MOENCH

Tufting Apparatus

AN ASME
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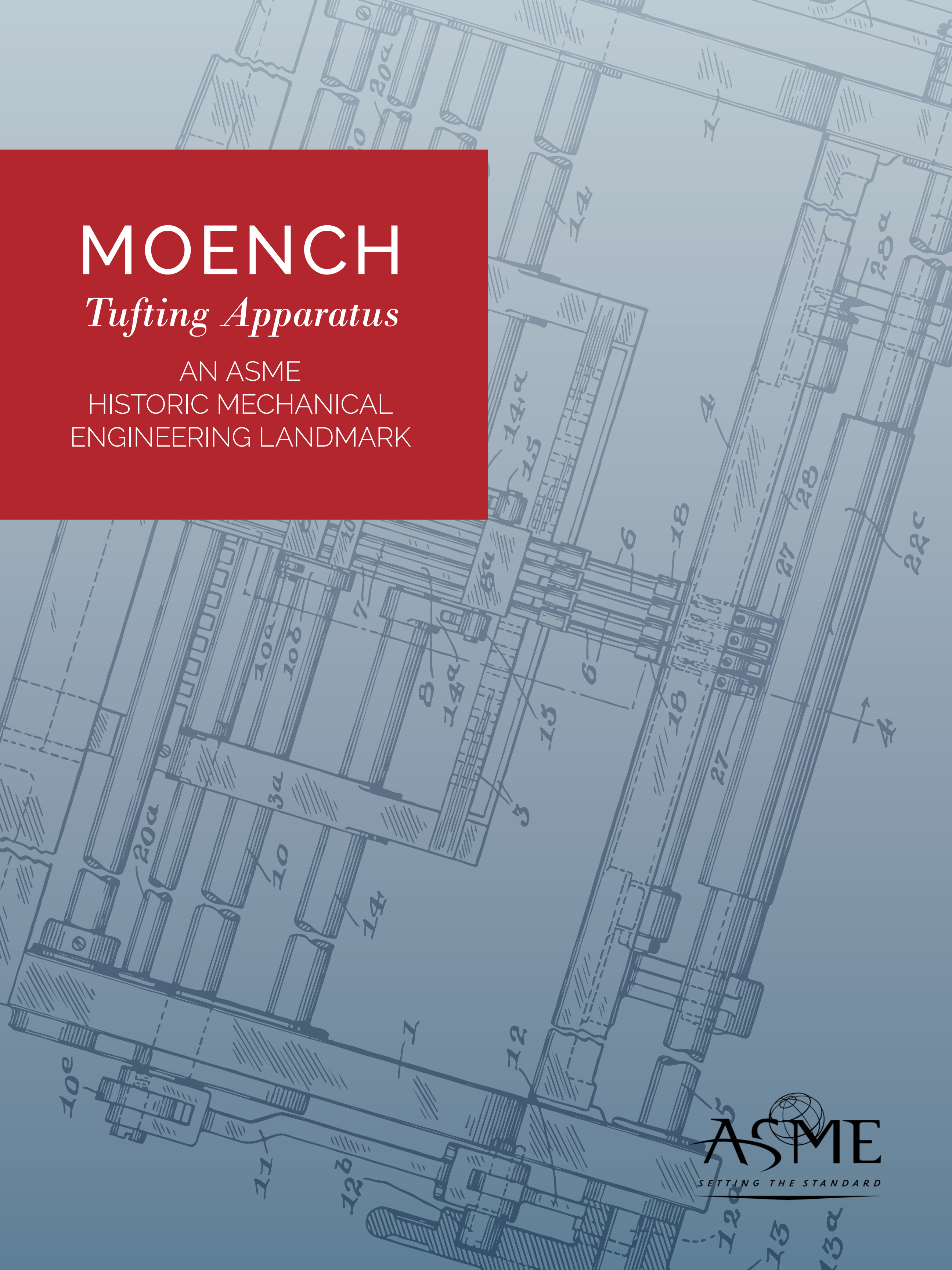
ENGINEERING LANDMARK



ASME
SETTING THE STANDARD

MOENCH

Carpet Tufting Apparatus

1928

The manufacture of cut-pile carpet involves the repeated insertion of loops of thick fiber thread through a backing material, then cutting the exposed loops to produce the cut piles. This is the first device to combine both operations, continuously and reliably, without human intervention. Ernest Moench designed a tufting needle to reliably handle thick fibers. His apparatus used this needle to punch the fiber loops through a moving web of backing, followed by a blade that sheared each loop, or pile, in two. Moench developed this device using a single needle, but he envisioned and patented an apparatus that could contain multiple, parallel needles to speed production, as well as support future improvements. Descendants of this machine now produce over three quarters of all American carpet.

