

Paper Folding in 15th Century Europe

Donna Serena da Riva

Ephemera - From the Greek work ephemeron; meaning a short-lived thing or thing of no lasting significance.

Our day to day lives are filled with ephemera, from a daily newspaper to the bag into which the clerk bags our most recent purchase. They are disposable items that may even be enticing or beautiful, like candy wrappers or wrapping paper, but they are ultimately not intended to last beyond their basic purpose for creation. The people in period must have been surrounded by ephemera in much the same way we are today. These disposable items lent texture to their daily existence, but due to their very nature little if any evidence of them has survived to this day. Even in the artwork that we have from the past, very few artists felt it necessary to depict the common and disposable. The search for ephemera is like a treasure hunt, but the few gems unearthed can be worth the trouble.

The inspiration for this project came from a marginal in *The Hours of Catherine of Cleves*. A Flemish manuscript dating from approximately 1440, *The Hours of Catherine of Cleves* is a masterwork of illumination and miniature painting. (Plummer 16) One of the distinctive aspects of the manuscript is the artist's decision to include a vast array of interesting and unique illustrations in the margins of many of the miniature pages. To engage his patroness he explored many items and activities not commonly represented in fine art. From fishing to baking, rosaries to communion wafer, the manuscript is a treasure trove of fascinating depictions. The specific depiction being examined today is included on the page dedicated to Saint Agatha, the patron Saint of forging, casting and weaving. Depicted at the bottom of the page are several pieces of jewelry wrapped prettily in gift boxes. And it is these boxes that cried out to be reproduced (Figure A).

The illuminator has gone to great lengths to depict the boxes in various stages of completion, so that one is provided with a set of instructions on creating a box of one's own. But first one must decide what material to use to construct the box. The two primary materials in consideration for this purpose would be animal hide parchment, as was used in the production of manuscripts, or paper. At this time, paper was a relatively new and possibly exciting material. Considering the context of the illustration and the presentation of a precious gift (jewelry, in one box a trio of buttons and in the other a heart) the contents implying a gift of a lover; I believe the box itself to be part of the gift. It is a puzzle to open and a novel way to present a gift, and paper would add to that aspect of the package.

It can be equally reasoned to be made of parchment, there is no doubt that it was an available commodity at the time and that manuscripts were made of the stuff. I have been unable to secure a reasonably priced supply of parchment to experiment with. Hopefully this avenue can be more fully explored in the future, but for now the substrate of choice is paper. But this is not merely a situation of substituting a modern item for convenience sake. I believe that a strong argument can be made that the box would be made of paper.

Concerning Paper

In 1150 El-Edrisi said of the Spanish city of Xativa "Paper is there manufactured, such as cannot be found anywhere else in the civilized world, and is sent to the East and the West." This mention predates the establishment of the first of the Fabriano paper mills in Italy in 1276 but not the first usage of paper in that same local in 1154. It is unknown if the Italian paper of 1154 was made in Italy or imported from the East. (Hunter, 472) This sets the stage for an ongoing debate regarding the actual origins of papermaking in Europe, but establishes the manufacture of paper in Europe well prior to the 1440 date of Catherine of Cleves. Add to this the facts that in Holland, the oldest surviving paper found in the archives is dated 1346 and the earliest mention of paper manufacture in Flanders is dated to 1405 (474, 475) and the evidence points to readily available paper source in the time and location of the production of the illustration.

Evidence for the proliferation of the usage of paper can be found by examining a parallel form of ephemera; the early printed woodcut. Beginning in early 15th century Germany, the production of block printed broadsheets (single pages of printed materials) began its ascent to a thriving industry. I was fortunate enough to visit the National Gallery in Washington D.C. during the special exhibit *Origins of European Printmaking* and view many of remaining extant examples of this art form. Among the essays in the voluminous catalog can be found the following observation:

