

AN EXHIBITION IN TEN STATIONS

Over, Under

The picture is the structure.

A print lies on its paper. A cloth has nothing underneath it: the threads that draw its picture are the threads that hold it together.

- Move the light across the cloth.

A Studio Helper concept. An exhibition identity and interactive publication for an exhibition that has not been held.

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SWATCH BOOK
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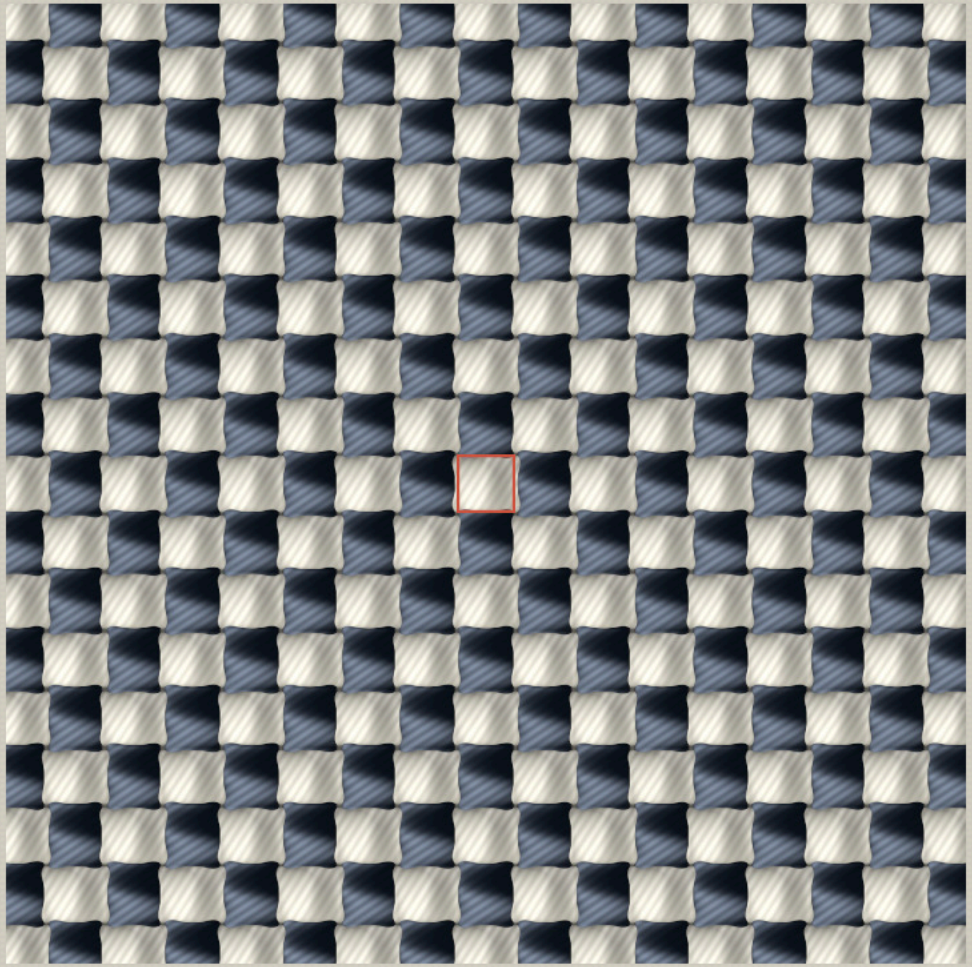
01 CROSSING

One decision

Stretch threads side by side on a frame; that is the warp. Pass another thread across them, over some and under others; that is the weft. Where the two meet, one of two things is true. The warp is on top, or the weft is.

Nothing else happens in weaving. Sailcloth and the silk of a portrait are both this one decision, taken again at every crossing, pick after pick. What you see as a picture is the record of those decisions.

Press a crossing to change which thread is on top.



Closer | Further | Change this crossing

End 16, pick 17: the weft is on top.

