

Interactive Machines



Jacques de Vaucanson (1709-1782)

Vaucanson Metal Lathe



The 1751 Machine that Made Everything

Machine Tool

"Many historians of technology consider that true machine tools were born when the toolpath first became guided by the machine itself in some way, at least to some extent, so that direct, freehand human guidance of the toolpath (with hands, feet, or mouth) was no longer the only guidance used in the cutting or forming process. "

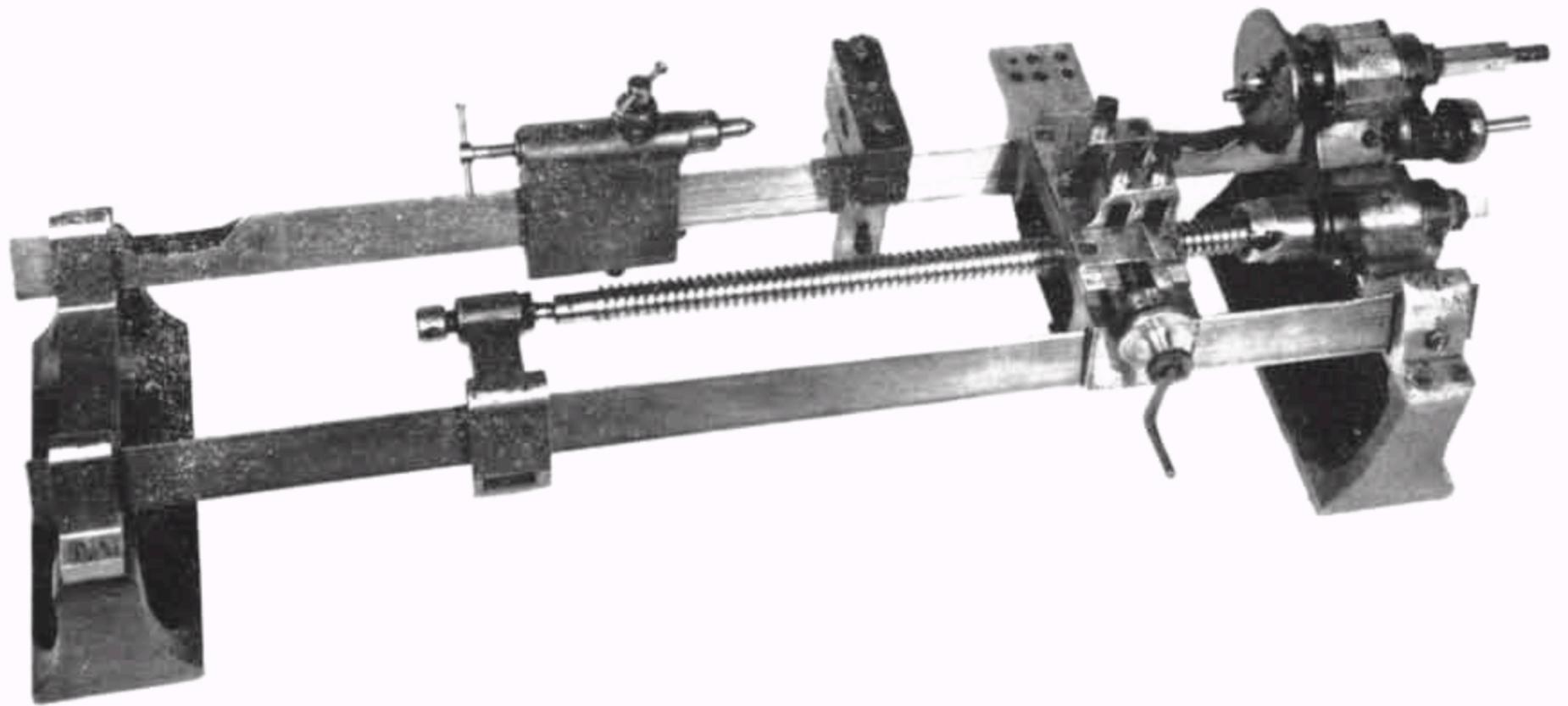


G. S. Gordon.
1827

dessiné sur pierre d'après Mather.

