



Paper engineers and mechanical devices of movable books of the 19th and 20th centuries

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Introduction

More than a mere container of texts, a pop-up book is a material object, with a form and a language, in which the presence of movable elements and the possibility to decompose the support have contributed to changing both production and reading practices. In pop-up books the support does not merely contain the text but itself becomes a communicative space.

The term pop-up was used in the history of books for the first time in the 1930s, by the US publisher Blue Ribbon Books Inc. and, since 1933, has been a registered trade mark (Patent no. 1913797) (Ghirardelli and Missiroli 1994-2003; Faden 2007).

Precursors of pop-up books are considered to be animated or movable books, which use paper mechanisms to animate the images by pulling on cardboard tables and/or transforming the book support into a three-dimensional structure. In pop-up books, the element of surprise is offered by the presence of paper components that are fixed to the pages but can be lifted, almost like a sculpture, to create unexpected three-dimensional effects. The *a posteriori* identification of these printed objects as movable books or pop-up books presents some complexity, linked to the many and often dissimilar forms of products embraced by the



definition. Although the term pop-up, or three-dimensional, does not often appear in the title of the book, they are frequently labelled as pop-up books, toy books, surprise books, puppet books, movable books, novelty books, eccentric books, action books.

The decomposition of the printed book underlying the operation of the movable book was used historically for different purposes (educational, mnemonic, ludic, cryptographic), as also described in the contribution by Gianfranco Crupi in this issue (2016). At the end of the 18th century, some publishers had adapted this decomposing mechanism to meet the expectations of a younger audience that wished to interact and play with the book-object: and thus the birth of the children's movable book. The developmental stages of this type of book destined for young readers were marked by the different paper-engineered devices used: starting from a two-dimensional structure, simulating movement and/or three-dimensionality, then came three-dimensional structures which broke the conventional structure of the book, going beyond the confines of the pages.

In 18th century European publishing, seeking new products and new readers came the English publisher John Newbery (1723-1767) who, considered the founding father of children's literature, was the first to exploit its potential, also in economic terms, offering a series of interactive books that children could also play with (Darton 1982; Tosi and Petrina 2011). Along with these children's books spread the idea that an object could be both book and toy at the same time (Mosca Bonsignore 2011).

After Newbery, other printers/publishers devoted their attention to the research of editorial models that could attract the audiences they targeted. Between the late 18th century and the first half of the 19th century, the growing number of publications of this special book genre was supported by new reproduction techniques – lithography and, above all, chromolithography –

which led to an increase in the mass production of low-cost coloured images. Moreover, around the mid-19th century came a key figure in the production of toy books, the *paper engineer*, “una figura fondamentale che può coincidere o no con quella dell’illustratore” and who “trasforma la pagina in una scultura pieghevole” (Loi 2012, 17). It is to these design skills that we owe those fantastic images that move on or are lifted from the page, creating an appealing three-dimensional effect.

The production of the movable book required considerable changes to the production process: to produce a book, both automated, in-series phases were required along with some almost unique manual activities, and between the late 19th and early 20th century (a period that saw the increasing mechanisation of production processes) this led many publishers to hire specialist craftsmen to oversee all the hand-performed activities involved in the production of the movable elements (Franchi 1998). The design of the mechanical devices by the paper engineer, the mass-production of the various elements and the manual assembly of the various parts led to an unusual contamination of the classic roles involved in the publishing industry. The production of a movable book required the careful design of the devices moving the images, to ensure that they are not damaged when the book is opened and closed. The complexity of the operations involved in the production of a movable book therefore drove publishers to frequently adopt models that could be re-used in different books.

The text accompanying the figures of movable/pop-up books was generally very simple: the stories were mainly conventional ones, already known to the audiences, and this is why what characterised them was not so much the subject narrated but rather the methods identified for their figurative representation, where the designers/paper engineers could express all their creativity (Reid-Walsh 2005, Reid-Walsh 2006). In fostering visual

and tactile exploration over the narrative thread, movable books were based on the knowledge acquired elsewhere by the reader, which in some cases was used to fill the gaps left by the poor narrative quality of the text: "it is likely that their young reader's external knowledge (or, at very least, the reader's parents or nanny) compensated for the book's relative paucity of narrative information" (Faden 2007, 79). In toy books, therefore, "svolgono un ruolo non marginale aspetti non verbali, come la qualità della carta e della stampa, la presenza, o meno, di illustrazioni e colore: non in quanto elementi che impreziosiscono l'oggetto materiale, ma in quanto elementi sintatticamente e semanticamente rilevanti, elementi narranti o co-narranti" (Negri 2012, 368).