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02 DRAFT

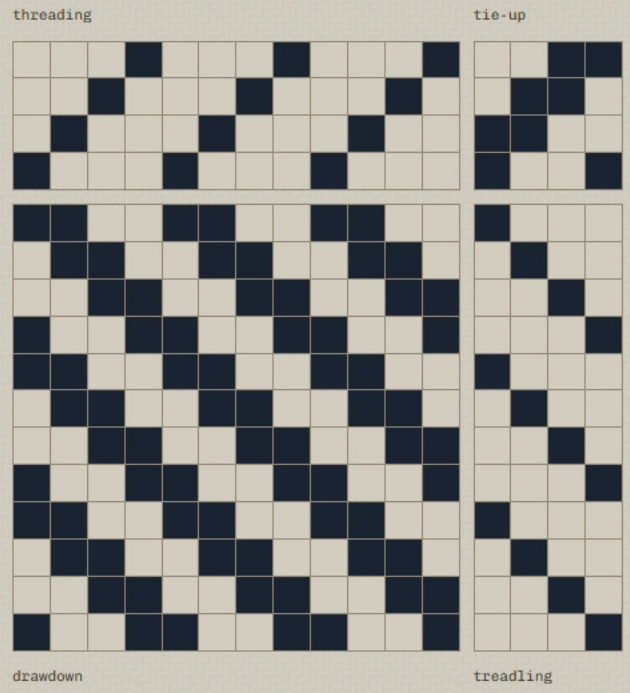
Written before it is woven

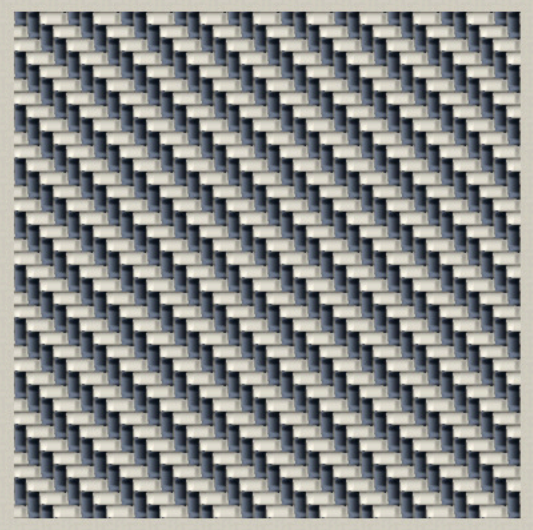
A loom does not lift threads one at a time. The warp is shared among a few frames called shafts, and each end is threaded through one of them: that list is the threading. Treadles under the weaver's feet are tied to shafts: the tie-up. The order in which the treadles are pressed is the treadling.

Those three lists decide the cloth completely. Where an end sits on a shaft that the pressed treadle lifts, the warp is on top; everywhere else, the weft. Weavers work the result out on squared paper and call it the drawdown. It is a multiplication: threading, times tie-up, times treadling.

Marx Ziegler, a master weaver in Ulm, printed drafts like these in 1677 for looms of two to thirty-two shafts. [1]

- Change a square in any of the three lists. The change travels into the cloth.





Plain | 2/2 twill | Point twill | Basket

12 ends on 4 shafts, 4 treadles. Longest float: 2 crossings.

03 FLOAT

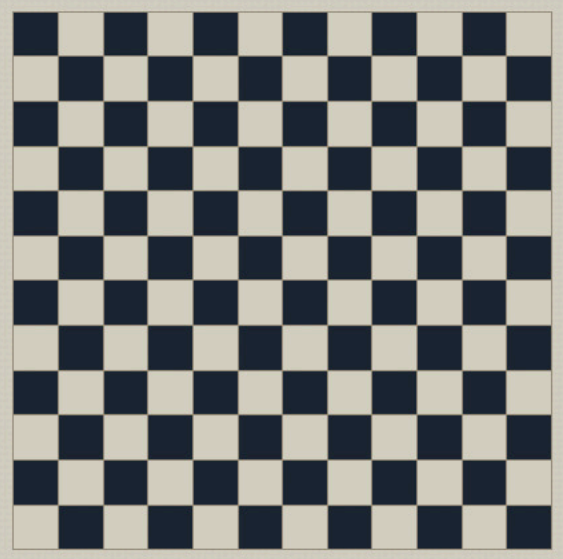
A picture has to hold

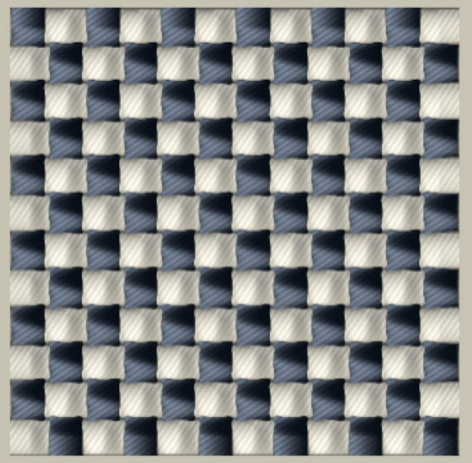
On paper you can draw anything. On a loom every mark is also a bond, and the bond has to hold.