Fifteenth-century woodcuts comprise a small but special corner of the history of printmaking, as they were the very first images printed on paper in the Western world. A fairly precise count of the eight volumes of Wilhelm Ludwig Schreiber's *Handbuch der Holz- und Metallschnitte des XV. Jahrhunderts* (1926 – 1930) totals close to 4,735 different prints (meaning different blocks), of which perhaps 7 percent exist in more than a single impression. Since 1930, at least another five hundred single-sheet prints have been discovered. Assuming that the average woodblock yielded at least one hundred impressions (smaller block could print more than one thousand impressions each), we might estimate that we have lost over half a million fifteenth-century relief prints; that calculation omits those prints that did not survive in even one impression. (Field, 19)

Which serves to provide evidence that not only was paper widely available, but it was also widely used to produce items to be sold and used on a daily basis. The collection displayed at the National Gallery consists of a large number of depictions of Saints and other religious figures as well as more common place items such as a bill to be posted notifying the public of counterfeited coins. There is even the earliest example of a “transformable picture” dating from 1450 called *Apes Performing on Horseback*. In this picture there is a small ovoid piece of paper affixed to the printed image with a small string. The ovoid can be rotated to create the appearance of the monkeys changing position on the horse (Figure B). This profane conceit draws an excellent parallel with our folded box as an example of using paper to create a toy or puzzle to amuse the owner.

On Paper Folding

The early evidence for European paper folding is scanty at best. After much research I made contact with a gentleman associated with the British Origami Society named David Lister. He has been recognized as one of the foremost sources of information regarding the history and culture of paper-folding and is currently working on a book on the subject. All of the references to early European paper folding that I was able to locate cited a woodcut in a Venetian text by Johannes de Sacrobosco called the *Tractatus de Sphaera Mundi* dating from 1490.

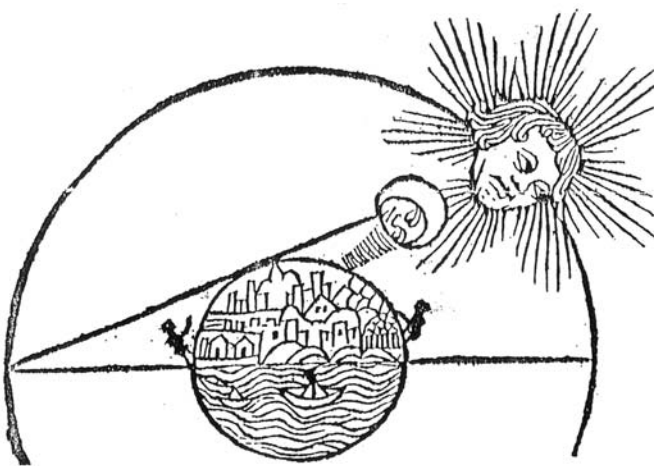


Figure C

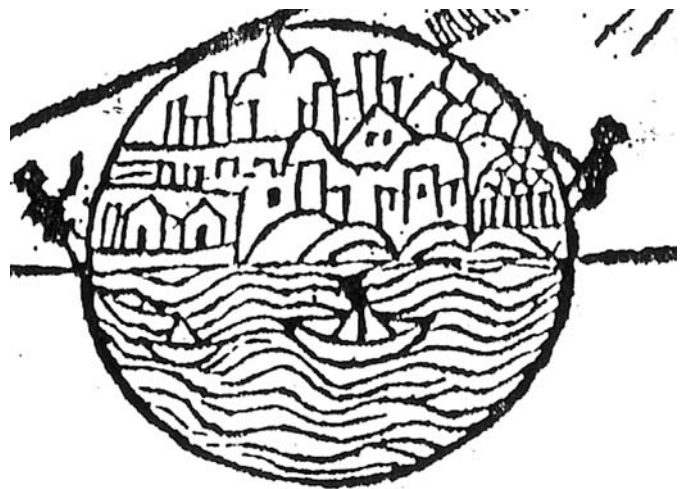


Figure C (detail)