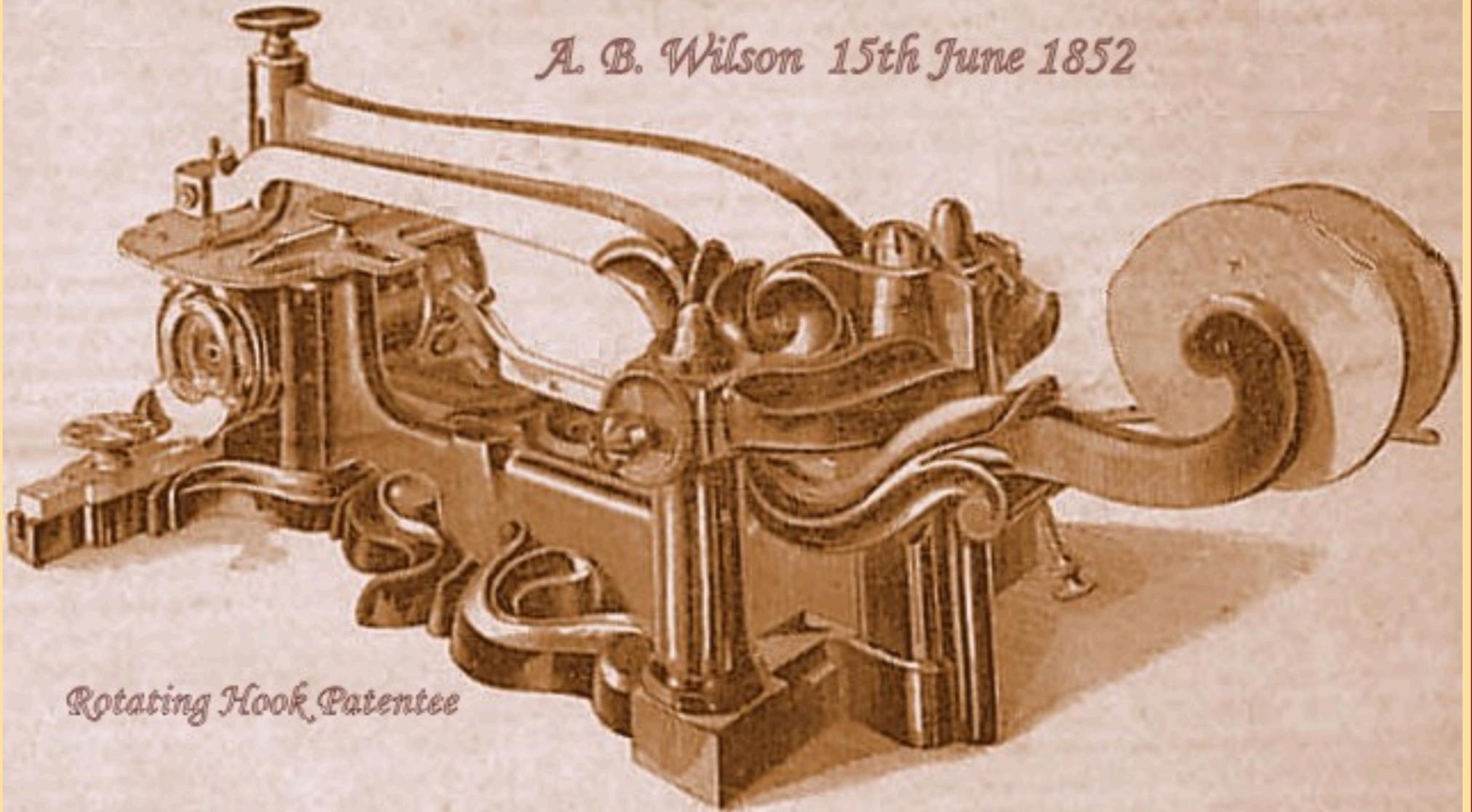
Lith de P. Noire

H. MAUDSLAY.

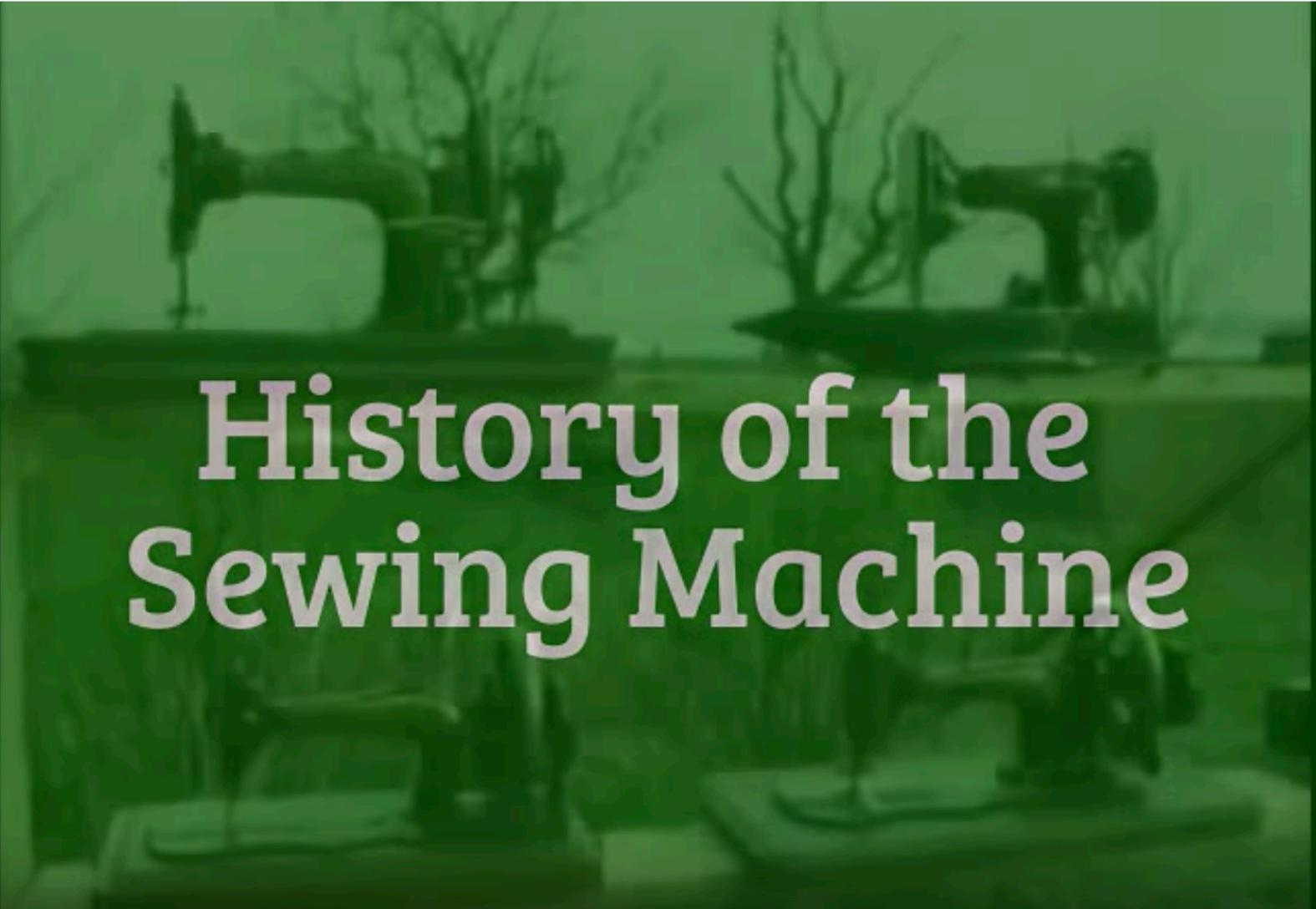


The Improved Sewing Lathe

A. B. Wilson 15th June 1852



Rotating Hook Patentee



History of the Sewing Machine



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Innovations

Lockstich instead of the chain stitch

Needle with groove

Tensioning arm

Bobbin, shuttle, and rotary hook

Feed mechanism (four motion, walking feet)

Foot treadle freed your hands (eventually motors)

