Medieval Looms

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Weaving during the Middle Ages became a widespread and profitable enterprise in most European towns. A wide range of occupations could be used to build a case for the importance of the textile arts and service industries during the Gothic era: the use of expensive dyes such as murex, the investment in gold and silver threads, and the value of silk and linen all support this proposition. However, even more elemental than these supportive occupations is the study of the variety of medieval looms and the technology on which the textile industry was based.

The inventories included here scarcely suggest the total extent of the textile industry, but they can serve to demonstrate the importance of textiles in medieval times and offer an estimate of the numbers of looms actually in existence. More than two thousand looms were reported at Provins by 1256. Flanders reflected the same prosperous condition: at Ghent there were two thousand and three hundred weavers making cloth; at Ypres in 1313, ninety-two thousand five hundred pieces of cloth were taken from the loom, and each piece measured from thirty to sixty yards. Productivity in twelfth-century Italy was accelerating. Sixty thousand weavers lived in Milan. Verona in 1300 reported thirty thousand pieces of cloth woven. Weavers in the Arno region wove one hundred thousand pieces of cloth worth over a million gold florins.

Inventories of tapestries further stress the monumental economic impact of the textile industries. The inventories of notables of the time suggest that they owned far more tapestries than could have been necessary. Philippe le Bon (1440) added a room in his Arras residence in order to guard his collection safely against fire. There he employed six guards and twelve valets to look after his tapestries, as well as a staff of repairers.

The following detailed examination of nine cloth looms found in Gothic art from 1250 to 1540 should give an intimate view of the development of floor looms. In addition five illustrations of the less complicated tapestry loom are considered. A glossary of terms and a labelled illustration (Fig. 1) are provided.

CLOTH LOOMS

I. From a manuscript in Trinity Collge, Cambridge, 1250.[1]

The floor model of a horizontal loom (Fig. 2)[2] shows the treadle-loom with all its essential parts. The front and back beam wind to hold long warps. Winding of the beam is achieved by means of a lever rod which exerts pressure against the warp beam. Sheds are formed by the raising and lowering of two harnesses which connect to the foot-powered treadles by cords and pulleys. The upper frame houses the cords and pulleys above the weaver's head. The nude weaver is seated at a convenient working height to the loom. His right hand holds a boat shuttle containing a bobbin or spool of thread. The lease-sticks remain in the warp to help maintain an even tension.

II. Weaver at Work (Fig. 3). Bas-relief carving on the Campanile of Florence Cathedral. 1340.[3]

The sturdy floor loom is dressed with a horizontal warp which is wound around the back beam suggesting an extended warp length. The winding and tension device is a lever inserted into holes drilled in the beam and operates on the same principle as Figure 2. The harnesses, hung by cords from an upper frame, can be clearly distinguished. The sheds are formed by the raising and lowering of the harnesses which are controlled by foot-powered treadles. There appear to be two harnesses. The weaver is female. A boat shuttle is held in her right hand which is raised in preparation for the next shot.

III. Nuremberg painting (Fig. 4). 1387.[4]

This floor loom, made of round unhewn wood, accommodates a horizontal warp. The beams are the winding-type but no tension or brake device is shown. The sheds are formed by the raising and lowering of harnesses operated by two or four foot-powered treadles. The pulley system is suspended from the ceiling above the loom. Two sets of cords appear to pass through the warp (a design feature which still occurs in modern floor looms) rather than being restricted to the outside as in Figures 2 and 3. The lease-sticks remain in the warp, a technique that keeps the warp threads in order as well as aiding in even tension. The weaver, dressed in heavy clothing, works barefoot. The weaving bench seems to be doweled into the loom frame. A boat shuttle containing a bobbin of thread is about to be thrown in the next pick. The large box of yarn on the floor indicates an abundance of work for the weaver.

IV. Fresco showing loom (Fig. 5). Constance, early 14th century.[5]

This somewhat simplified floor loom is dressed with an invisible horizontal warp. No indication of a winding beam is included. There is an overhead frame for harness cords and batten. The lady weaver is seated on a stool independent of the loom frame. Her left hand holds a boat shuttle with a spool of thread. A child sits on the floor spooling thread.