Designation Date

July 31, 2018

The Inventor

Ernest J. Moench, of Nashville, TN, invented the apparatus while Orrin Henry Ingram, his employer, claimed ownership.

Timeline

1900

Catherine Evans Whitener makes handmade chenille bedspreads using thick cotton yarns and manual clipping. This prompted the emergence of several small, family-operated businesses.[3]

1928

Ernest Moench designs a "simple and efficient" tufting apparatus.[2]

1934

The United States Patent Office issues Moench a Carpet Tufting Apparatus Patent.[2]

1936

Glenn Looper modifies a sewing machine to allow tufting using thin or lightweight backing materials.[5]

1938

The United States Patent Office issues Looper a Carpet Tufting Machine Patent.[5]

1940s

Moench's apparatus adapted so that needlepoint for intricate designs is possible. This allows chenille bedspreads to be made by machine, not hand.

1946

Cobble Yardage allows yards of carpet at one time to be tufted as opposed to single rows.

Early 1950s

In a span of five years tufted carpeting rapidly displaces woven carpeting in new sales and installations in the United States.

2011

The computer-controlled Infinity Machine by Card Monroe Corporation, the highest state of the art, has every needle individually programmed so that the machine can create a cut or loop pile in any possible pattern.

History/Significance

Prior to the mid twentieth century only the very wealthy could afford to cover the floors of their dwellings with carpeting. Today carpeting is commonplace. Two major developments account for the revolution that drastically increased production of carpeting while simultaneously lowering its price: the introduction of synthetic fibers and the mechanization of tufting, a method of manufacturing carpets that involves surface yarns being punched through a backing material and cut to form projecting tufts. Roughly 95% of all carpet produced today is tufted.

Tufting is an ancient method for providing an insulated layer to fabrics, but the process was time consuming and had limited application and popularity. However, around 1900 handmade tufted bedspreads with colorful patterns became a popular cottage industry in northern Georgia. Tufted goods had achieved sufficient status by the early 1920s that a number of mechanical innovators began experimenting with ways to mechanize the tufting process, often by modifying domestic sewing machines. These mechanical inventors included R.E. Hamilton, Glenn Looper, and Ernest J. Moench. Unlike Hamilton and Looper, who modified sewing machines for tufting, Moench built his tufting apparatus from scratch.

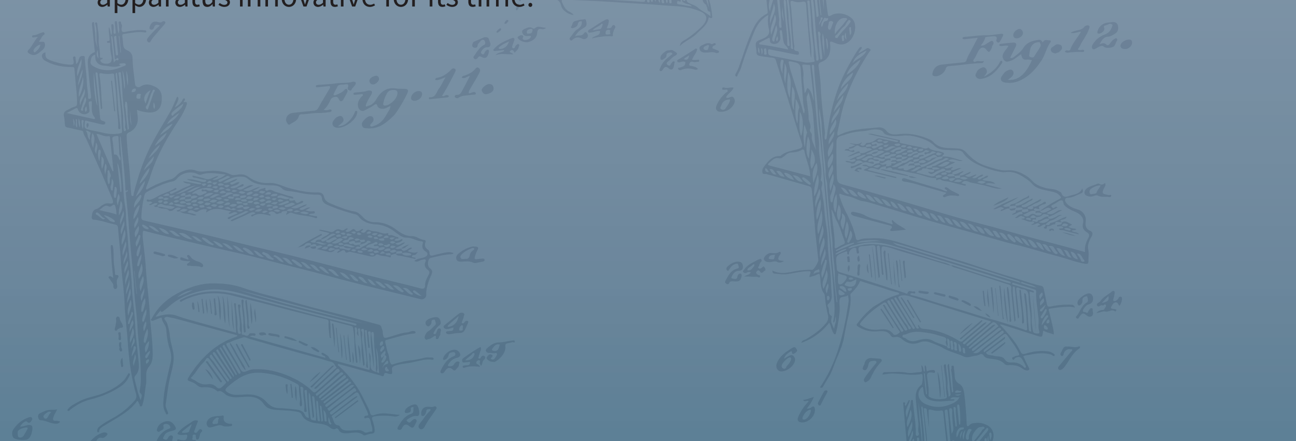
It was a simple but robust device that allowed tufting at comparatively high speeds.[2] As such, it provided the textile innovators who followed Moench in further mechanizing tufting and expanding it into carpeting with a more durable and straightforward design with which to work. Moench's 1928 patent would be referenced in improvement patents as late as 1980. The Moench tufting needle at Shaw Industries is one of the few, if not the only, remaining exemplar of early attempts to mechanize the production of tufted materials.

