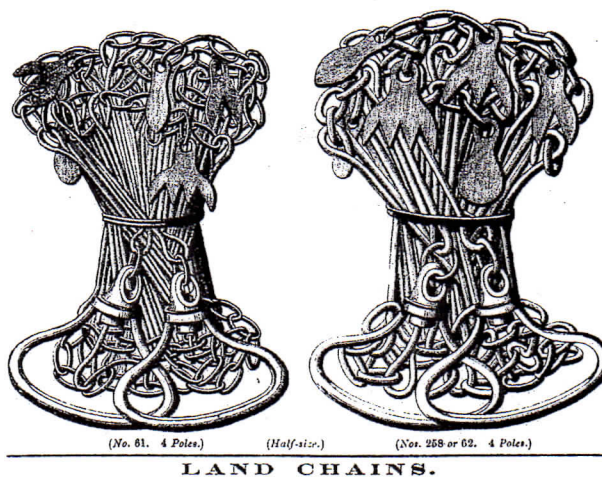


Figure 2. This was the type of chain used by early surveyors to measure distances. A chain is 66 feet long; 80 chains make a mile. A "rod" or "pole" is a quarter of a chain, or $16\frac{1}{2}$ feet long. Thus "40 rods" is 10 chains, or an eighth of a mile. When steel tapes were used in place of chains, they were called steel tape chains and had their measurements graduated in chains. They are still used today by loggers to retrace old survey lines.

was also making award-winning steel measuring tapes in Brooklyn, New York, around the same time, but his tapes were only a few dollars cheaper than Chesterman's.

Justus Roe

Justus Roe was a surveyor by profession (Figure 3). He served as the chief civil engineer for the Long Island Rail Road during the period of its greatest expansion and was chosen by the state to mark the location of



Figure 3. Justus Roe, founder of Justus Roe and Sons.

the Fire Island Lighthouse. As a surveyor who had used the land chain, he must have been aware of a market for the convenient new steel measuring tapes if they could be sold at a lower price.

With his son Howard, he established his business, Justus Roe and Son, in

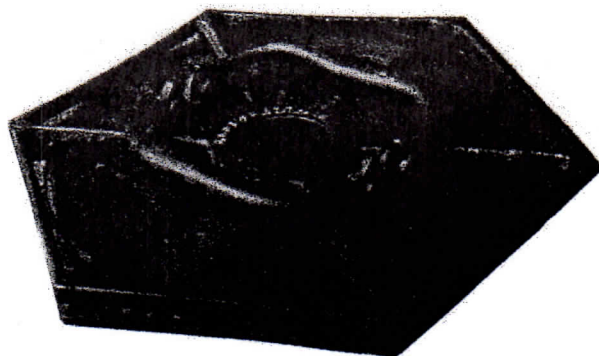


Figure 4. A reel for a steel tape measure that can be held horizontally, giving vertical readings. It was patented by Justus Roe in 1893.

1876. The business started on the second floor over a corner drug store on Main Street in Patchogue with the tapes being produced in Brooklyn and New York City. He discovered that he could sell his tapes for less than half the price charged by his competitors and still make a profit.

Early Patents

Justus Roe began to experiment with different types of reels (Figure 4). In 1888 he took a patent out for a reel that allowed the user to insert the fingers of one hand into the reel to both hold the tape and to keep it from springing back when it was wound.

There is no evidence that this reel was ever marketed. It would appear that the tape could spring out of the reel if it were dropped (Figure 5). He was also interested in other measuring devices and took out a patent for a folding protractor, which he patented in 1890. It opened to an angle with a base of fourteen inches and folded into a compact seven inch rule (Figure 6).

But it was his patent for what he called "Roe's Elec-

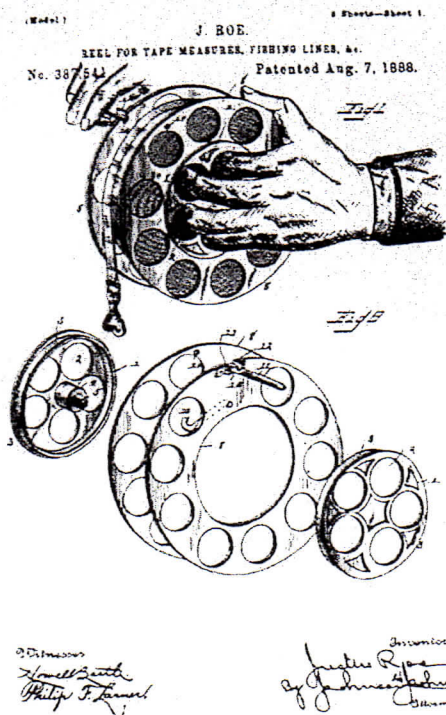


Figure 5. Patent for a tape measure reel issued August 7, 1888.