V. Family of Flemish weavers at work (Fig. 6). From the Book of Trades, Ypres, 14th century.[6]

A master and student are teamed as cloth weavers on this large production loom. Two sets of treadles are indicated by the two sets of cords and pulleys suspended from the upper loom frame. Two harnesses are shown, one raised to form the shed. The weavers' hands are resting on the batten while the aged weaver prepares the boat shuttle for the next pick. Lease-sticks remain in the warp which is wound on the back beam. It is unclear how the back beam is supported but a ratchet wheel and pawl are shown for its braking and tension device. A child sits filling bobbins (not spinning!) from a reel or swift. An extra bobbin is conveniently hung on the upper loom frame between the weavers.

VI. Window of the Drapers (Fig. 7), Semur-en-Auxois, France, 1460-65.[7]

The window depicts four scenes of fulling, weaving, cutting and finishing cloth. A horizontal warp is wound on a large floor loom. The beam is controlled by a ratchet-wheel and pawl mounted at each end. The loom had an overhead frame that supports a harness system which is not shown but indicated by the use of a boat shuttle held in one of the two weavers' hands. The presence of two weavers indicates a weaving width probably over sixty inches. Each weaver operates two foot-powered treadles connected to the same harness to ensure an even shed.

VII. Treadle-loom with batten (Fig. 8). From Rodericus Zamorensis, "Spiegel des menschlichens Lebens." Augsburg, 1477.[8]

This large floor loom with horizontal warp has an unusual beaming system which accommodates a longer warp. The back beam is elevated on the rear loom frame while the front beam is lowered to a position just above the treadles. The back beam is fitted with a large gear, probably a ratchet wheel. Sheds are formed by foot-powered treadles connected to the harnesses by a system of pulleys and cords. The weft beater is suspended from the upper frame of the loom. The weaver, wearing only a shirt, holds a boat shuttle in his right hand.

VIII. Cloth loom, 17th century (Fig. 9). From "Piazza Universale" Frankfort on the Main, 1641.[9]

This late example of a horizontal floor loom demonstrates a perfection in loom construction. The fine woodwork includes mortice and tenon joinery. Although the devices for controlling the beams are not shown, other members of the treadle-loom are rendered in detail. Sheds are formed by two harnesses raised by a cord and pulley system connected to two treadles. The batten swings from the upper frame of the loom. The weaver is seated on a bench that appears to be supported by two legs on one end and the lower loom frame on the other. His right hand, holding a boat shuttle, is resting on the breast beam while his left hand pulls the batten towards him to beat the weft. The full basket of yarn on the floor indicates a successful business.

IX. Penelope at her Loom (Fig. 10). Flanders, early 16th century. Boston Museum of Fine Arts.[10]

Penelope is rendered as a courtly Flemish lady working at a small table-top loom. This horizontal warp loom is a scaled down version of the large floor looms and operates on the same principle. The long warp is wound around the beams braked by a ratchet wheel. Sheds are formed by harnesses lifted by pulleys. Treadles are replaced by a hand-operated lever which Penelope is moving with her left hand. A thin boat shuttle is held in her right hand. Penelope's right arm is extended in a motion typical of a weaver unwinding sufficient thread for the next shot of the shuttle.

These nine illustrations of floor looms may be considered as a contemporary statement on the vastness of the textile industry during the Middle Ages. Though it can be inferred that the floor loom was used in many areas, the degree of sophistication of the tool varied: for instance, the braking and winding devices for the warp beams reflect several differences such as a primitive lever device in Figure 2 which contrasts with the more complex ratchet-wheel and pawl system in Figures 7 and 8. Battens appear in three forms: hand-held beaters (Fig. 2), low-mounted battens (Figs. 4 and 6) and battens suspended from the upper frame of the loom (Fig. 8). Harnesses were suspended from upper frames (Figs. 3 and 6) or from the ceiling (Fig. 4). Pulleys (Fig. 9) and simpler rollers (Fig. 2) were used. The placement of the warping beams was adapted according to need and space (*cf.* Figs. 7 and 8). The looms used in large-scale cloth production (Figs. 3, 4, 6, 7, 8 and 11) employed foot-powered treadles to free both the weaver's hands while Figure 10 shows slower hand-operated "treadling" for small-scale production. Regardless of size, these looms indicate a concern for production of uniform quality cloth at a profitable rate.