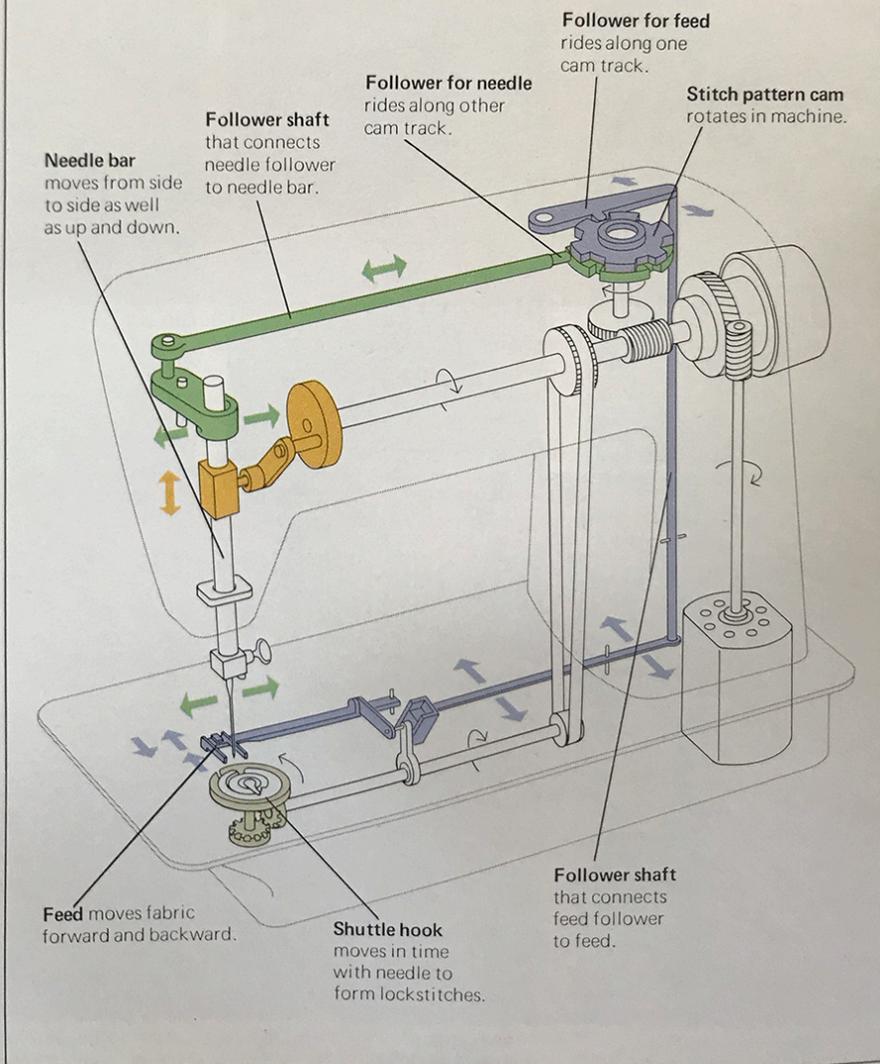
Zig-Zag stitch using a cam

Automatic threader

From Readers Digest Complete Guide to Sewing

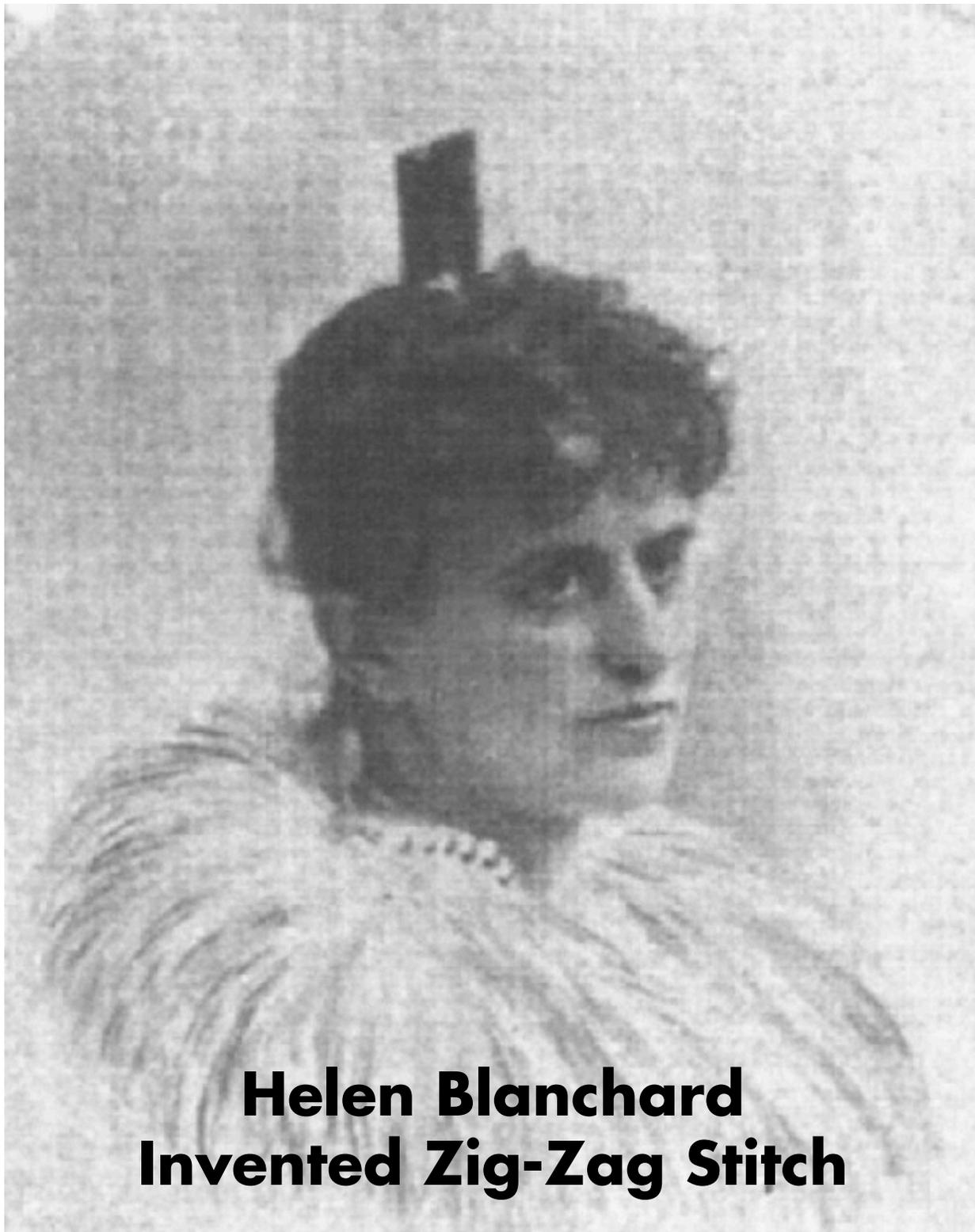
duced by co-needle and feed roller is moving during stitches, the moving the fabric forward according to requirements. Pattern with zigzag rolled. Because however, stretch double (two-stations on one action; those movement of the diagram at the basic principles es are formed. require a **stitch** position the fol-propriate cam **stitch width and** permit the op-titch size. urd feed action tch stitches, in formed in the traight stretch o stitches for- se, or a total of place. iverse stitches he same length rd. In stretch rd and reverse this tendency ortion. To help achines with y are equipped **control.** ecise patterns, as critical for straight or zig-ook too unbal-until stitches eye (see p. 31). djust the foot on pages 28-29.

Stretch stitches are produced basically as shown in the diagram. As two-track *cam* rotates, a *follower*, connected to the needle bar, rides along one track to move the *needle bar* from side to side. Another follower, connected to the *feed*, simultaneously rides the other cam track to move the feed for forward and reverse stitches as required by the design. *Stitch pattern selector* positions followers onto appropriate cam tracks; *stitch width regulator* determines the maximum width of the pattern; *stitch length regulator* controls the stitch length. As these actions are taking place, the needle bar is moving up and down in time with the shuttle hook to form lockstitches between the top and bottom threads.