The pop-up book thus became a place of experimentation, on one hand, for publishers and paper engineers who adapted the structure of the book to the reading methods deemed most appropriate to the type of readers targeted, and on the other hand, for readers who, required to interact with the book-object, had to find a balance between "part text, part image, and part sculpture" (Karr Schimdt 2006: iii).

The development of children's movable books, which peaked with the production of the very first pop-up books, has in this article been traced through the history of the mechanical devices used in some selected movable books, produced between the mid-18th century and the end of the 19th century, and some of their key figures – Dean and Son, Lothar Meggendorfer, Ernest Nister, S. Louise Giraud, Vojtěch Kubásta (publishers/paper engineers) – whose skill led to the definition of specific characteristics and the success of this editorial genre.

The first children's movable books

Movable components in books destined for children were first used by the London-based publisher Robert Sayer (1725-1794)

(Brown 2006; Lee Hendrix 2008). From 1756 Sayer produced a type of movable book, using 'lift the flap' type devices, called *metamorphoses books*, *turn up books* or *harlequinades*, which took their name from the popular character Harlequin, who was the key character in many stories. "Movable books, generally called metamorphoses, and also known as mechanicals, transformations, harlequinades, turnouts, and dissected pictures, usually consisted of folded and hinged pages which in various combinations composed pictures" (Brown 2006, 358). Harlequinades, which were very popular in England, were also exported to other countries. Robert Sayer's metamorphoses books frequently contained brief instructions on how to lift the flaps and other indications to the readers, to convince them to help the characters in their enterprises and therefore, implicitly, to continue reading (Reid-Walsh 2005)¹.

The very first children's movable books were produced in London by the publisher Dean and Son in the late 1850s. To produce their movable books, Dean set up a department of craftsmen who produced the movable devices by hand, while to design the books the paper engineers based themselves on the principle of the peep show.

The tunnel book, or peep show book,² a type of movable book which enjoyed great success in the 19th century, is made from a series of sheets that open accordion-style. There are no pages to leaf through or any text to read: the viewer looks through a hole in the first picture to see the others in perspective, almost like a miniature stage set with scenes and backdrops. When the book is

¹ For an overview of the metamorphic pictures produced between 1650 and 1890, consult The Union Catalog of Early Movable Books, a database of metamorphic pictures produced by Penn State University, <http://sites.psu.edu/play/the-union-catalog-of-early-movable-books>.

² <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c013486710c71970c-pi>

open,³ the sheets are kept at a constant distance by paper tabs that are folded over the different layers when the book is closed.

In the books produced by Dean and Son, each illustration is arranged along three or four shaped planes, held in parallel to each other by strips of cardboard. By pulling a ribbon on the back of the background image, the whole scene is raised to create a three-dimensional effect. The printed text is visible only when the illustration is raised. The paper-engineered mechanism described was used to produce the books in the *Scenic Book* series; the first story represented was *Little Red Riding Hood*,⁴ followed by *Robinson Crusoe*, *Cinderella* and *Aladdin* (Haining 1979).

Around 1860 Dean and Son also published the first theatre books: *Royal Movable of Punch and Judy* and *Royal Movable of Punch and Judy Played before the Queen*. Theatre book⁵ is a special type of movable book, the support of which can be transformed into a theatrical stage used to represent the narrated story; the characters (actors) may be still or, using mechanical elements, animated. The origins of the theatre book probably lie in the wooden optical toys used by travelling story-tellers to show fantastic and fairytale worlds to their spectators. In the early 19th century, the wooden walls were eliminated and the first multi-level scenes were created using only paper, as was then done with the books known as peep show books or tunnel books.