Tapestry weaving differs from cloth weaving in function and production. In production the cloth weaver throws one thread across the entire width of the cloth but the tapestry weaver works in small areas of colors so that different threads are used to build up areas of the design. A skilled tapestry craftsman does not produce more than a few dozen square inches of the design per day, consequently it often required months to finish a tapestry, and sometimes as many as seven craftsmen worked simultaneously on different areas of the same piece.

Whereas cloth served a purely utilitarian function, tapestries were indeed one of the most versatile crafts of the Gothic area. They turned the bare walls of castles and noble houses into elegant and colorful interiors; other fabric furnishings—including upholstery and floor coverings—were often chosen to go with the wall hangings. For various festivities and processions and town holidays, tapestries were hung along roads or from windows of buildings. This temporary decoration added importance and an air of festivity to the streets to give necessary magnificence to the event. The utilitarian function of tapestry was to act as insulation to interior walls, blocking drafts and warding off the chill of damp stone houses. Thus, the tapestry weaver created indispensable decor for both joyous and somber days, a frame for public and private events.

TAPESTRY LOOMS

There are two basic differences in tapestry looms, size notwithstanding. One is simply a horizontal frame over which the warp is stretched. The other type of tapestry loom is a vertical frame which quite often includes a shed-making device such as string heddles tied to a bar. The weft is beat in place with a tapestry fork or comb.

I. Figure 11 illustrates a simple tapestry loom.[11] The loom is a large frame that stands on the floor and holds a horizontal warp. There is no shed-making device, no batten. The weaver is using a tapestry bobbin to place the first pick. There is no cartoon placed under the warp to instruct the lady in her design.

II. Miniature of a Young Weaver (Fig. 12). 1450.[12] The tapestry is over half-completed in this courtly scene. It is an upright frame loom which is worked from the top down. No shed-making device or batten is indicated. The lady is working with a tapestry bobbin and comb to lay the thin threads of color into the warp.

III. A Young Lady at Her Tapestry Loom.[13] Figure 13 depicts another upright tapestry loom on which the warp is wound in a circle. The fabric can be pulled down around the lower beam to bring the unwoven warp from the back. The harness has rigid heddles; by pulling the harness out from the warp, sheds are formed. The weft is being beat down with a tapestry fork.

IV. Two Nuns at their Work, 1450-75.[14] The nun in this illustration (Fig. 14) is weaving on a larger but less complicated version of the frame loom in Figure 13. No shed forming devices are used; instead, she lifts each set of warp threads with the fingers of her left hand and weaves in the weft with her right. This panel, near completion, shows two scenes, one above the other. The nun, working from the top down, is building up single areas of the design rather than working straight across the warp one row at a time. The small tapestry loom (also seen in Figs. 11, 13, 15, 16) is suitable for work done on a small scale by one person, especially a nun in a convent or a courtly lady. Weaving on this scale is of a more personal nature and is not conducive to monumental workshop pieces.

V. Figures 15[15] and 16[16] illustrate very similar tapestry looms. Both are free standing vertical frame looms. The weft is woven from the bottom up. No shed-making device is used; the warps are lifted individually by hand and the weft colors are laid in. Areas of color are built up rather than across in rows, and both looms have the quality of fine woodwork with the tops and bases of the looms ornately carved.