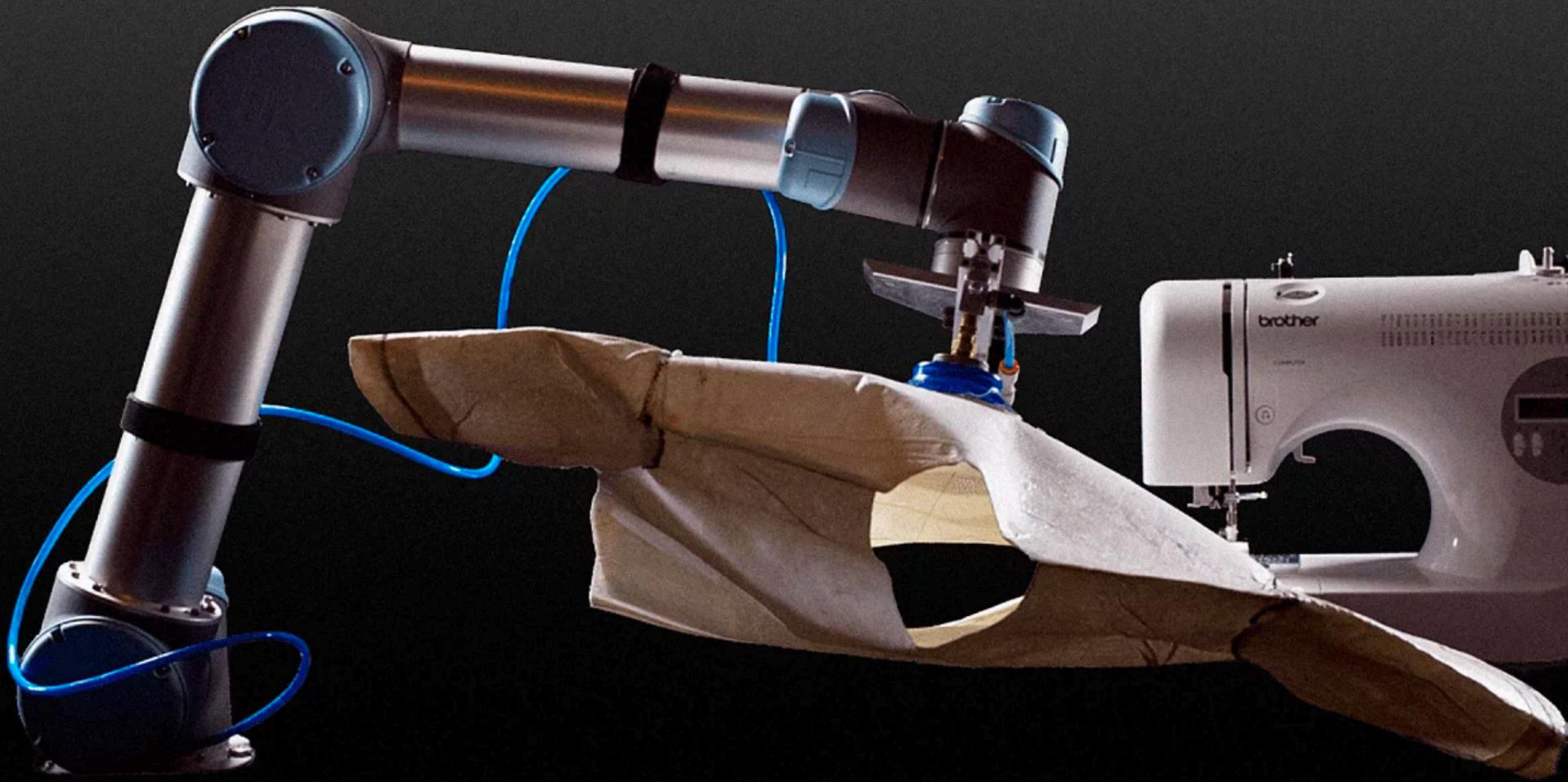
A typical stretch stitch. The needle moves left, for...

A pattern selector (left) helps that cam...



**Helen Blanchard
Invented Zig-Zag Stitch**







**The Invention of the Sewing Machine
Grace Rogers Cooper**

Premise: People want to be involved in the making process - not just push a button and run a machine

Challenges:

- **How would you allow for design/improvisation during the making process?**
- **How to design the interaction between people and the machines?**

Smart Tools

The wise chisel



Black & Decker Gyro BDCS40G

A hand is shown using a white, augmented compass on a piece of paper. The compass has a glowing green light on its handle. The hand is holding the compass and a pencil, and is in the process of drawing a line on the paper. The background is a plain white surface.