In the books produced by Dean and Son, there is no real decomposition of the support: the book keeps its conventional shape, the story developed by turning the pages, but the characters of the stories are represented on each page on a

³ <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0133f34cca67970b-pi>

⁴ <http://www.popuplady.com/coll03-dean.shtml>

⁵ <https://www.libraries.rutgers.edu/rul/libs/scua/montanar/ali.htm>

theatrical stage and, like puppets,⁶ can be moved by the reader using paper tabs and levers. The text, almost like a script, contained the lines of the characters on stage.

Lothar Meggendorfer

"There is little doubt that the most elaborate and ingenious movables even produced were those of Lothar Meggendorfer made during the 1880s and 1890s" (Haining 1979, 65). The technical skill and creativity of the first paper engineer in the history of the movable book, Lothar Meggendorfer (1847 – 1925), combined with the level of printing expertise achieved in Germany in the late 19th century, made his movable books among the most amazing in the history of the movable book.

Meggendorfer began to create movable books in 1880 and continued up to the start of the First World War, when publishing in Europe practically came to a standstill. The inspiration for his first movable book, *Lebende Bilder*, made in 1878 for his son Adolf as a Christmas gift (Franchi 1998), came from a children's birthday card with relief images. Over his long career, Meggendorfer produced over sixty books⁷. His meeting with Jakob Ferdinand Schreiber, a German publisher of illustrated books, cut-out sheets and paper theatres, was particularly fortuitous: together they organised a team of designers, cutters, colourers, to cover all the production phases of the movable book. As described by Waldo Hunt, Meggendorfer created a model for each book, with coloured images and movable paper elements, complete with instructions for the assemblers of each copy (description of the various assembly

⁶ <http://www.thornbooks.com/thorn/images/items/18739d.jpg>

⁷ For a full bibliography of the works of Meggendorfer, consult Schiller 1975; Friederich and von Katzenheim 2012. For information on his biography, cf. Krahe 1983

phases, assembly order, printing suggestions) (Trebbi 2012). The subjects of the stories were selected by Meggendorfer, who did not base his animation solely on classic fairytales; his stories were filled with everyday characters, and the comic elements came from ordinary situations showing the human side of each character; irony, along with his artistic skills, helped to make his stories both original and famous (Allegro 2009). The influence of puppet theatre, in which Meggendorfer worked all his life, is reflected in the representation of his characters: clear facial features such as a wide mouth, big eyes and potato nose are frequently found in his books, adding a clearly comical effect. Other recurrent themes in his stories are music and animals, both of which he was passionate about. The fame and originality of his books, which charmed and entertained readers of all ages, were linked to the paper devices he created: pull tabs to move the pictures (mechanical pictures), panorama books, harlequinades and revolving pictures.

In movable books with pull tabs, the illustrations include elements that are animated by the tabs. These were created using cardboard, string, elastic bands and thin metal wire. The images were moved by a pull tab (made from sufficiently strong cardboard to ensure prolonged and repeated use), which the reader pulled to move the picture. The elementary effect obtained is that of a picture running vertically or horizontally, or which oscillates like a swing (Hiner 2012). The mechanical pictures created by Meggendorfer reached a considerable level of complexity: often his works contained up to five elements that were moved simultaneously and in different directions, combining both sliding and oscillating effects. The multiple and synchronised movement of the different parts by a single pull tab was made possible by a complex system of levers hidden between the pages, linked together by small spiral-shaped metal rivets (up to 12 rivets per picture) (Montanaro 1996). The 1884 edition of *Neue Thierbilder* (Monaco, Braun & Schneider, 33x24cm) is a

superb example of the paper-engineering skill of Meggendorfer. The book contains eight hand-coloured pictures with pull tabs generating multiple movements.⁸ The presence of complex movements made possible simply by pulling the cardboard tab is also widely illustrated in the book *Lustiges Automaten Theater*⁹ (1898, Esslingen, Monaco, J.F.Schreiber, 37x26cm).¹⁰ In both books, the text is given on the opposite page.