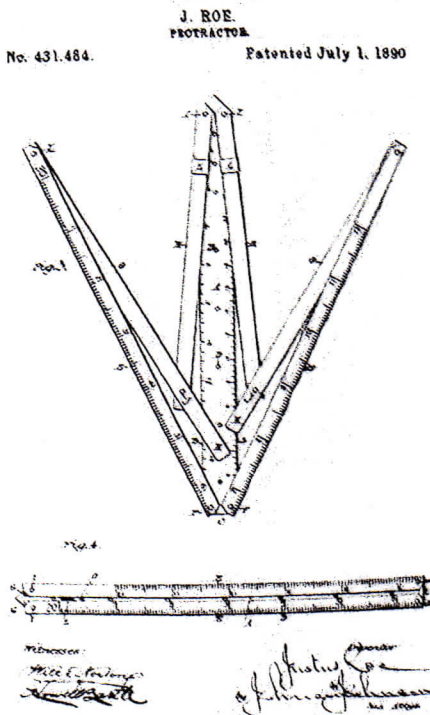
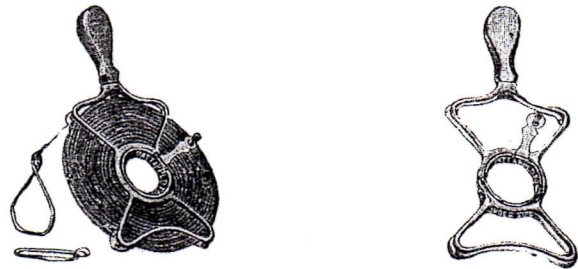
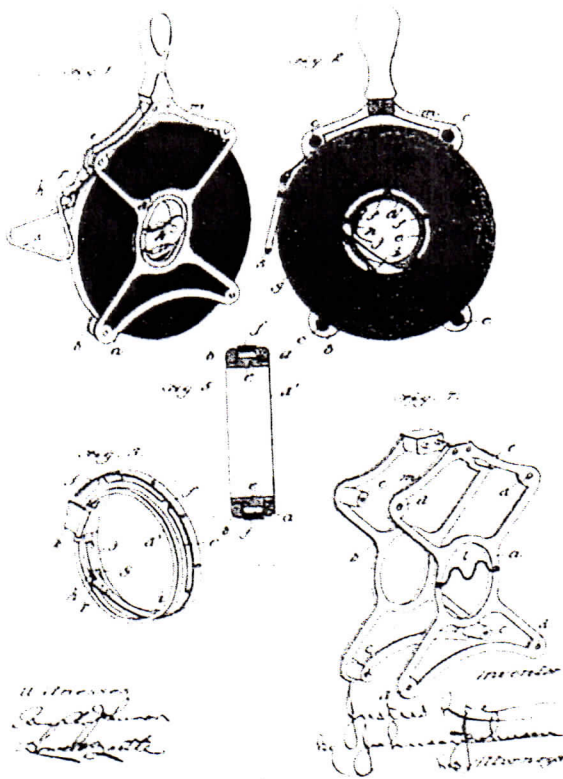


Figure 6. Patent for a protractor issued to Justus Roe on July 1, 1890.

Measuring Tapes and Chains.



Roe's Steel Tape Chains, 2/16 in. wide, on Electric Reel.

3260	100 feet long, graduated every foot, end feet in tenths,	-	each, \$5 00
3241	100 " " " " " inches,	-	" 5 00
3262	50 " " " " " tenths,	-	" 4 00
3263	50 " " " " " inches,	-	" 4 00
3264	200 " " every 5 feet, " tenths,	-	" 6 00
3265	200 " " " " " inches,	-	" 6 00
3266	300 " " " " " tenths or inches,	-	" 8 00
3267	400 " " " " " " "	-	" 10 00
3268	500 " " " " " " "	-	" 12 00

These Steel Tape Chains are also made aluminum plated, or can be had graduated every foot. Prices on application. Extra heavy, wider tapes made to order at short notice.