Where a thread passes over several others without going under, it floats. Short floats give a cloth its sheen. A long one lies loose on the surface and catches on whatever touches it. A thread that never goes under at all is not held by the cloth, and comes away from it.

So a weaver's drawing answers to a rule a painter never meets: how far may a thread travel before it must be tied down?

- Draw on the grid. Threads the cloth cannot hold lift away from it.





Start from plain weave | Clear

Longest float: 1 crossing. Every thread is held.

04 SATIN

The arithmetic of a shine

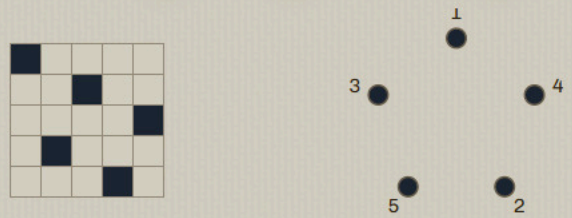
Satin has the longest floats a cloth can bear and the fewest ties. The ties are scattered so that no two touch, and that is why a satin reads as one smooth sheet of light rather than as a diagonal.

The scattering is arithmetic. On n shafts, each pick moves the tie the same number of shafts along. That move must share no factor with n, or some threads are never tied; and it cannot be a single step either way, or the ties fall into line and make a twill.

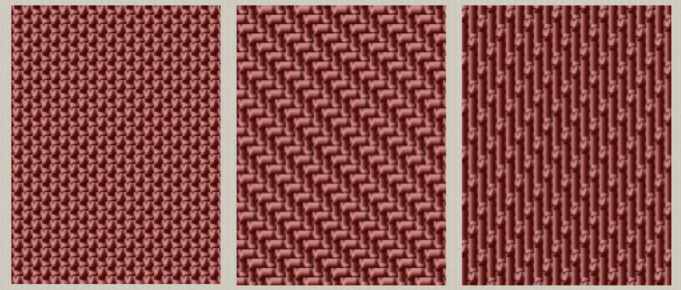
On five shafts a move of two works. On six, nothing does: two, three and four each share a factor with six. There is no regular satin on four or six shafts. [2]

■ Choose the shafts and the move. Then move the light across plain weave, twill and satin.

SHAFTS n − 5 + MOVE k − 2 +



5 shafts, move 2: a regular satin. Each end is tied once in 5 picks, and no two ties touch.