By all appearances this demonstrates the childhood mainstay of a simple folded paper boat can be dated as far back as the late 15th century. But as the earliest known example of paper folding it is 50 years younger than the *Catherine of Cleves* manuscript. The entirety of my correspondence with Mr. Lister can be found in Appendix A. Specifically in reference to the *Catherine of Cleves* image Mr. Lister had this to say:

The box from the Book of Hours is unusually clear, showing both the method of construction and the completed box. This is a design that often occurs in modern books of recreations dating from the 19th Century, such as, for instance, "Cassell's Book of Indoor Amusements" which was published in 1881. It still occurs from time-to-time in modern books of recreations or crafts. However, because the paper is cut, it doesn't find much favour with modern paperfolders. Mush[sic] the same effect can, in fact be obtained by methods which avoid cutting the paper.

Nevertheless, this example from 1440 is an enormously important find and I am most grateful for it. May I have permission to make it available in the Origami World?

Considering this response, it seems that the world of Origami and the world of manuscript Illumination had not crossed paths in the past. Confident that this illumination depicted a form of paper folding I ordered the recommended book *Cassell's Book of Indoor Amusements* through my local library. While waiting for that book to arrive I attempted to devise my own method of creating the box.

During further research I unearthed an article written for *Tournaments Illuminated* number 89 by Clare de Crecy. The entire article can be found in Appendix B. Using this article I attempted to make my own box. I did not care for the 8 x 8 size and decided to do a great deal of complicated math to create the box. I was able to produce a box that looked remarkably like the box in the illustration by using what I will call the measure and cut technique supplied by the article. By measuring out the square and drawing out your grid with a ruler and a pencil you can establish your basic shape. I then used an X-acto knife with the ruler to remove all of the unnecessary portions of the paper. The black areas in Figure D designate all of the paper that has to be removed.

When using a heavy weight paper it is necessary to score all of the fold lines with a scribe so that you do not get wrinkly creases. It is also necessary to elongate the vertical walls of the outer two flaps to compensate for the thickness of the paper. If you do not do this the panels do not meet in the center. This technique of measuring, scoring and cutting is fairly time consuming, but the result is a lovely box that looks very much like the images in the illumination.

Then the copy of *Cassell's Book of In-Door Amusements, Card Games and Fireside Fun 1881* arrived. While it is so far out of period as to almost be modern, it is the earliest set of instructions written in English for this particular box fold according to Mr. Lister. It is full of fascinating information, including instructions on making a paper boat very similar to the one depicted in *Tractatus de Sphera Mundi*. The instructions for creating the paper box can be found in facsimile in Appendix C.

These instructions are drastically different from what I had already done. Beginning with a square piece of paper the box is created utilizing a series of folds, just as in origami. The immediate difference is the way the box is oriented on the square piece of paper. When measuring out the lines for folding it is necessary to measure along the straight edges. This positions the points of the cross in the center of the edges of each edge. With the folding technique the points of the cross are located in

Figure D

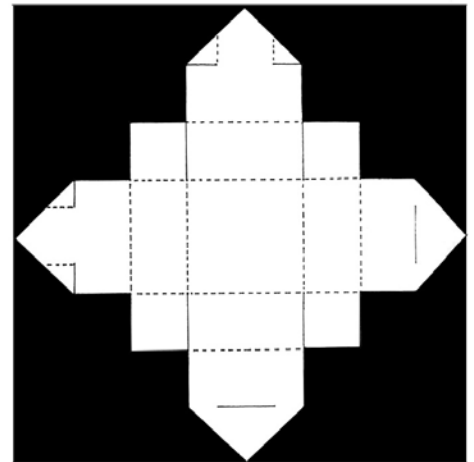
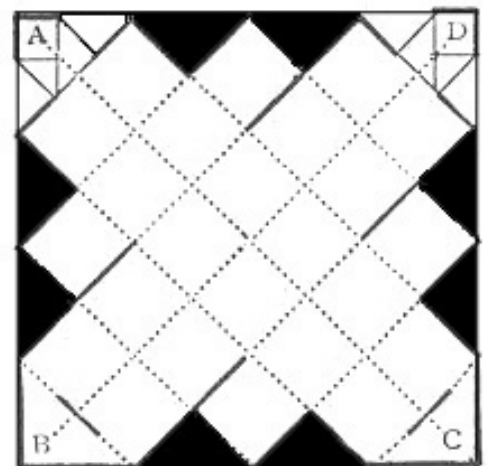