VI. Figure 17 is "The Virgin Executing a Tapestry from a Panel of the History of the Virgin," Cathedral of Reims, 1510.[17] This courtly tapestry illustrates the Virgin using a singularly primitive horizontal tapestry loom which is worked from the side. The warp, evenly spaced by a rod near the end, stretches between two decorated columns. The surprising appearance of this loom indicates the concurrent use of an extremely simple tool at a time when less humble looms were common.

The study of looms in medieval art can be used to explore the relationships between the tool and the product. It has been illustrated that mechanized floor looms were used primarily in cloth production while the vertical loom was best suited for tapestry. Although exceptions exist, as shown in Figure 11 where a tapestry is being woven on a horizontal loom, there was a preference for form following function. A vertical arrangement facilitates easier viewing of the tapestry design in progress and since viewing is not an issue in production, the horizontal loom functions better for cloth weaving.

Tool evolution occurred mainly for two reasons: (1)to increase the quality of the product, and (2) to speed up the production rate. No major changes to dramatically increase production rate of cloth or tapestry were introduced in loom design from 1144 to 1640. Generally the quantity of cloth that came off each loom remained unchanged. What did occur was an increase in the sophistication of the tool which increased the quality and complexity of the product. There was a manipulation in the size of the loom which was determined by large- or small-scale production. The floor loom experienced more obvious modifications than the vertical loom. Placement of battens and reeds is determined by the type of cloth being woven—overhead battens are generally used for lighter cloths such as linen but heavier fibers such as wool are beat from below. Plain weaves need only one or two harnesses (Fig. 4) whereas complex repeating patterns required a multiple harness loom (such as draw boy looms). Tapestry looms use string heddles or have no harness system (Fig. 14); and the beaming arrangement is determined by available space, size and type of cloth being produced (Figs. 8 and 17).

These flexible factors in the tool represent a slow increase in production rate, rather than a revolutionizing change. Although the loom was known in earlier times and in other areas of the world the study of looms as they appear in medieval illustrations proves the broad range of ingenuity and adaptability of the craftsmen of the era.

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1 G. Schaefer, "The Hand Loom of the Middle Ages and the Following Centuries," *Ciba Review*, vol. 16, December, 1938, p. 554.

2 John Harvey, *Mediaeval Craftsmen* (New York: Drake Publishers, Inc., 1975), plate 29, identifies this as a vertical loom. I feel he is in error.

3 *Ciba Review*, p. 554.

4 *Ibid.*, p. 556.

5 *Ibid.*, p. 556.

6 *Ciba Review*, vol. 14, 1938, cover illustration.

7 Harvey, plate 111.

8 *Ciba Review*, December, 1938, p. 557.

9 *Ibid.*, p. 556.

10 Phyllis Ackerman, *Tapestry, the Mirror of Civilization* (New York: Oxford University Press, 1933), plate XVI.

11 Harvey, plate 29.

12 Betty Kurth, *Die deutsche Bildteppiche des Mittelalters*, 3 vols. (Vienna: n. p., 1926), vol. 1, ch. 1, n. pag.

13 *Ibid.*

14 *Ibid.*

15 *Ibid.*

16 *Ibid.*

17 Henry Havard, *La Tapisserie* (Paris: Librairie Delgrave, 1920), p. 79.

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Glossary

Back winding beam: beam which warp threads wind around.

Beater: same as batten, houses the reed.

Boat shuttle: a device used to carry the weft from one side of the warp to the other.

Breast beam: the beam over which the cloth passes before being wound on the cloth beam.

Draw loom: a hand loom for figured textiles.

Front winding beam: beam which cloth winds around.

Harness: a frame with heddles hung in it.

Heddle: vertical wire or string with a loop in the center through which each warp end passes; housed in the harness.

Lease-sticks: rods used to keep warp ends in order while putting warp on loom.

Loom: cloth-weaving instrument used to facilitate weaving of cloth.

Pick: one or more weft threads carried by a single passage through the shed.

Ratchet-wheel: gear used to brake a beam.

Reed: used to keep the warp ends evenly spaced, and to beat down the weft; housed in the batten.

Sheds: the separation of the warp-ends to permit the passage of the pick.

Shot: *see* Pick.