plain 2/2 twill 5-end satin

LIGHT

05 COLOUR

Nothing is mixed

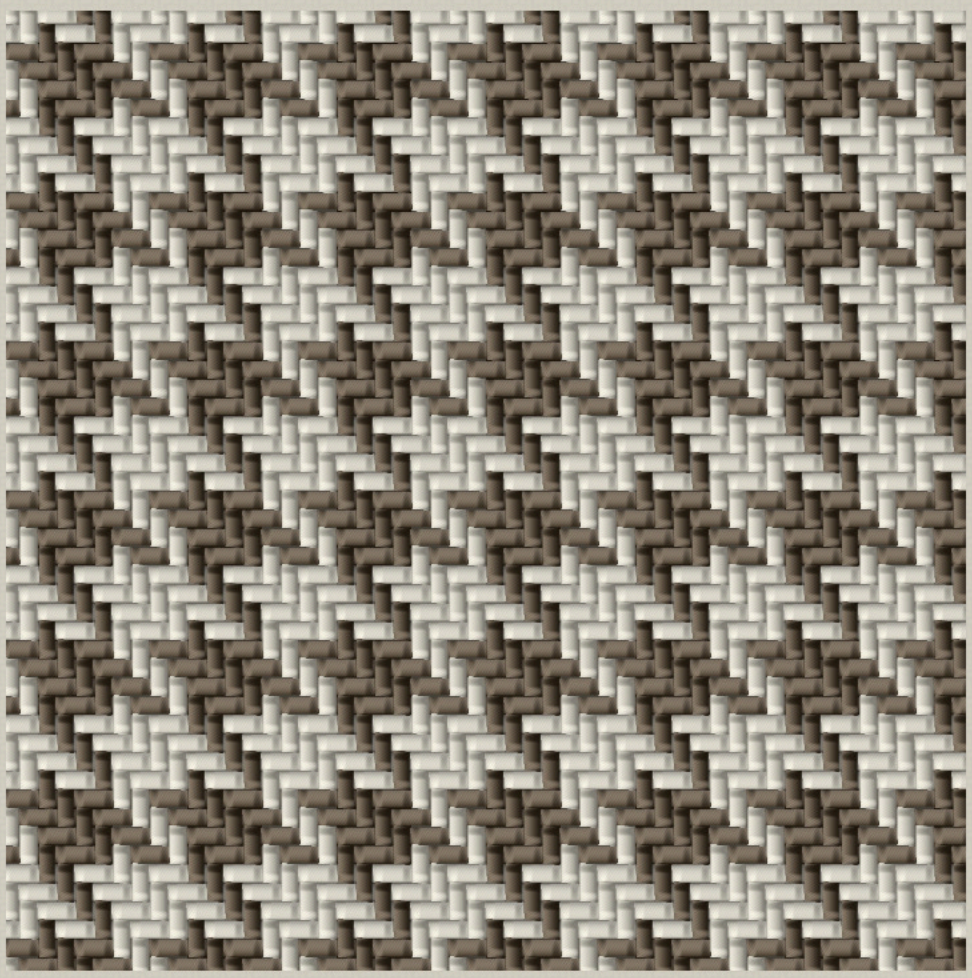
A woven colour is not stirred in a pot. Each crossing shows the colour of whichever thread is on top, and the eye does the mixing from a distance.

Four dark ends and four light, four dark picks and four light, on an ordinary two-and-two twill, and a shape appears that nobody drew: the houndstooth. [3] Put indigo in the warp, leave the weft undyed, and bring the warp to the face: one side of the cloth is blue and the other pale. That is denim. [4]

In 1824 Michel-Eugène Chevreul took charge of the dyeing at the Gobelins, where the blacks were said to lack vigour. The dye was sound. The weakness, he wrote, was “owing to the colour next to them”. [5]

The threads here take their colours from wool dyed to old recipes: woad indigo, madder, weld, and a black of oak galls and iron. [6] Dyers made green in the vat, by dipping yellow wool in blue. The only green on these pages is a blue thread crossing a yellow one.

■ Change the colour orders and the weave. Step back from the cloth to watch the colours mix.



Houndstooth | Denim, face | Denim, back | Blue across yellow

warp

weft

STEP BACK

iron black and undyed threads. From a distance the eye reads #a7a296.

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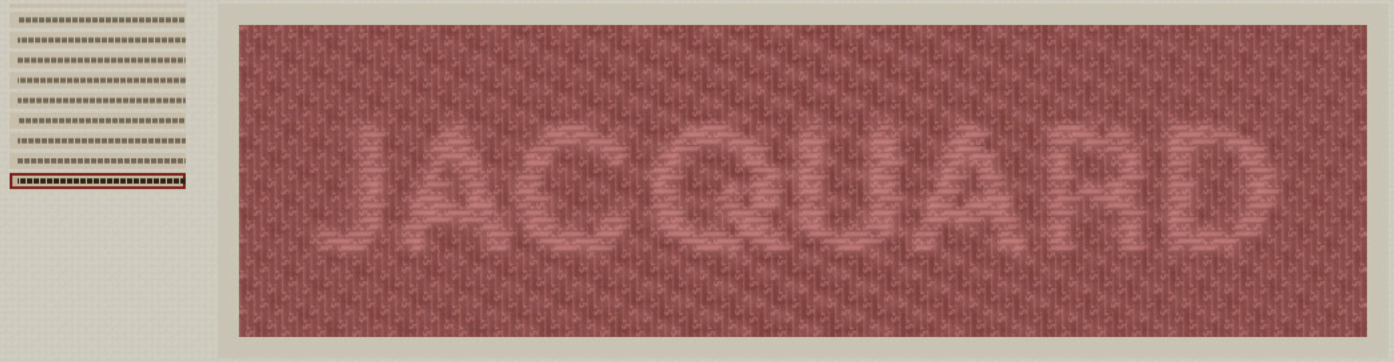
06 CARD