Figure E

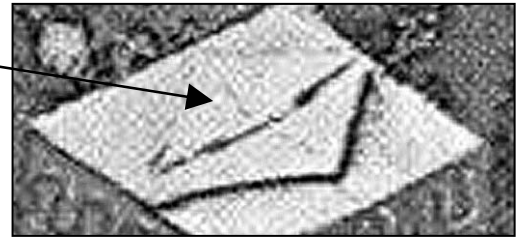


the corners of the square, providing the natural points to the edges. When all of the folds are completed as described in *Cassell's* one simply has to cut away a few small triangles of paper along the edges. The only significant difference between the box in *Catherine of Cleves* and the one in *Cassell's* is that there are additional points cut into the folded in tabs that end up in the interior of the box. In Figure E the black areas designate where paper is cut away.

When the box is folded as instructed in *Cassell's* the proportions appear to be visually identical to the proportions in the illuminations. The one issue clouding my conclusion is the apparent lack of crease lines in the illustrated boxes. If you look very closely at the open box on the right you can see a vertical line bisecting the front panel. Also, if you look closely at the top of the completed box in the center you can also see what



appears to be a center fold. The folds on either side of the center, that we know must be there, to allow



the tab to fit through the slit are not illustrated. This suggests selective representation by the artist as is frequently seen with the omission of seams in depictions of clothing.

Taking into consideration the excessive waste of the measure and cut method as well as the evidence in the illumination I believe that the folding pattern represented in *Cassell's* is the correct method of construction. I was originally concerned with using a lighter weight paper, but when folded across the grain it has considerably more strength than I had thought it would. Also considering that the contents appear to be very small and light, I do not think a heavier weight is necessary. When experimenting with folding of a heavier weight paper the creasing techniques produce an unattractive result that is less noticeable in the lighter weight papers.

Paper Choice

Having already established the availability of manufactured paper it is necessary to address the choice I have made in paper for my piece. Most of the test pieces displayed are made of whatever paper I had handy. The following is a breakdown:

- A: Measure and Cut method, 7 ½ inch square base sheet. Strathmore Bristol 80# Cover Smooth
- B: Measure and Cut method, 10 ½ inch square base sheet. Strathmore Bristol 80# Cover Smooth
- C: Folding method, 7 ½ inch square base sheet. MaxBrite Copy Paper 20# Text
- D: Folding method, 8 inch square base sheet. Strathmore Drawing 80# Text
- E: Folding method, 8 inch square base sheet. Strathmore Charcoal 64# Text, 100% cotton, Laid
- F: Folding method, 11 inch square base sheet. Green 80# Cover, Laid

All of these relatively unfinished items are being supplied for comparisons sake. Compare A to C and B to F for an idea of the size difference produced by the different production methods. Item D was my first attempt at the folding method, after seeing how well the cross grain folding held up I decided to try it with a lighter weight to see what would happen, thus Item C. Item C is too flimsy which helped me arrive at a good weight range. Item F was my experimentation with the heavier weight paper and as already mentioned I do not care for the results. Item E is a plain rendition of my final paper choice, the one which most closely approximates that which would have been available in period. I would have liked to find a heavier weight paper; I believe it would have supported the paint better. But with the restrictions of being 100% rag and the Laid pattern, the only weights I could find were the 64# and the Cover – neither of which are ideal.