3269 Roe's Electric Reel, without tape (for 50) or 100 ft. tape - each, \$1 50

Roe's Electric Reel (Figures 7, 8, and 9)

Figure 7 (above). Patent for Roe's Electric Reel issued to Justus Roe on May 24, 1892.

Figure 8 (above, right). Advertisement for Roe's Electric Reel from the Kolesch and Company 1900 catalog. The reel sold for \$1.50.

Figure 9 (right). Photograph of Roe's Electric Reel from the collection of Alfred Roe, grandson of Justus Roe. It is made of brass and gilded, the brass now tarnished and the gilding worn.

tric Reel" that proved to be his best seller. There was nothing electric in this reel, but it did sell as fast as an electric bolt because there was no steel measuring tape on the market as inexpensive as Roe's. Instead of etching, measurements were marked by holes and rivets. His competitors were etching measurements onto the tapes at three times his price. A disadvantage of marking measurements with holes and rivets was that the rivets had a tendency to push the tape to one side against the bars of the frame. This patented reel prevented it (Figures 7, 8 and 9).

Justus Roe and Sons

By 1890, his sons Austin and Henry had joined the firm, and the name of the company was changed to Justus Roe and Sons. The youngest son, Nathaniel, left Patchogue to study tool and die making at Pratt Institute



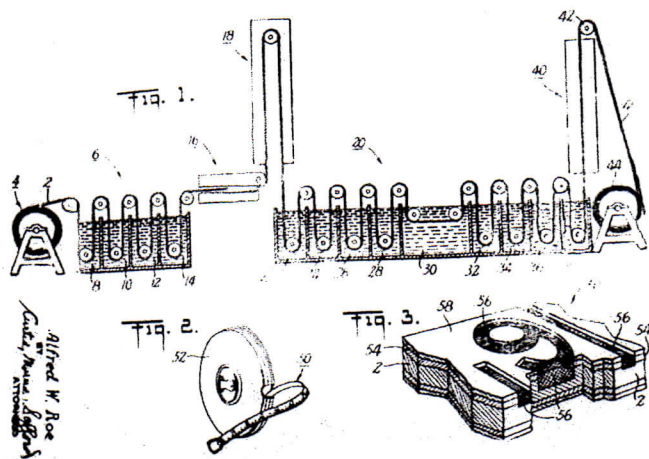


Figure 10. A photograph of an original patent drawing for etching numbers and letters into steel blades. The actual size of the reels on either side of the press can be seen in Figure 17.

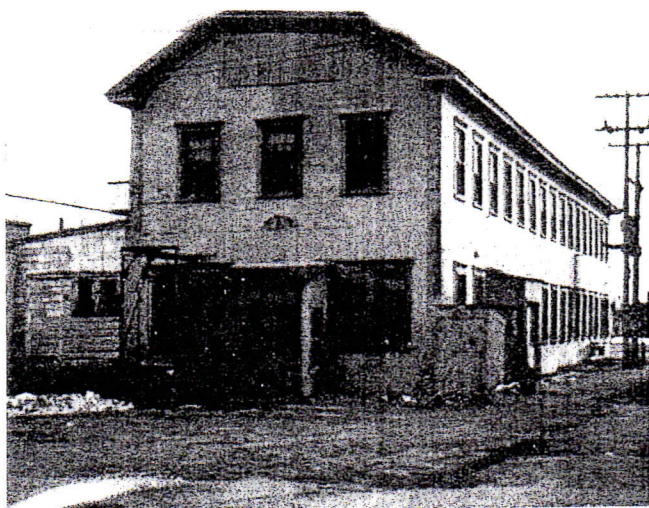


Figure 11. The first factory built in 1900 and used until 1960 when the company moved to River Road.

in Brooklyn and then went to work for Richard Hoe and Company, the famous manufacturer of printing presses. A few years later, Nathaniel returned to the family business, and using the knowledge he had acquired, designed a printing press that could etch the measurements into the steel. In 1895 steel tapes with etched measurements were sold by Roe & Sons for the first time. This was an important move for the company to stay competitive, because some companies were now selling steel tape measures with the etched measurements for only a dollar more than Roe & Sons' tape chains. The etching process was a continual challenge for the company throughout the years. It had to be deep enough to prevent wear but not compromise strength and durability. One patent for a press had to be discarded when it was discovered that it weakened the tape (Figure 10).