A memory made of holes

A picture needs each end to rise on its own, pick after pick, in an order no weaver could hold in their head. In 1725 Basile Bouchon picked them out with a band of perforated paper; three years later Jean-Baptiste Falcon was using pasteboard cards. The machine Joseph-Marie Jacquard patented in 1804 read a chain of cards, one card to each pick. Where a hole is punched, a hook rises and lifts its thread. [7]

In 1839 a portrait of Jacquard was woven in silk at Lyon, from about 24,000 cards. [8] Charles Babbage owned one. It looked, he wrote, “so perfectly like an engraving, that it had been mistaken for such by two members of the Royal Academy”. [9]

It was not an engraving. Every tone in it was a thread, going over or under.



- Type a word. It will be woven, and every card punched.

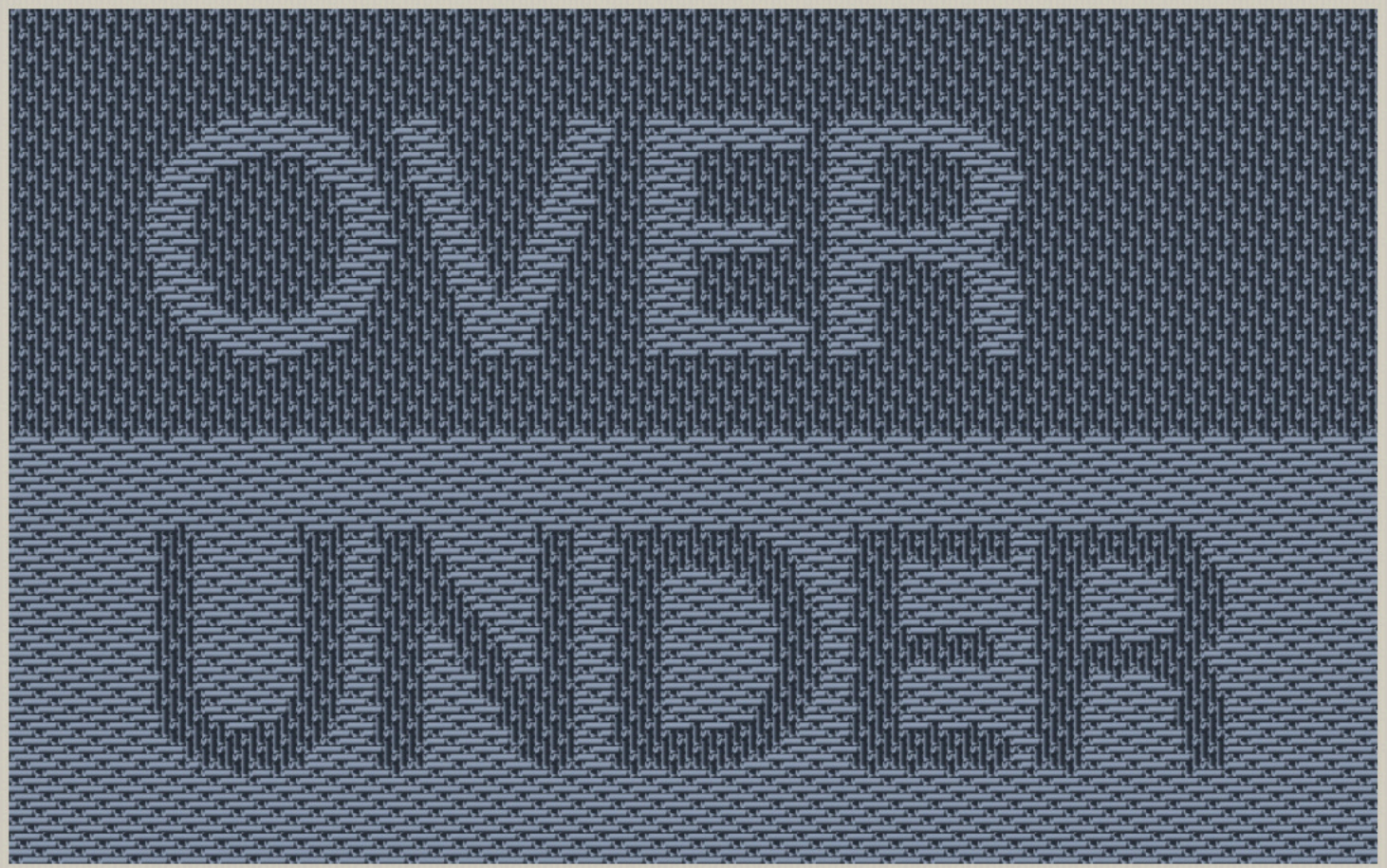
A WORD TO WEAVE

JACQUARD

Weave

JACQUARD: 159 ends, 44 picks, so 44 cards and 4,967 holes.

Longest float: 4.



07 DAMASK

A figure made of direction

Weave a single thread, in a single colour, as satin. On the face the warp floats, lying one way. On the back the weft floats, lying the other. Set the two faces side by side in one cloth and you have damask: a figure with no dye and no ink, made only by the direction of the threads. [10]

Light is what shows it. As the light moves, the figure brightens, fades, and darkens against its ground. Turn the cloth over and the picture becomes its own negative.

You have been reading damask since the first screen. OVER is woven in weft floats, UNDER in warp floats.

■ Move the light. Then turn the cloth over.

LIGHT

Turn the cloth over

The face.

08 CUT

Off the loom

Every cloth ends the same way. The threads are cut, the cloth comes off the loom, and the picture comes with it.

There was never anything underneath.



Weave it again

Weave it again

09 COLOPHON

About this exhibition

Over, Under is a self-initiated concept by Studio Helper: an identity and an interactive publication for an exhibition that has not been held. No venue, lender or object is implied.