“Until the latter part of the eighteenth century practically all papers of Occidental origin had been made from linen or cotton rags or a mixture of these fibres. (Hunter, 309)” While I have been unable to locate a source for paper with a linen content, it is still possible to purchase paper with 100% rag content; this rag being exclusively cotton in modern times. The specific moulds used during the 15th century produced what are known

as laid lines as an artifact of the paper making process (114). When viewing the printed pieces on display in the *Origins of European Printmaking* exhibit these laid lines were clearly visible on nearly every piece. This manufacture technique continues in usage to modern times, albeit on a machine and no longer by hand except by paper making Artisans. Unfortunately these Artisans are more concerned with the “homemade” or rustic look which would be much too rough for my purposes. After hunting through many paper sources I have chosen to use Strathmore Charcoal Paper as my period substitute. It is made of 100% cotton and has a traditional laid finish. Even the white is not a bright white and is therefore more reflective of the non-bleached aspect of period papers.

Finishing

To create the decoration as shown on the finished box in the illumination I have chosen to use traditional illumination techniques. By using the paint thinner than typically used in manuscript illumination there is not as great a chance of cracking in the paint. I have also chosen to add a bit more Gum Arabic to the binder to help with the same issue. For the red I chose to use Holbein Cadmium Red as a substitute for vermilion. And as a substitute for shell gold I used Holbein Brilliant Gold Gouache. Both of these are artist grade gouache and contain no artificial ingredients such as acrylic.

For the purpose of this entry I have chosen to reproduce the top box in the center. The red was applied only to the sides of the box as reflected in the illumination. There appears to be a double line horizontally dividing each panel in half with curved swoops above and below. The swoops are painted so that they appear to jump from one panel to the next, furthering the illusion of a solid box and enhancing the puzzle aspect of the piece.

Conclusion

Attempting to reproduce an ephemeral item poses a great many challenges. As far as I can determine, there are no extant examples of 15th century paper boxes. Frankly, I do not expect any to be discovered. In all of the manuscripts and works of art I have examined, this is the only illustration of such a thing. If it were not for the meticulous detail in which it was depicted it probably would not have caught my eye. Even with this detail one could dismiss it as a fancy of the artist, if it were not for the subsequent discovery of the exact folding technique in a later source. I believe the illumination to be a faithful depiction of a piece of disposable packaging, designed to delight and amuse its recipient. It is a beautiful and useful item and I believe its further use could enhance the recreation experience within our Society.

Bibliography

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Field, Richard S. “Early Woodcuts: The Known and The Unknown”. *Origins of European Printmaking*. Ed. Peter Parshall and Rainer Schoch. Yale University Press, New Haven and London. 2005.

Hunter, Dard. *Papermaking: The History and Technique of an Ancient Craft*. Dover, New York. 1978.

Justis, Tracy. “A Fifteenth Century Gift Box”. *Tournaments Illuminated No. 89*. Winter A.S. XXIII. 36.

Plummer, John. *The Hours of Catherine of Cleves*. George Braziller, New York. 1966.

Appendix A

Hello,

My name is Barbara Benson and I participate in a Historical Recreation organization here in the United States. I am working on a research project with the end goal of producing a reproduction of a Medieval folded box. But to do this I need to find more documentation regarding Medieval/Renaissance European Paper Folding.

My searches on the internet led me to your very informative site and commentaries on other sites. I was hoping that you might be able to suggest some books that I can consult for further research - hopefully in English.

From what I have gathered the image from Tractatus de Sphaera Mundi is the earliest evidence that has been found. Is this still true, and where might I find a good reproduction of this image?

The image that inspired me to investigate this subject comes from an illuminated manuscript called the Hours of Catherine of Cleves and was created around 1440 in the Netherlands. I have webbed the image here: <http://www.serenadariva.com/Temp/CatherineofClevesdetail.jpg>

Do you think it represents folded paper boxes?

A second image that I have found that I believe confirms my suspicions is from an Illuminated copy of the Decameron that was produced in Flanders around 1432. Again I have webbed it here: <http://www.serenadariva.com/Temp/Decameron.jpg>

I thank you for any time that you may be able to devote to this missive. And I hope that I have not committed a grievous error in equating the folding of these boxes to the origami you discuss on your website.