They started to expand their product line to include metallic and linen tapes, pantographs, pocket protractors, and tapes cased in both leather and nickel-plated brass. The tapes were sent to hardware stores all over the country on consignment at a 43 percent discount to be paid when they were sold.

The First Factory

The steel tapes were selling so well that in 1900 a factory was built in Patchogue where orders could be handled from start to finish. The tapes needed to be checked on a flat surface because holding them in suspension would produce a catenary which would make it difficult to check the correctness of the measurement. This was done on a 100-foot board. The factory was built 103 feet long to accommodate the board needed to check 100-foot tapes. The long rectangular shape of the building can be noted in Figure 11.

Justus Roe did not live to guide his company into the twentieth century. He died in 1900 at the age of



Figure 12. Justus Roe's sons, Howard, Austin, Henry and Nathaniel.

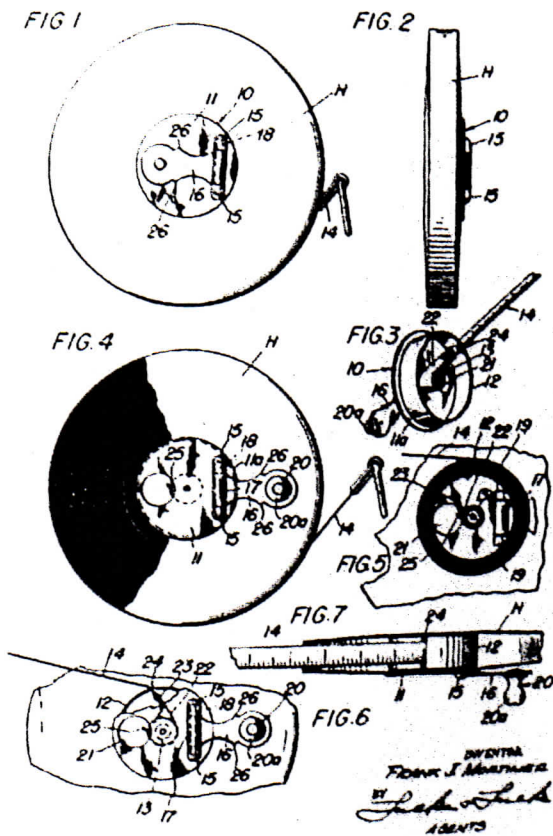


Figure 13. Patent for a reel housing construction issued to Justus Roe & Sons on September 14, 1948.

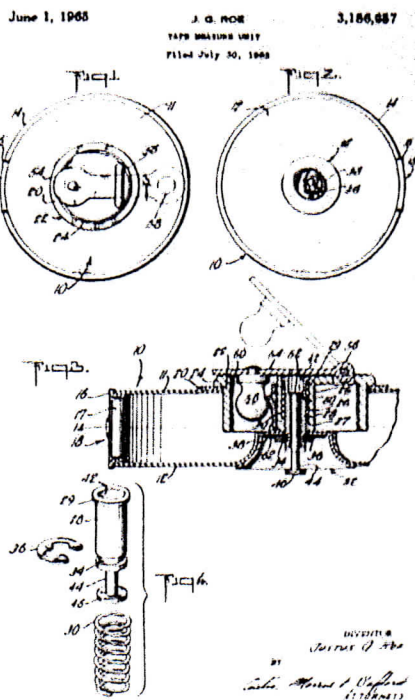


Figure 14. Patent for a tape measure issued on February 19, 1963.

sixty-two, and his four sons took over the business (Figure 12).

Although the tape chain for surveyors continued to be a best seller, the leather-cased tape measures were also becoming popular. The leather cases had to be hand sewn and this work was done by women at home. In 1929, New York State passed strict labor laws to ensure a safe working environment, and because work done at home could not be regulated, it was prohibited. The women would now have to be hired as employees with benefits, and space in the factory would have to be provided for these workers. To keep production costs down, a scheme was devised whereas the women bought the materials needed from Roe, sewed the tapes at home, and then sold the completed tape measures back to Roe making the women contractors, not employees.