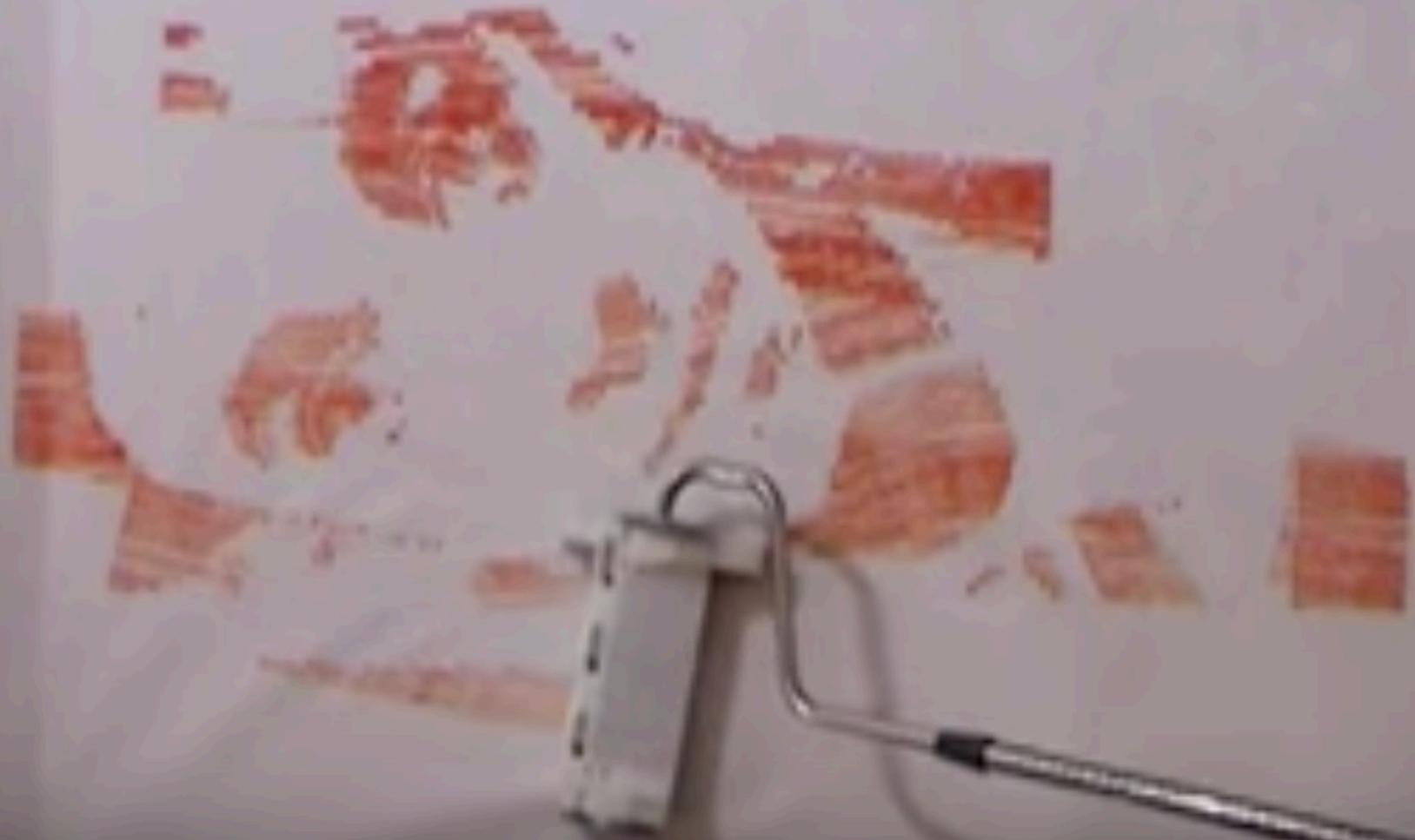
COMP*PASS

Augmenting a Compass to Enable Drawing
and Duplicating Various Figures on Physical Papers

Keio University
Ken Nakagaki and Yasuaki Kakehi

▶ ▶ 🔊 0:08 / 2:58





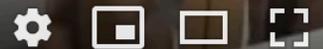
Operation:Schoener Ltd, © 2006
www.random-international.com



constructable

interactive lasercutting

▶ ⏪ 🔊 0:01 / 7:12



<https://dl.acm.org/citation.cfm?id=2380191>

The Advantages of CAD

Precision

Fast interaction

Trial and error (undo and redo), modify

Documentation

Invent new ways to create drawings other than by making, e.g. parametric design, generative modeling