Treadle: the foot pedal of a floor loom used to raise and lower the harness frame.

Warp: the lengthwise yarns of a fabric.

Weft: the crosswise yarns of the fabric.

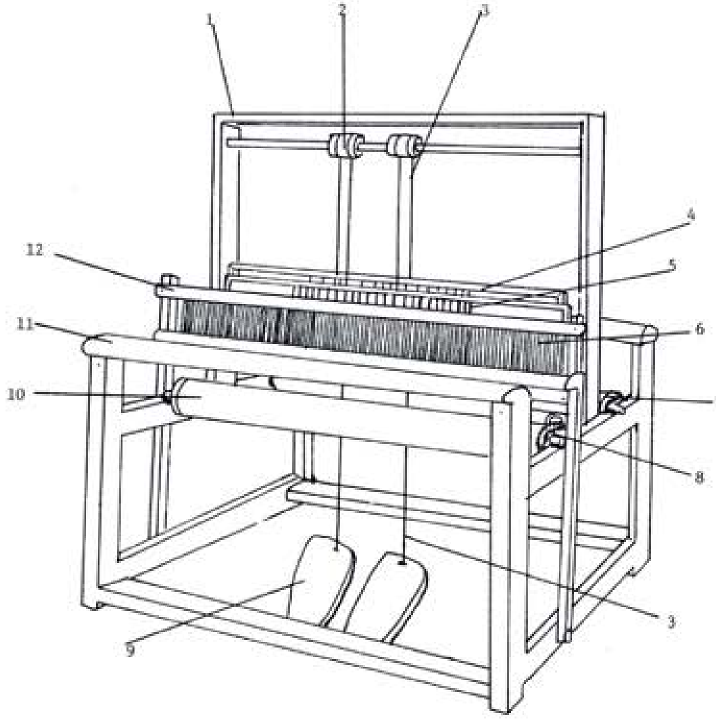

Fig. 1, Parts of a floor loom: (1) upper frame; (2) roller; (3) cord; (4) harness; (5) heddles; (6) reed; (7) back winding beam; (8) rachet wheel; (9) treadle; (10) front winding wheel; (11) breast beam; (12) batten.

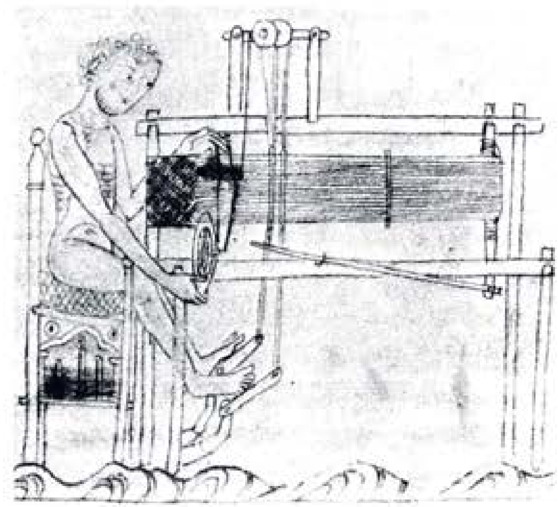

Fig. 2, From a manuscript in Trinity College, Cambridge, 1250. *Ciba Review* (1938), p. 554.

Fig. 3, Weaver at work. Bas relief on the Campanile of Florence Cathedral, 1340.