Thank you,

Barbara Benson

Atlanta, Georgia USA

Dear Barbara Benson,

Thank you for your most interesting e-mail received this morning, and especially for the pages from the Medieval Book of Hours of 1440 and the Decameron of 1423.

While many modern paperfolders would insist that anything incorporating cutting of the paper was not "origami", this is a very modern attitude and for historical purposes, I have no hesitation in saying that these two pictures must be taken as examples of early European paperfolding.

The box from the Book of Hours is unusually clear, showing both the method of construction and the completed box. This is a design that often occurs in modern books of recreations dating from the 19th Century, such as, for instance, "Cassell's Book of Indoor Amusements" which was published in 1881. It still occurs from time-to-time in modern books of recreations or crafts. However, because the paper is cut, it doesn't find much favour with modern paperfolders. Much the same effect can, in fact be obtained by methods which avoid cutting the paper.

Nevertheless, this example from 1440 is an enormously important find and I am most grateful for it. May I have permission to make it available in the Origami World?

The picture from the Decameron of 1432 is not so clear and it is hard to tell how the box shown is constructed. It does not seem to be the same box as in the book of hours because the paper holds together at the corners. (Of course, glue could have been used.) Each of the four flaps at the top seems to show a vertical line, which could indicate that the paper was folded to the centre of the flap. But this is not at all clear on the picture as I have received it. Would it be possible for you to examine the picture in more detail.

Apart from what you have discovered, the earliest reference so far found to a paper "box" is in John Webster's play, "The Duchess of Malfi" of 1614, in which he refers to the paper prisons in which young boys trap flies. While we cannot be certain, this appears to be the well-known water bomb (or balloon in Japan), which is still folded today. It has been known as a prison for flies in modern Egypt and China. If this is what we think it is, then it is true paperfolding which does not employ cuts.

I suspect that you are associated with the Society for Creative Anachronism. If so, this is not the first time I have been consulted by a member about early paperfolding. In November, 1903 Origami USA passed on to me

a query from Aleyna Browne (alyna@mchsi.com) who was doing a project about traditional (pre-1600) "origami" for the SCA and wanted to know how to fold traditional figures.

I want to prepare an adequate reply and also to check my references. I hope you will bear with me. Meanwhile, thank you very much for your outstanding contribution to the documentation of medieval paperfolding.

Yours sincerely,
David Lister

Note: The second image cited in this exchange from a manuscript in the Bibliotheque de l'Arsenal cited as Boccace, *Décameron*. 1432. Paris, BNF, Arsenal manuscrit 5070. I have not been able to procure a better image of the item and have chosen not to include it in this entry due to lack of sufficient information. The image itself can be seen below.



A Fifteenth Century Gift Box

By Clare de Crecy

While perusing the marginalia in a reproduction of the *Hours of Catherine of Cleves* (M. 945 Pierpont Morgan Library), I found charming paper gift boxes at the base of the illumination of Saint Agatha. Two of the boxes are depicted open, and two closed, so it is easy to see how they are made. The manuscript is renowned for its detail, and it is possible to reconstruct these boxes.

The gift boxes are ingeniously constructed of one piece of paper, folded to make a surprisingly sturdy unit. (The illuminated boxes appear to be of paper, which was available at the time of the manuscript, c. 1440.) The pattern was based on an 8x8 grid, which makes a 2x2x1 box. Faint lines of the original grid can be seen on one of the unfolded boxes. Figure one is the flat pattern for the box; solid lines are cutting lines, and dotted lines are fold lines. Figure two is the partly folded box, copied from the St. Agatha illumination. Note that the folded tab on one side slips through the slit on the other and unfolds, locking the sides together. Figure three is the completed box. In the manuscript, the two unfolded boxes are green inside and out, and the two folded boxes are white with red and gold decorated sides.

St. Agatha was considered a patroness of forging and casting, and hence of jewelers, which is why the two opened boxes contain jewels.