Moench's device, and the improvements which built on it, accelerated and broadened the mechanization of tufting. While early efforts focused on bedspreads, throw rugs, and robes, by the 1930s the focus had shifted to carpeting.[4] The success of these efforts put Dalton, Georgia, on the map in the 1950s as the "Carpet Capital of the World." By the middle of the 1950s Dalton and the surrounding area produced almost 90% of carpet worldwide.[1]

Today, Whitfield, Bartow, Gordon, and Murray counties of Georgia remain a major center in the world's carpet industry, resulting in some of the lowest unemployment rates in the state.[3]

Description

While Moench's mechanized tufting needle was developed as a standalone device, Moench clearly envisioned the conversion of an industrial sewing machine to use his needle, with later adaptations that would hold more robust needles, hooks, and knives to form multiple rows of cut pile stitching. His patent design featured a robust tufting needle, able to penetrate thick layers of material (such as carpet backing) and a stationary looper blade to hold loops in place until they could be cut to a standardized length. The device's ability to thread, loop, and cut thick fibers without human interaction and with a minimum of moving parts made the apparatus innovative for its time.



Operation

Moench sought to provide a simple and efficient device for applying pile loops, or so-called tufts, to a fabric body or backing, to produce tufted fabric. As noted, he sought to minimize the number of moving parts that worked in conjunction with the puncturing needle, thread, and fabric feed to speed up the operation and make it more reliable.

In Moench's device [see Fig. 3], a shaft rocked back and forth to give the desired back and forth oscillation to the needle. This oscillation was timed to the movements of other parts—such as the backing feed—by power transmitted from the drive shaft.

The fabric backing through which the needle operated to apply the pile loops was fed rearwardly over the top surface of horizontal faceplates, one for each needle. Once the needle, moving through an opening in the faceplate, punctured the backing, it formed a loop. The movement of the fabric carried this loop over a stationary looper blade attached to the rear of the faceplate. This blade held the loop in place and standardized its length.

As the fabric backing was fed rearward—the distance determining the length of the stitch, or the spacing between pile loops—a rotary cutter severed the loop creating tufts. This action allowed the looper blade to engage the next loop being formed by the needle.