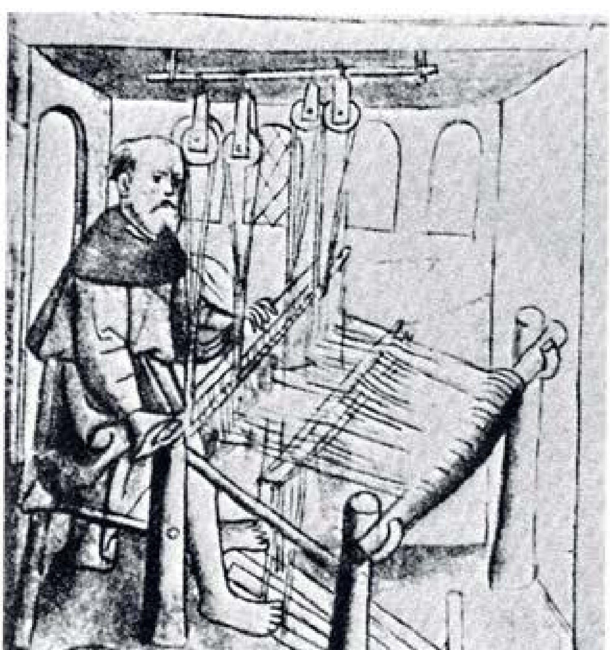

Fig. 4, Nuremberg painting, 1387. *Ciba Review* (1938), p. 556.

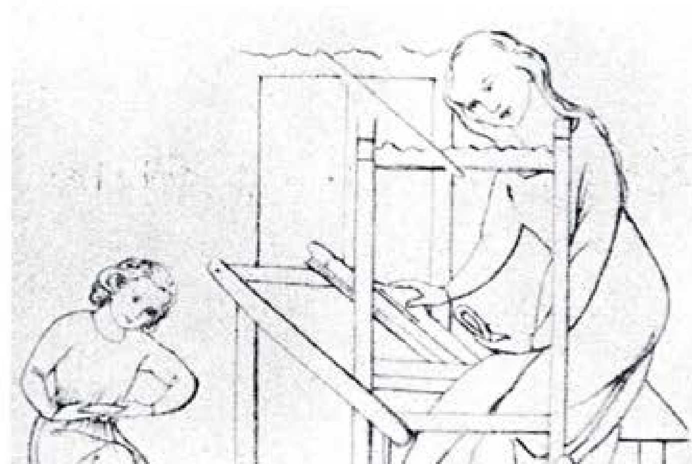

Fig. 5, Fresco showing loom. Constance, early 14th century.

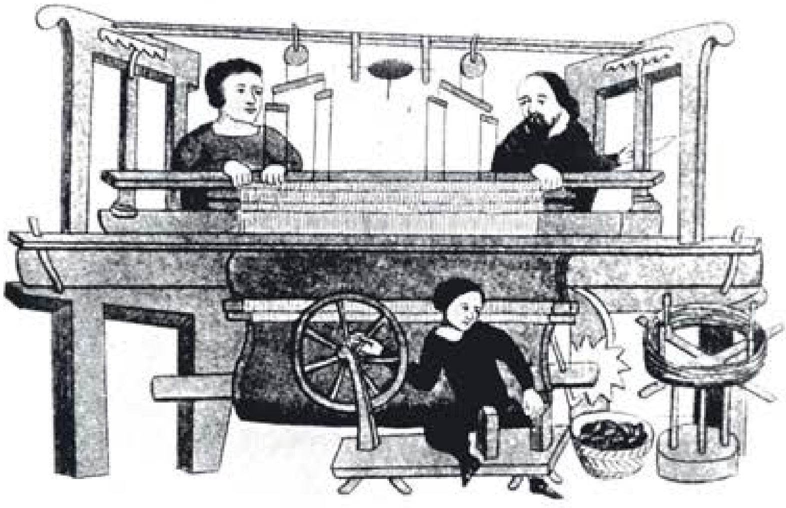

Fig. 6, Family of Flemish weavers at work. From the Book of Trades, Ypres, 14th century.

Fig. 8, Treadle-loom with batten. From Rodericus Zamorensis, "Spiegel des menschlichen Lebens." Augsberg, 1477.