The swing effect is skilfully obtained in a scene from *Fur Brave Kinder* (1884 Munchen, Braun & Schneider, 33x23cm) where two children have fun shaking a pear tree.¹¹

Meggendorfer's editorial productions also include panorama books, with folded pages that, once open, create a three-dimensional structure consisting of a number of successive scenes. Worthy of mention among his three-dimensional books are *Im Stadtpark*, *Das Puppenhaus* and *Internationaler Circus*, his most famous work, a panorama measuring around 1 metre when fully unfolded. *Internationaler Circus* (1887, Esslingen, J.R. Schreiber), considered one of Meggendorfer's masterpieces, when opened in a semi-circle reconstructs a circus tent with six sections; it counts around 450 characters, orchestra players, acrobats, clowns, tightrope walkers and the audience (Franchi 1998; Brian 2013). The text, given in the last panel of the panorama book, consists solely of the show programme.

⁸ position 1: <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0133f32894b9970b-pi>, position 2: <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0133f3289803970b-pi>.

⁹ <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0134864c344e970c-pi>

¹⁰ position 1: <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0133f328c31d970b-pi>; position 2: <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0133f328d33f970b-pi>.

¹¹ position 1: <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0133f3294dae970b-pi>; position 2: <http://allegrobookcollection.typepad.com/.a/6a0134859ae390970c0134864cc2a8970c-pi>.

The techniques used by Meggendorfer to move the pictures also included harlequinades (mix and match books, flap books, transformation books). Each page of the book is cut into two or three horizontal sections, and each one can be turned separately to replace a portion of the image with that on the next or previous page. This offers an infinite number of combinations and creates a comic effect.

Viel Kopf, viel Sinn (1898, Stuttgart, J.F. Schreiber, 28x20cm) is a light-hearted set of faces drawn in pencil and red crayon divided into three parts, so that the forehead, eyes and mouth on each face can be changed. The book contains only pictures, with no accompanying text.

Meggendorfer also used discs or *volvella*¹² in his movables to transform a figure into another (revolving picture). The upper disc has cut-out parts that reveal the image printed on the lower disc: an infinite number of combinations can be obtained by rotating the *volvella*. Revolving pictures with rotating disc can be found in *Lustige Drehbilder* (1892, Esslingen J.R. Schreiber): where the head is, the upper disc has an oval aperture through which various expressions drawn on the disc below can be seen (from four to twelve). Some plates have two characters, so where their heads are there are two discs of different sizes.

The complexity of the paper-engineered devices designed and created by Meggendorfer involved many manual operations to obtain the finished printed product. The first products, with hand-coloured pictures, were of a high quality, and due to their high price were destined for a wealthy market; with the spread of

¹² The term “*volvella*”, from the Latin *volvere*, to turn, refers to overlapping paper discs that are free to rotate around a central axis through which they are fixed to the support. *Volvella*e were used to calculate dates, identify the position of the stars, decipher codes (cf. the contribution of Gianfranco Crupi in this volume)

chromolithography, the colour quality improved and production costs fell, thus also the sales price: between 1880 and 1900, Meggendorfer's works were reprinted and many copies were sold.

His movable books appeared in many international editions: in Germany published by J.F. Schreiber of Stuttgart and Esslingen and Braun & Schneider in Munich, in England, Grevel and, occasionally Dean, in France, Capendu and Dambuyant & Guignard, without forgetting the various translations into Italian, Spanish, Russian, Swedish and Bohemian (Dawson 1995). In particular, Hoepli was the main Italian publisher of Meggendorfer's books: *Storielle buffe* with six movable pictures and text, from 1884, was the first Italian edition of a movable book by this ingenious paper engineer, followed in 1886 by *Sempre allegri bambini*. Hoepli published several editions, taken from various books by Meggendorfer: in fact, the most important illustrations published in a book in Germany were frequently used to create another edition, perhaps in a different country from where the original edition was published.