The women continued to stitch the cases long after a method was devised to fasten the edges with a metal rim because of contracts the firm had with the United States Navy whose specifications included the stitching. (Examples of both kinds of leather tape cases, hand-stitched and metal rim, are illustrated on the back cover). During World War II, the company supplied both the United States Army and Navy with measuring tapes, and it is still the tape measure supplier to the U.S. Government Supply Administration.

The Second Generation

Austin Roe died in 1943, and the others died or retired shortly after leaving the business to Nathaniel's sons, Nathaniel, Alfred, and Justus. This new generation expanded the business internationally with overseas operations in Australia, England, Russia, Israel, and India.

In an effort to keep production costs down, a reel was designed that could be fabricated easily and inexpensively from a minimum of parts. This reel was patented in 1948 and became the standard for more than a decade (Figure 13). In 1963 another patent was taken out for a reel that was "sturdy and relatively inexpensive to manufacture" (Figure 14), and in 1963 a patent was given for a reel that could "accurately be assembled by unskilled workers."

Back in 1904, Austin Roe had received a patent for an angle tape measure. This tape had lap joints with holes which would enable the user not only to create angles, but by placing nails into the holes, secure those

J. A. ROE.
ANGLE TAPE MEASURE.
APPLICATION FILED JAN. 19, 1904.

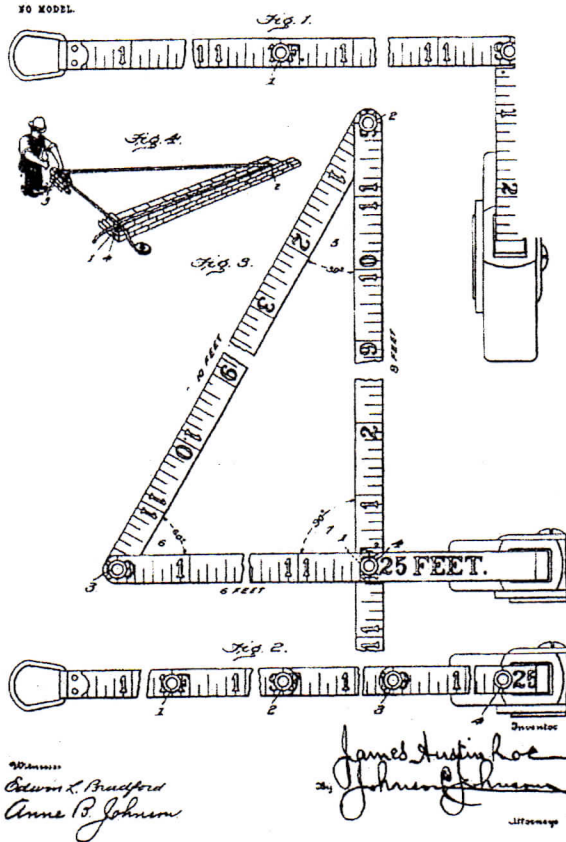
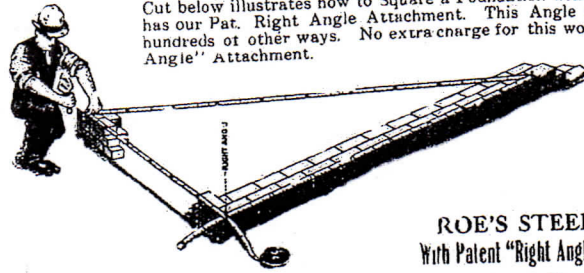


Figure 15. Patent for an angle tape measure issued on May 10, 1904.

Cut below illustrates how to Square a Foundation with our Tape that has our Pat. Right Angle Attachment. This Angle can be used in hundreds of other ways. No extra charge for this wonderful "Right Angle" Attachment.



ROE'S STEEL TAPE
With Patent "Right Angle" Attachment

Figure 16. An advertisement for the angle tape measure which sold for \$3.71, from a brochure put out by Roe and Sons. Note the same drawing (marked Fig. 4) was used in the patent in Figure 15.

angles (Figures 15 and 16). His nephew, Justus, received another patent for an improved version of this tape in 1957.