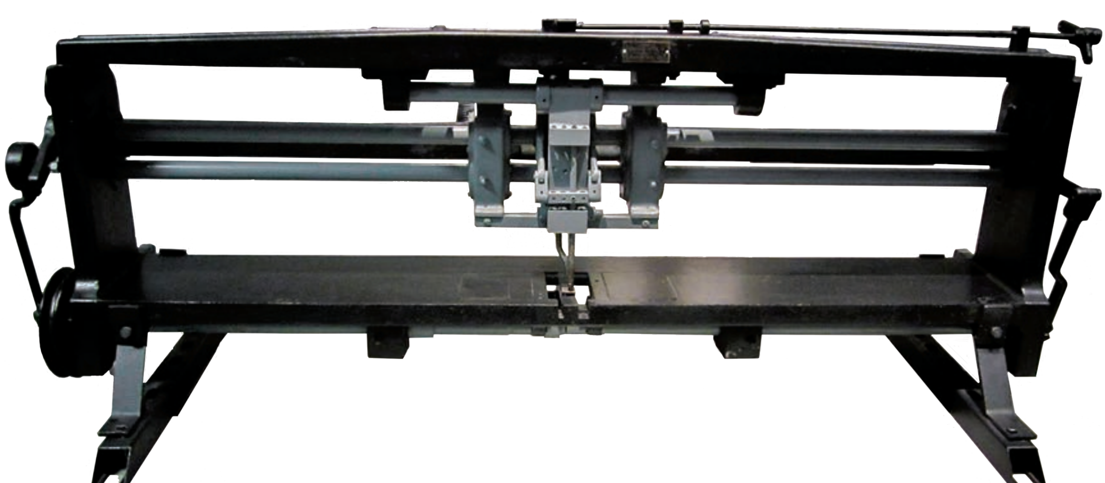


FIG. 1: MOENCH'S TUFTING APPARATUS, LOCATED IN DALTON, GEORGIA, AT SHAW INDUSTRIES' RESEARCH AND DEVELOPMENT DEPARTMENT.

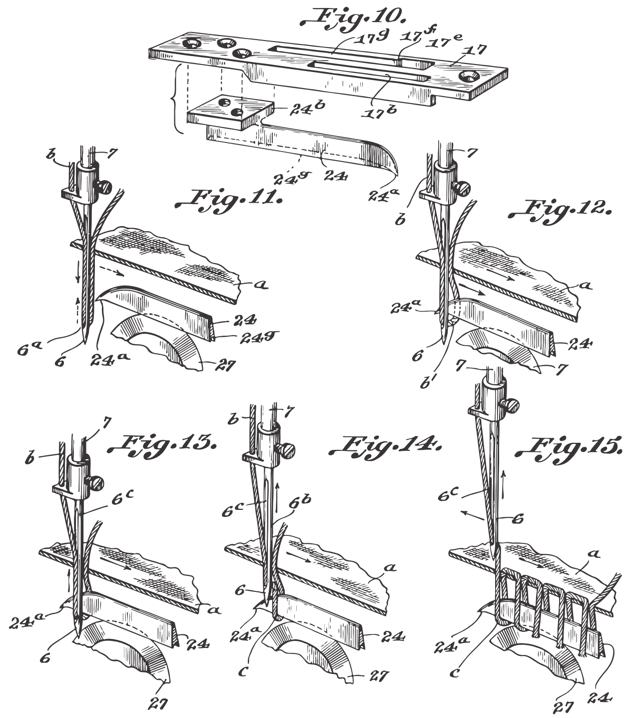


FIG. 2: A DRAWING INCLUDED IN MOENCH'S PATENT APPLICATION DONE BY MOENCH HIMSELF. HERE, MOENCH IS SHOWING HOW THE NEEDLE MAKES LOOPS AND IS CUT BY A BLADE.

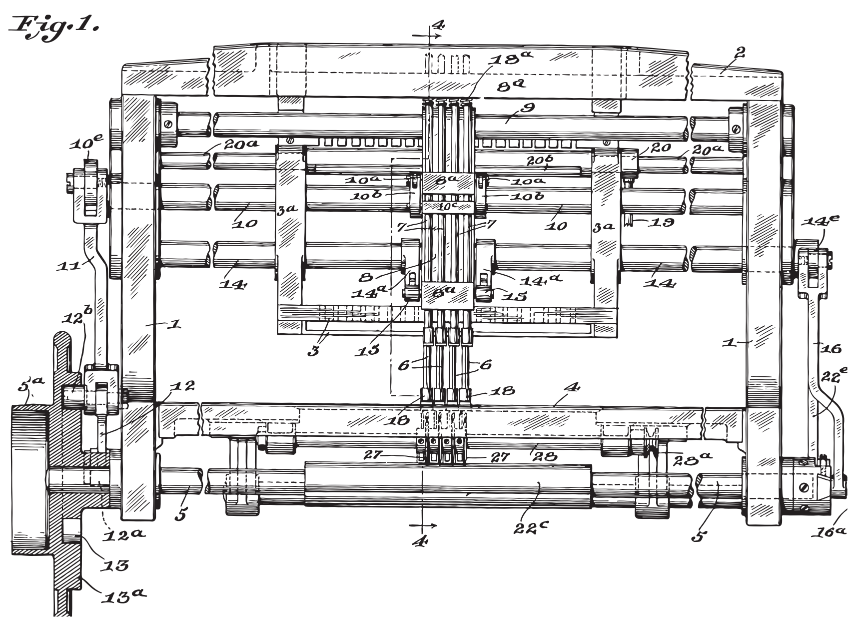
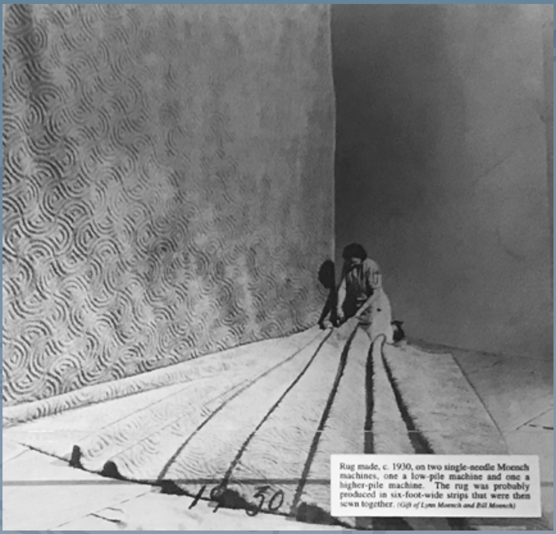