Ernest Nister

Another important figure in the editorial panorama of children's movable books was Ernest Nister (1842–1909), from Oberklingen, Germany. In 1877 he bought a small lithography workshop in Nuremburg. Even after 1888, when he opened a branch in London, all printing phases were carried out in Germany, exploiting the high technical quality achieved in chromolithographic printing, and the London branch was used only to distribute the finished product. Nister was a book creator, and supervised all the phases involved in the creation of the finished product. In fact his books are easily identifiable by the high quality of the pictures and above all the ingenuity of the moving mechanisms used. During his life Nister produced over 500 children's books, but from 1890 onwards his production was

dedicated almost exclusively to movable books. The illustrations in his books are a snap-shot of an ideal world in which well-dressed, wealthy children play in flower-filled meadows in the English countryside. The images represent the triumph of chromolithography; the use he made of pastel colours is a trade mark in his works, which are still reprinted today and continue to bear witness to the publisher's poetic world. Nister often reused illustrations in other books, adding some extra elements that were not found in the original work. The figurative part was usually accompanied by short, simple texts in rhyme, printed on the opposite page. He also personally selected the books produced in Germany he considered adaptable to the English market, and made commercial contacts with the US publisher E.P. Dutton, which allowed him to export his works also to New York, where they became very successful (Whitton 1986; Lavender and Smith 1997-1998).

Nister's contribution to the movable and pop-up book world is represented by some mechanical devices, the most noteworthy of which were dissolving or revolving pictures. Before him, Dean and Son had produced similar pictures, the operation of which was based on Venetian blinds (changing or transformation picture), but Nister perfected the technique with circular images, accompanied by a short text and generally surrounded by a floral or geometrical frame. By rotating a cloth ribbon positioned around the perimeter of the picture, the upper image dissolves, sliding through a radial slot, beneath the image below, which was previously hidden. The underlying element of this effect is the *volvella*: two overlapping illustrated disks fixed to the page by a central pin, around which they are free to rotate. The ribbon movement is reversible. Nister obtained a patent for the revolving picture mechanism in both England (Patent no. 10870 of 1899) and Germany. This mechanism can be found in the books *Round Pictures for All Little Folk* (c. 1910, Dutton & Nister, Bavaria, 19.8x19.1 cm), *Magic Moments* (c. 1910, Dutton & Nister:

London, 28.0x26.3 cm), *Twinkling pictures* (c. 1899, Nister: London).¹³ While in the book *What a surprise. A mechanical book for children* (Dutton & Nister, New York and London),¹⁴ the changing pictures are square rather than circular in shape. The operation is based on the overlapping of two square pictures, each of which has a diagonal 45° cut. By moving the tab which, contrary to the other books by Nister, can be found along the side edge of the page, the illustration on the upper dial is divided along the diagonal and with a semi-circular movement it disappears, revealing the image below. On each page there is a short text above the picture.

Nister created a series of other paper-engineering solutions used to produce his movable books, for example in the *Panorama Picture Books*,¹⁵ in which the pictures are arranged along two parallel planes with respect to the surface of the page, suggesting a sense of depth and three-dimensionality. On opening the books, the imaginative publisher welcomed his readers by illustrating the features of his inventions and providing a reading guide (Plunkett 2007). Like other publishers of his time, Nister also produced other types of books, and his catalogue included annuals, story books, toy books, poetry books, books on religious topics as well as calendars, birthday cards with pop-up elements, toys and puzzles (Franchi 1998).

¹³ http://digisrv-1.biblio.etc.tu-bs.de:8080/docportal/receive/DocPortal_document_00051377.

¹⁴ <http://www.popuplady.com/mm03-nistersuprise.shtml>.

¹⁵ <http://www.samemory.sa.gov.au/site/page.cfm?a=10&c=8801&mode=singleImage&treasuresWallImage=2>.

The first real pop-up books

Dean and Son, Meggendorfer and Nister may be considered the stars of the early golden age of movable books: a lucky period that ended when the First World War broke out¹⁶.

The contribution of Germany which, in the previous century, was so essential in the production and printing of movable books, was lacking, and neither England or America was able to match Germany in either printing or chromolithography. The result was a decline in both the quantity and quality of the movable books produced.

Around the 1930s, the work of publisher Saint Louis Giraud (1879-1950) began to make its mark: between 1929 and 1949, he designed and produced a series of annuals, firstly for the Daily Express newspaper and later as an independent publisher under the name Strand Publications. Giraud's career lasted exactly twenty years from the first annual for the Daily Express, published in autumn 1929, until the last of the sixteen Bookano¹⁷ Stories, at Christmas 1949, six months before he died.