In 1960, the company moved to its present location on River Road bordering the Patchogue River (Figures 17 and 18).

At this time it, was apparent that a faster way to print the tapes was needed. The printing press they were using produced only 6,000 feet per man per day. They had been improving the press with creative innovations since the first one was installed, and by 1960 they had a press that could produce 200,000 feet per man per day, which was a bench mark press for the industry. Six of these presses were installed in the new plant and six others were sent to their overseas plants (Figure 19).

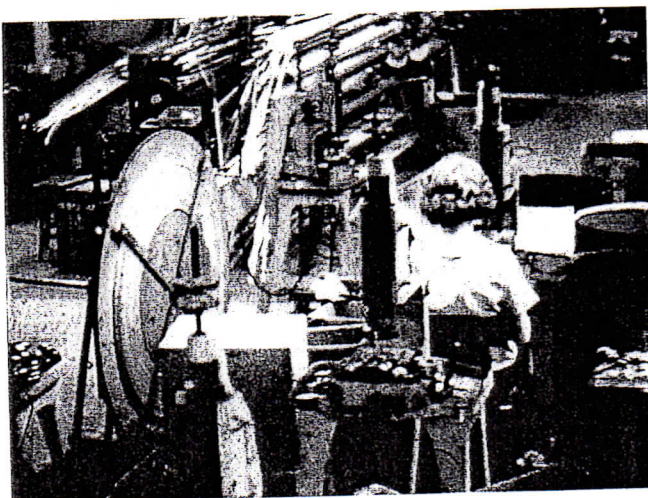


Figure 17. Photograph taken inside the 1960 factory on River Road shortly after it opened. Note the steel blades in the background stacked on shelves and the large reel of tape in the foreground. The large reel of tape is also shown in the Figure 10 patent drawing of the printing press.

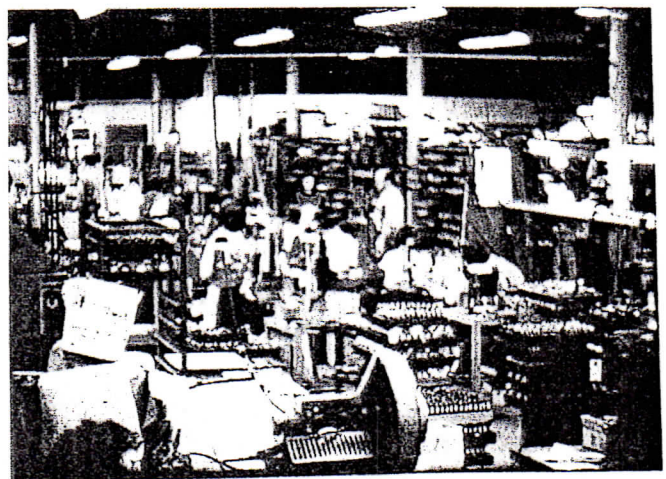


Figure 18. Photograph taken of the production floor of the River Road factory.

April 9, 1963

J. G. ROE
PRINTING MACHINE

3,084,622

Filed Aug. 5, 1968

2 Sheets-Sheet 1

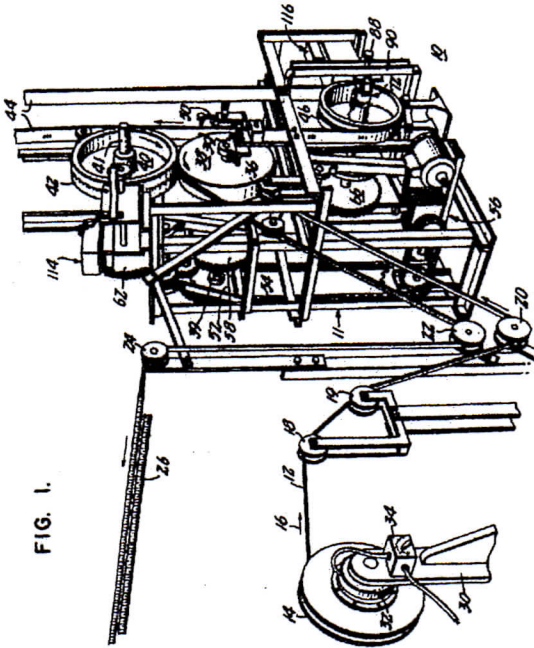


FIG. 1.