FIG. 3: ANOTHER DRAWING INCLUDED IN MOENCH'S PATENT WHICH SHOWS THE MACHINE IN FRONT ELEVATION.

FIG. 4: ROW UPON ROW OF MOENCH MACHINES LINE THE PRODUCTION ARE OF TENNESSEE TUFTING IN NASHVILLE, TN, C. 1935. (GIFT OF LYNN BILL AND BILL MOENCH, DISPLAYED IN DALTON, GEORGIA, AT SHAW INDUSTRIES' RESEARCH AND DEVELOPMENT DEPARTMENT).

FIG. 5: SINGLE NEEDLE MOENCH MACHINE, C. 1928. (GIFT OF LYNN BILL AND BILL MOENCH, DISPLAYED IN DALTON, GEORGIA, AT SHAW INDUSTRIES' RESEARCH AND DEVELOPMENT DEPARTMENT).

FIG. 6: RUG MADE, C. 1930, ON TWO SINGLE-NEEDLE MOENCH MACHINES, ONE A LOW-PILE MACHINE AND ONE A HIGHER-PILE MACHINE. THE RUG WAS PROBABLY PRODUCED IN SIX-FOOT-WIDE STRIPS THAT WERE THEN SEWN TOGETHER. (GIFT OF LYNN BILL AND BILL MOENCH, DISPLAYED IN DALTON, GEORGIA, AT SHAW INDUSTRIES' RESEARCH AND DEVELOPMENT DEPARTMENT).



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Note: In the following list of names, include any others, if appropriate, who were involved in a significant way with the specific landmark ceremony. The people listed should be incumbent in the position as of the designation ceremony date. Pursuant to ASME guidelines, include, if applicable, the designation P.E. offset by a comma from the name. Exclude any academic or honorific titles.

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For more information about Shaw Industries Inc., please visit www.shawinc.com.

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Further Readings

Deaton, Thomas. Bedspreads to Broadloom: The Story of the Tufted Carpet Industry. Acton, Mass.: Tapestry Press, 1993.

Flamming, Douglas. Creating the Modern South: Millhands and Managers in Dalton, Georgia, 1884-1984. Chapel Hill: University of North Carolina Press, 1992.

Patton, Randall L., and David B. Parker. Carpet Capital: The Rise of a New South Industry, 1945-1970. Athens: University of Georgia Press, 1999.

Reynols, William A. Innovation in the United States Carpet Industry, 1947-1963. Princeton, J.J.: D. Van Norstrtand, 1969.

References

City of Dalton GA, “History – City of Dalton Georgia.” Cityofdalton-ga.gov https://www.cityofdalton-ga.gov/index.asp?SEC=C4E6D9F4-E5BE-423B-9E24-27AA40F54421 (accessed May 24, 2018).

2. Moench, Ernest. 1934. Tufting apparatus. US Patent 1,956,453, filed May 3, 1929, and issued April 24, 1934.

3. Patton, R.L., “Shaw Industries.” New Georgia Encyclopedia. https://www.georgiaencyclopedia.org/articles/business-economy/shaw-industries (accessed May 24, 2018).