As a businessman, Giraud welcomed anyone with a good idea for making books, evaluating the proposals and deciding which ideas were worth putting into practice. This was the case of Theodore Brown (1870-1938), an English inventor specialised in the production of magic lanterns, who knocked on Giraud's door

¹⁶ Between the late 19th century and the early 20th century, movable books were produced which can more than others be defined as multimedia objects, in which the addition of light and sound helped to increase the effect of surprise in the animated illustrations.

¹⁷ The term Bookano derives from the merger of the words "book" and "meccano" (the metal construction toys). These were thick books, inside which four or more pages had pop-up illustrations.

with some small models made by folding and cutting paper. The publisher was impressed by the models, immediately understanding their potential in the children's book sector. With Brown, he therefore decided to deposit the model on which the operation of these pop-ups was based with the Patents Office. The invention, patented in Great Britain and later in the United States, produced an authentic three-dimensional picture, rather than a series of planes arranged one behind the other. This description of the model for the patent was accompanied by technical drawings showing how to make a three-dimensional house, which was later used in the *Daily Express* annuals no.s 1 and 2 and in the *Bookano Stories* no.s 2, 4, 5, 6 and 14 (Dawson 1991a). Shortly after obtaining the patent, Giraud had already mobilised the support staff needed to produce the pop-up annuals: paper suppliers, printers and cutters, assembly staff. Direct testimonials talk of a team of fifty girls employed to assemble and glue the pop-up components. The folding and gluing phases were very delicate as the correct pop-up effect and the possibility to correctly and repeatedly open and close the book depended on their precision.

Giraud created the first authentic pop-ups. Each of the books published for the *Daily Express*¹⁸ and the whole *Bookano*¹⁹ series contained at least five double pages in which the support paper is cut, folded and glued so that when the page is opened a complex three-dimensional model appears, seen from all four sides. The effect of the *living models*, as the publisher decided to call his productions, is surprising: the illustration is perpendicular to the page, and often contains elements that move as the pages are opened and closed. Like other annuals of the period, his also contained a compendium of stories, pictures, comic strips on different subjects, from fairy tales to earthquakes.

¹⁸ <http://www.library.unt.edu/rarebooks/exhibits/popup/daily.htm>.

¹⁹ <http://www.library.unt.edu/rarebooks/exhibits/popup/bookano.htm>.

The editorial model chosen for the *Daily Express* annuals was later maintained to produce the *Bookano* stories: covers coloured with historical and/or mythological figures, paper elements glued directly to the card and, above all in the last *Bookano*, a predominance of ochras, oranges and reds. The books presumably targeted children aged between five and ten.

Giraud's books became very popular and, compared to those of his predecessors, were never expensive: they were printed on rough, absorbent paper, with cheap covers and poor quality bindings. For these reasons, many of his books did not withstand the wear and tear of time and frequent use. The quality of Giraud's books is almost exclusively linked to the presence of the pop-up pictures, while the quality of the texts and images was poor.

From the second *Daily Express* annual, Giraud began to introduce a preface in rhyme in each book, presented by the *Wizard* who illustrated the devices found in the book to the readers. To produce the books in the *Bookano* series, much of the preparatory work was outsourced to craftsmen, who received packs containing one hundred printed sheets and instructions on how to assemble them, folding and gluing the various parts.

In 1939 the outbreak of the war caused a serious recession for all independent publishers who, due to the reduction in the amount of paper in circulation and, above all, the lack of labour, could no longer maintain a constant production of pop-up books. Despite this, the annuals continued to be published: issues seven and thirteen of the *Bookano* series were produced using materials from other volumes; it was only with issues 14, 15 and 16, produced respectively in 1947, 1948 and 1949 was the splendour of the first productions reached once more (Dawson 1991b).

Vojtěch Kubásta

From the late 1950s, a series of innovative pop-up books, produced by the Artia publishers in Prague, made its appearance in Europe: Vojtěch Kubásta was the paper engineer behind these ingenious paper architectures.