Every image on these pages is computed in the browser from weaving drafts. Nothing is photographed and no museum image is reproduced. Where the text states a fact, it is sourced below; where it states a rule, the rule is calculated here and the cloth obeys it; the woven words are illustrations.

The dye colours were sampled from a published photograph of wool dyed to fifteenth- to seventeenth-century recipes. They are close to those wools, not measurements of them.

Type: Castoro, Host Grotesk and Chivo Mono, under the SIL Open Font License. The woven letters are Host Grotesk set on the thread grid.

NOTES

1. Marx Ziegler, Weber Kunst und Bild Buch (Ulm, [1677]): "von dem 2. schäfftigen an, biß auff das 32. schäfftige". Bayerische Staatsbibliothek, digitised copy bsb11283522. ↑
2. Calculated here from the definition of a regular satin; see B. Grünbaum and G. C. Shephard, "Satins and Twills", Mathematics Magazine 53 (1980): 139–161, and K. Donde, "Satin Dreams", Handwoven, 2015. ↑
3. The colour order and weave as given by C. Booker, "Houndstooth", Weaving Space. The cloth here is computed from those rules alone. ↑
4. An indigo warp and an undyed weft in a warp-faced twill. The face and back here are computed, not photographed. ↑
5. M.-E. Chevreul, The Principles of Harmony and Contrast of Colours, trans. C. Martel (London, 1855), Author's Preface, pp. xi–xii. First published as De la loi du contraste simultané des couleurs (Paris, 1839). ↑
6. Wool samples dyed to historic recipes (MODHT): J. Kirby and D. Saunders, "A Comparison of the Fading of Dyestuffs as Textile Colourants and Lake Pigments", Heritage 8 (2025): 260, fig. 19 and table 2. CC BY 4.0. ↑
7. Bouchon and Falcon as recorded in the history of the draw loom; Jacquard's patent of 1804 and the working of hooks and cards: Science and Industry Museum, Manchester, "Programming patterns: the story of the Jacquard loom". ↑
8. Woven by Michel-Marie Carquillat for Didier, Petit et Cie after a painting by Claude Bonnefond. Examples: Computer History Museum X341.84; Metropolitan Museum of Art 222531. ↑
9. Charles Babbage, Passages from the Life of a Philosopher (London, 1864), chapter XI. ↑
10. Damask: a reversible figured cloth of one warp and one weft, figure and ground in the two faces of a satin. ↑