4. Tamasy, Robert J., Tufting Legacies: Cobble Brothers to Card-Monroe: The Story of the Men Who Revolutionized the Carpet Industry. Bloomington: iUniverse, Inc., 2010.

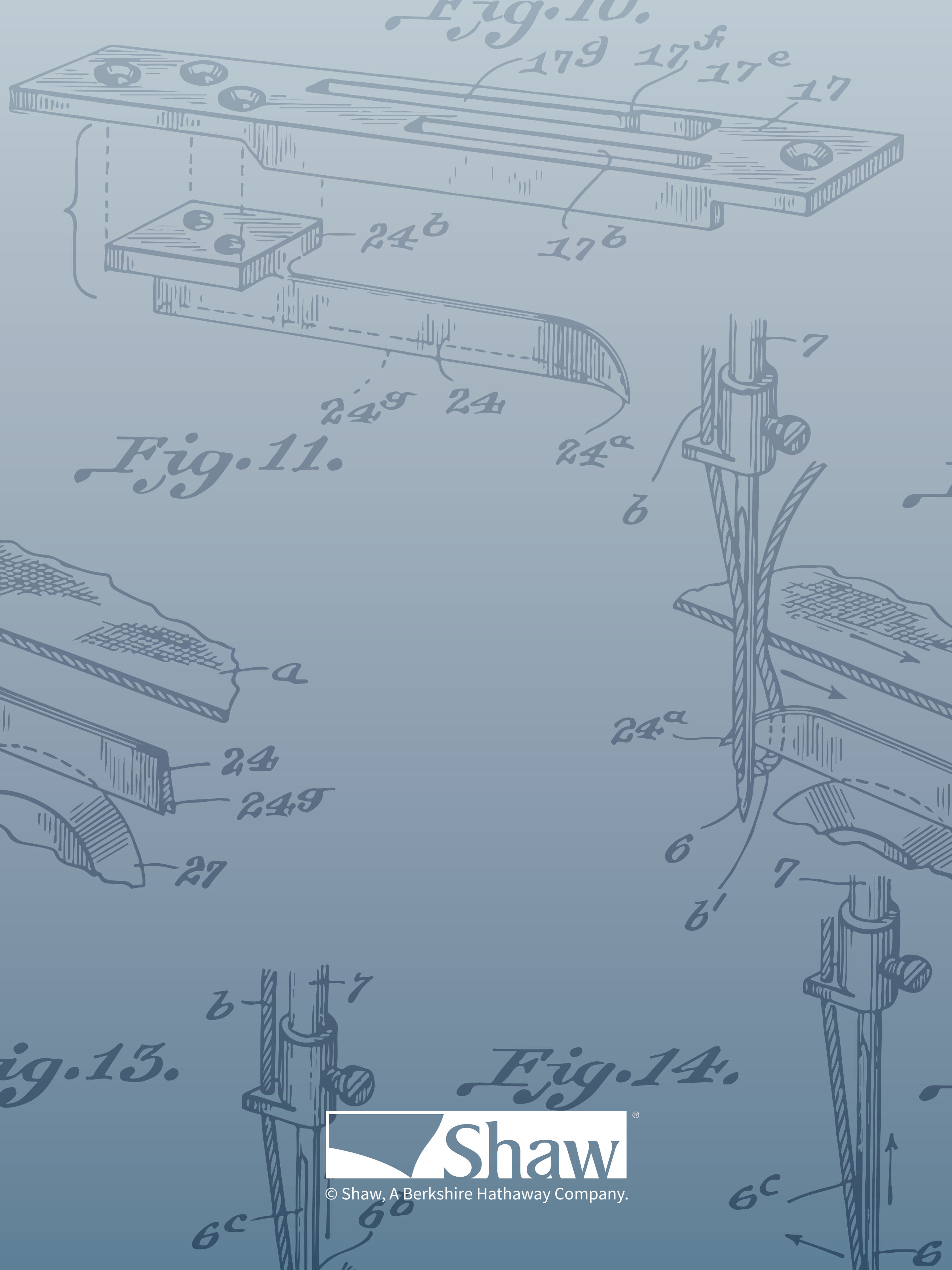
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Fig. 14.