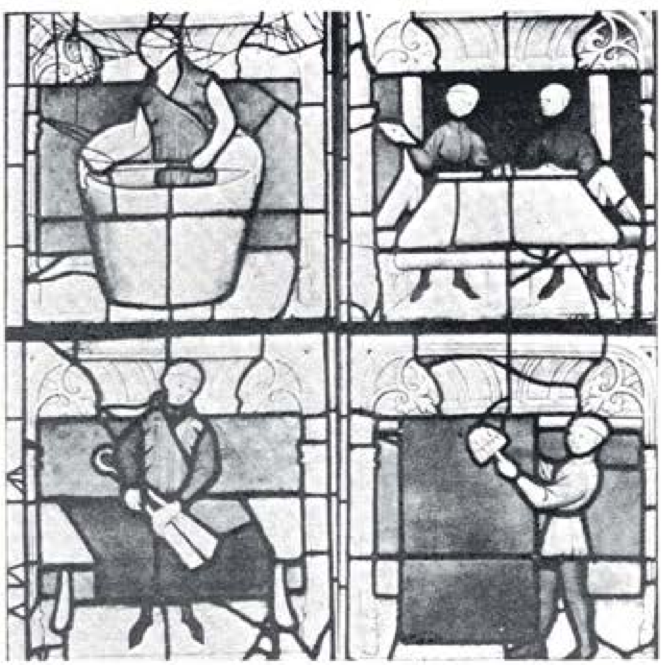

Fig. 7, Window of the Drapers, Semur-en-Auxois, France, 1460-1465.

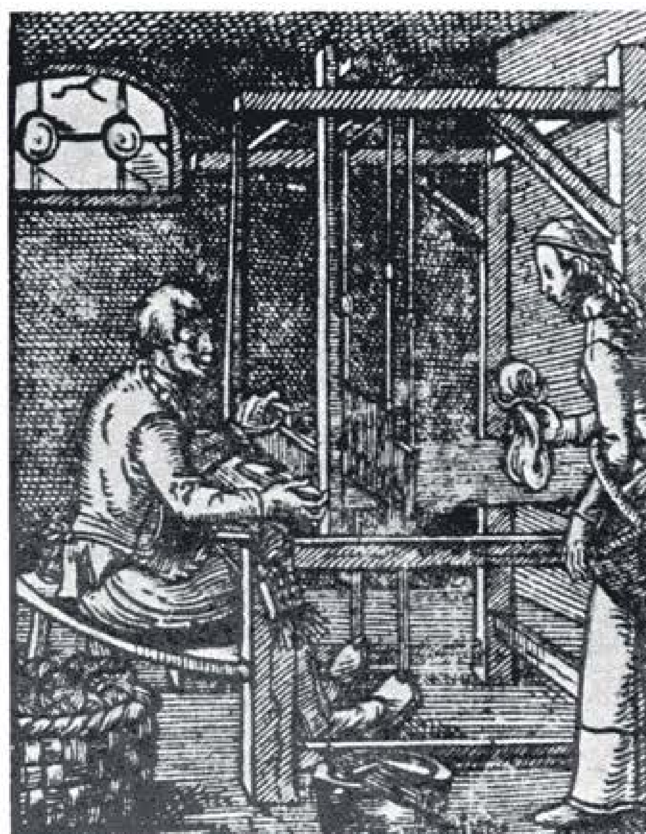

Fig. 9, Cloth loom, 16th century. From "Piazza Universale," Frankfort on the Main, 1641.

Fig. 10, Penelope at her Loom. Flanders, early 16th century. Boston Museum of Fine Arts.

Fig. 12, Miniature of a young handweaver, 1450. Kurth, v. I, ch. 1.

Fig. 11, Horizontal loom. French, 15th century. Harvey, pl. 29.

Fig. 13, Young lady at her tapestry loom. Stained glass at Straussengel, Vienna, Figdor Collection.

Fig. 14, Two nuns at their tapestry loom. Berlin, Artmarket, 1450-1475.

Fig. 15, The Death of Arachne. Woodcut from Bocaccio. Ulm, Johannes Zainer, 1473.