Design space exploration using simulation

Interactive fabrication: new interfaces for digital fabrication





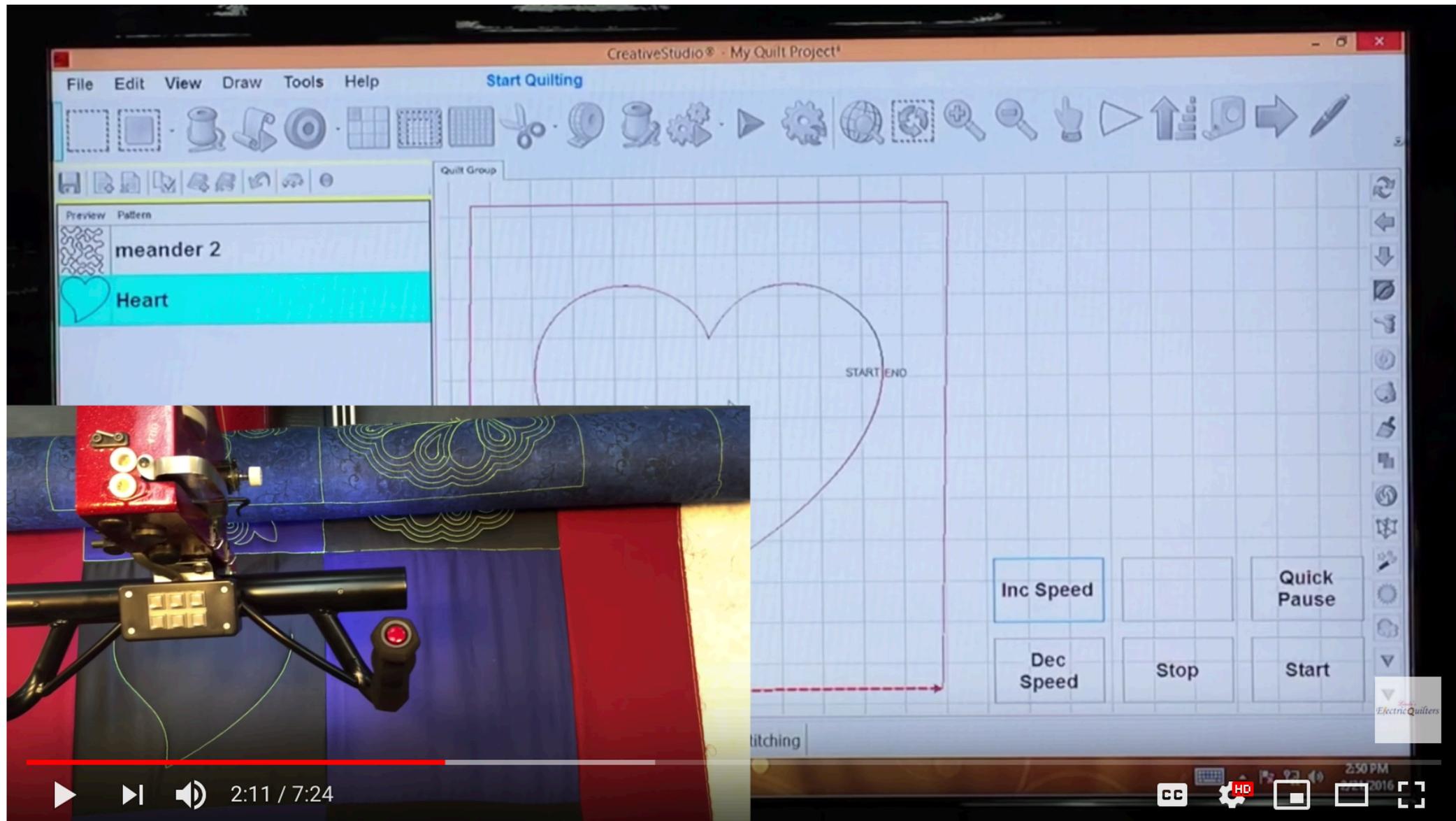
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Interactive?

Embroidery Machine
Paper Cutter
Plotter



Back to the Basics- Fill Inside & Outside
Linda Electric Quilters