INVENTOR
JUSTUS G. ROE
BY
Curtis, Harris & Safford
ATTORNEYS

Figure 19. The patent for the printing press that became a benchmark press for the steel measuring tape industry. It was filed in 1958 and issued on April 9, 1963.

Justus Roe and Sons were now making tapes under special labels for other companies, such as Stanley, for whom they produced 1,500 short tape measures a day. The Johns Manville Company's special promotion, which involved giving Roe tapes as a premium, generated additional business for Justus Roe and Sons. As production increased new products were added, such as tank gauging tapes. Cases for the tapes and packaging were restyled, adding a contemporary look (Figure 20).

Under New Ownership

The centennial year of the company, 1976, was marked by celebrations and a parade. The name of the company was changed to Roe International and reflected the direction the company was heading in its second century. However, only five years later, Nathaniel decided it was time to sell the company. The other partners disagreed, but Nathaniel persevered, and on April 23, 1981, Roe International was purchased by Irwin Tool Company, which renamed it Irwin Measuring Tool Company.

It was an interesting merger, for the Irwin Tool Company's history also went back to the nineteenth century and both had founders who gave up professional careers to manufacture tools. Charles Irwin, a pharmacist in Ohio, bought a blacksmith's patent rights for a solid center auger bit and formed Irwin Auger Bit Company in 1884.

Irwin Measuring Tool Company continued the Roe tradition of producing world-class tape measures under the leadership of its president, Carol Basset. On May 28, 1990, she bought the company and renamed it U.S. Tape. The company was reorganized to make it more efficient. Whereas before each worker's job was specialized, now workers were assigned to cells working as teams. The result of this reorganization was a reduced labor force. It was difficult for those remaining to see co-workers lose their jobs, many who had worked there for more than thirty years.

U.S. Tape was sold again in 1998 to RAF Industries, the



Figure 20. A sample of some of the products put out during the 1960s including a lock power tape rule and a fiberglass tape measure.

present owners. Keeping the name U.S. Tape, they expanded to include a forestry product line, added a private label program which has been successful, and continued to make tapes for the United State government. U.S. Tape remains one of the last companies manufacturing tape measures in the United States. By being able to offer more personal service and fill orders faster, they are able to compete with companies that are outsourcing.

The company Justus Roe founded in 1876 is still producing steel tape measures. One hundred and twenty-eight years of innovations and creative improvements on the steel tape measure is truly a remarkable achievement.

Author

Louise Muse has sold antique tools since 1976 specializing in rules and measuring devices. She retired her business last year and is now spending more time researching tools and trades. The author wishes to acknowledge the following individuals who helped her in researching Justus Roe and Sons. Alfred Roe, grandson of Justus Roe; Peter Rosenquist, president of U.S. Tape; Linda Crawford, office manager of U.S. Tape; Hans Henke, Village of Patchogue historian; Mark Rothenberg, librarian of the Local History Room at the Patchogue Public Library; Brian Salzano, her son-in-law and native of Patchogue.

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Letters

How the Hay Knife Met the Cider Press

I enjoyed Bob Roger's "Update on Hay Knives" in *The Chronicle*, 57, no. 3 (2004), and his prior piece on the subject as well. As regards, Silas Wheeler's "Cider Cheese Cutter" in Figure 1, however, I disagree with Bob's dismissal of it as being out of place in a cider mill.

I think the confusion about the use of the tool comes from the injection of burlap into the discussion of the cider-making process. In traditional eighteenth- and nineteenth-century cider mills, the apple pomace was wrapped in straw (not purchased burlap or other cloth) to form a "cheese" for pressing. After pressing, the edges of the cheese were routinely cut off with a hay knife of some sort, and piled on the top of the cheese for further pressing. Not only do early accounts mention this, but also old cider press beds that I have examined show the telltale scarring from repeatedly cutting the edges off the cider cheeses.

In sum, the tool may well be a hay knife, but I doubt it just accidentally "found its way into a cider mill."

Thanks very much to *The Chronicle* for publishing the article and to Bob for his work on the subject.

Sincerely,

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