I have found these boxes to be delightful and period alternatives to gift pouches, and I hope you do, too. ♣

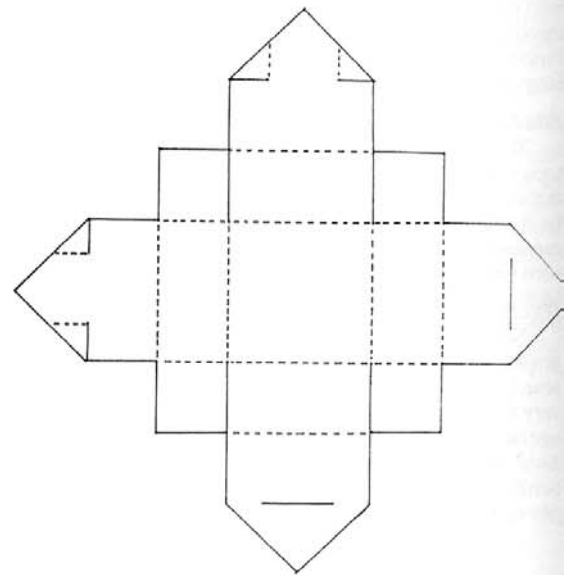


Figure 1

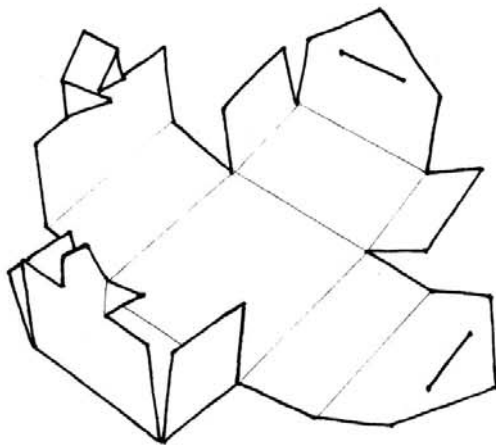


Figure 2

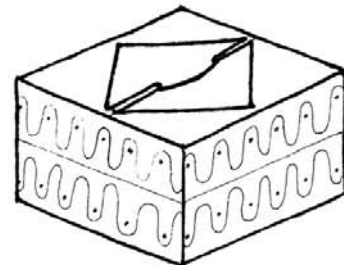
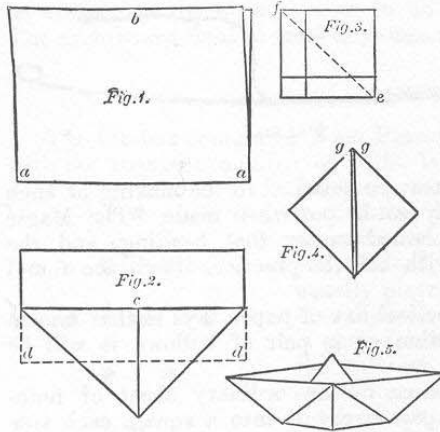


Figure 3

turn down the two sides *c*, one to the one side, and the other to the other side, to the dotted line *d d*. Insert the thumb of each hand, and pull out the paper



PAPER BOAT.

so that it may take the form of Fig. 3; being careful in so doing to arrange neatly the corners *d d* of Fig. 2. Turn up the points marked *e* in Fig. 3, one to the one side, and the other to the other, till they touch the point *f*, folding at the dotted line of the figure. Insert the thumbs again, and pull out the paper to make the form shown in Fig. 4. Lastly, take hold of the paper with the finger and thumb of each hand at the points *g g*, and pull them gently outwards right and left, being careful not to press the inside, and the boat will be complete as in Fig. 5.