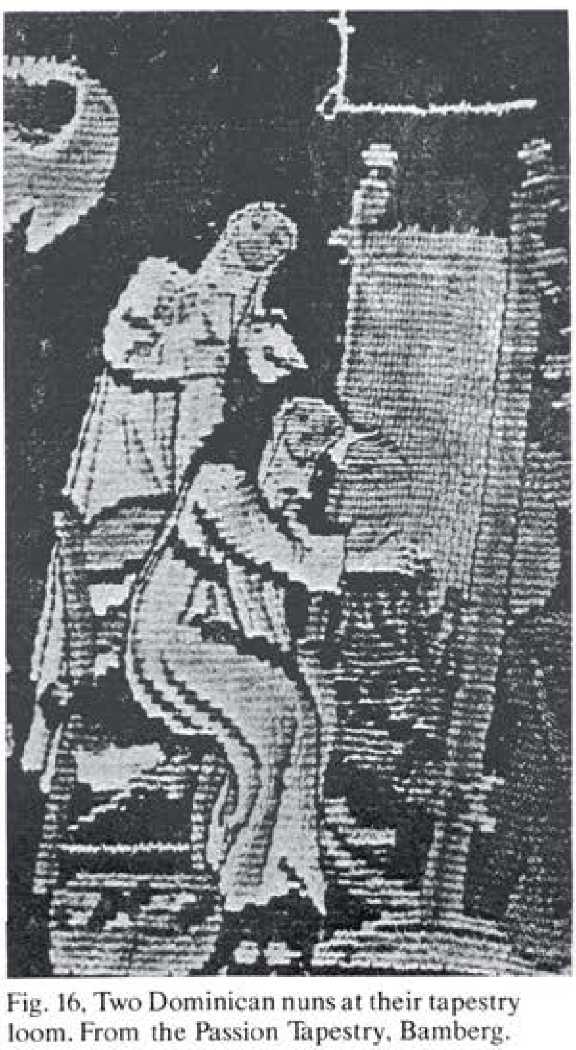

Fig. 16, Two Dominican nuns at their tapestry loom. From the Passion Tapestry, Bamberg.

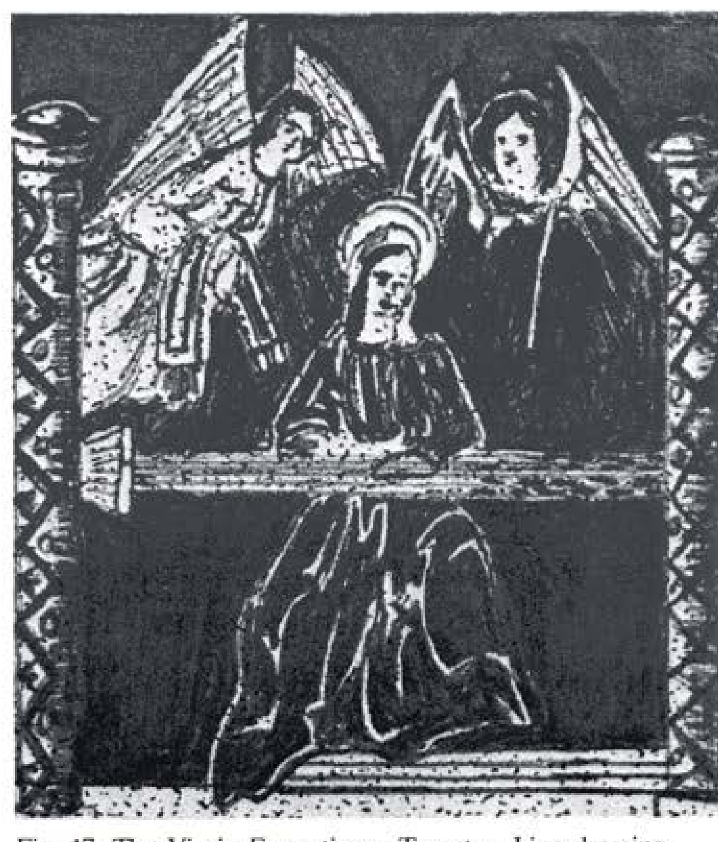

Fig. 17, The Virgin Executing a Tapestry. Line drawing from a panel of the Life of the Virgin, Cathedral of Reims, 1510.