Paper Boxes.—Cut a piece of paper into a square of dimensions according to taste, or according to the size of the box required. As a first attempt a piece of paper about six or eight inches square will be found to be most con-

venient. Make folds in the paper according to the dotted lines shown in Fig. 1, remembering that in making paper boxes the paper is never to remain folded,

except in the last figure, and that the folds are merely to be looked upon as marks for future guidance. Then fold the corners *A B C D* into the centre, and the folds will show as in Fig. 2. Next fold over and unfold alternately, *A* to *H*, *B* to *F*, *C* to *I*, and *D* to *G*, after which the folds should appear as in Fig. 3. Then in the same way fold and unfold *A* to *N*, *B* to *M*, *C* to *L*, and *D* to *K*, when the dotted lines in Fig. 4 should each be repre-

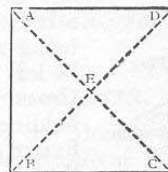


Fig. 1.

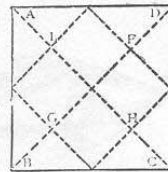


Fig. 2.

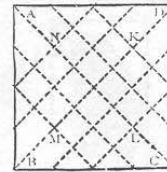


Fig. 3.

PAPER BOXES.

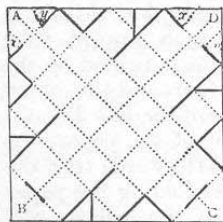


Fig. 4.

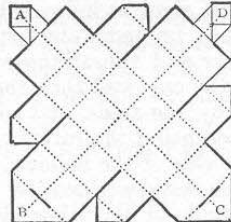


Fig. 5.

PAPER BOXES.

sented by a fold in the paper. Take a pencil or pen and mark the paper in accordance with the black lines of Fig. 4, and cut with a pen-knife at all those marks, removing such pieces as will necessarily become detached. Fold and *keep folded* the short sides *x* and *y* of the corners *A* and *D*, so that they may pass easily through the slits in the opposite corners *B* and *C*. Lastly, and to finish the box, pass the folded corner *A* through the slit in the corner *C*, then opening out the folds in order to make the fastening secure; pass the folded corner *D* through the slit in the corner *B* in the same way, and at the same time fold in the side that would otherwise overlap.

Paper Chinese Junk.—This paper toy is one of the most complicated and

Paper Folding in 15th Century Europe

Donna Serena da Riva

Summary

Based on an illumination found in the Flemish Manuscript from 1440, *The Hours of Catherine of Cleves*, presented here is a recreation of what is believed to be the earliest example of European paper folding. The first attempts at the piece were based upon instructions found in a previously published copy of *Tournaments Illuminated*. This technique (referred to herein as the Measure and Cut Method) involved drawing out the grid pattern of the box, scoring the fold lines and cutting out the piece with an X-acto knife.

This procedure proved to be time consuming and wasteful of paper. A second procedure was discovered based on the earliest English instructions for creating this specific box found in *Cassell's Book of Indoor Amusements* published in 1881. Using a slightly modified version of the instructions a box identical to the one depicted was achieved. This method is much quicker and less wasteful of paper and therefore I believe a more likely technique for the production of this box.

On Display

- Item A: Measure and Cut method, 7 ½ inch square base sheet. Strathmore Bristol 80# Cover Smooth
- Item B: Measure and Cut method, 10 ½ inch square base sheet. Strathmore Bristol 80# Cover Smooth
- Item C: Folding method, 7 ½ inch square base sheet. MaxBrite Copy Paper 20# Text
- Item D: Folding method, 8 inch square base sheet. Strathmore Drawing 80# Text
- Item E: Folding method, 8 inch square base sheet. Strathmore Charcoal 64# Text, 100% cotton, Laid
- Item F: Folding method, 11 inch square base sheet. Green 80# Cover, Laid

Viewers are encouraged to compare the different results achieved with different papers and techniques.

Compare Items A and C and consider they were made with the same sized sheet. Items B and F were also made with very similar sized sheets.

Item E was produced with paper closest to what was available in period. Contrast this with Item D which is a much smoother and polished modern paper.

The final piece is a painted version of Item E. This is the recreation attempt.

Materials Used

- Strathmore Charcoal, 64# Text, 100% Cotton, traditional Laid pattern
- Holbein Artists Gouache Cadmium Red
- Holbein Artists Gouache Brilliant Gold
- Gum Arabic
- Artists brushes
- X-Acto Knife
- Ruler