Kubásta (1914-1992), of Austrian origins but Czech by adoption, having moved to Prague in 1919, was an architect, illustrator, graphic artist and paper engineer. In the 1950s, at the height of the renaissance of children's literature, collaboration began with the state publishers Artia, to which he proposed his first pop-up works, consisting of small theatres in book form (Curletto 2011; Findlay and Rubin 2005). To create his *hýbačky* ('that which moves'), Kubásta was technically inspired by the Americans of German origin, Benjamin and Geraldine Clyne, who between 1939 and 1954 created the *The Jolly Jumps-ups*²⁰ series (Pierluigi 2011). The stage was a single sheet, cut into and cut out so that the images took on a three-dimensional appearance when the two consecutive pages were opened at 90°. This method avoided the burdensome task of assembling and gluing the various elements. Kubásta worked on this technique, introducing asymmetrical planes and V-folds, with a high impact in terms of perspective; he also included cellophane, aluminium and other elements in the illustrations, to add a touch of reality to the portrayed scenes. The inclusion of these elements was not merely decorative but also helped to create the illusion of a small theatre. The book opened at 90°, with the cloth spine at the top, the text arranged parallel to the spine, the bindings in coloured cord and the card folded and folded again to recreate the images. Some books also had movable elements²¹ in the cover. The individual scenes making up Kubásta's books were printed separately in Velký Šenov or

²⁰ <https://www.youtube.com/watch?v=CFrpZ5anWXM>.

²¹ <https://www.youtube.com/watch?v=fT60FZna4vg>.

Bratislava and then assembled by hand in Nepomuk and Brtníky by female workers (Pierluigi 2011).

In 1960 the versatile Prague-based designer invented the Tip+Top series, stories about two inseparable friends, one thin and one fatter, who in some tales were accompanied by their dog. Often the two characters tackled technical jobs (such as building a car), so that Kubásta could demonstrate his construction skills (Findlay and Rubin 2005). While for the animated editions of classic fairy tales he chose the format 20.5x26.5 cm, for his so-called "panoscopic" books, albums that could be opened to 180° (Pierluigi 2011), he used a larger size (33x25 cm), which enhanced the attractive three-dimensional effect. According to the Opus VK 1989 census, *Christopher Columbus* (1954) was the first pop-up book in the *Panoscopic Model Series*. Each book in the series comprises three cardboard parts with an illustrated story in the central part. Once the two sections with the illustrations are opened the pop-up²² picture lifts up from the page.

His collections of Prague memorabilia, maps of the old town and antique prints, inspired many of his works. Puppet theatres (popular in Czechoslovakia around the mid-19th century) were also a great source of inspiration for him in his works, and indeed between 1930 and 1940 Kubásta collaborated with the director of a famous puppet theatre, designing the stage sets (Czech villages, castle interiors, etc.) and sometimes even the costumes.

There is still not a complete list of Kubásta's works: in 1989, the paper engineer himself, with Helena and Eduard Škoda, attempted to compile a file, the *Opus VK*, containing some of his works, probably his favourites²³. In addition to pop-up books,

²² <https://www.libraries.rutgers.edu/rul/libs/scua/montanar/moko.htm>.

²³ A video of the exhibition is available on-line: "The Amazing Vojtěch Kubašta: A Showcase of His Pop-up and Illustrated Children's Books" held at the Bienes Museum J LIS.it. Vol. 7, n. 1 (January 2016). Art. #11610 p. 106

Kubásta produced many nativity scenes, chocolate boxes, advent calendars, wedding invitations, postcards, souvenirs of Prague and Czechoslovakia, logos, *ex libris*, book covers, advertising material, stamps, pencils, etc.: a rich and varied production that marked the extraordinary editorial success of Kubásta's works²⁴.

Concluding this overview, we must remember that the first modern pop-up book was produced in 1979, *The Haunted House*, born from the collaboration between illustrator Jan Pienkowski (1936-) and paper engineer Tor Lokvig (Lee Hendrix 2008). This date symbolically marks the start of mass production of movable books. Here our journey among movable books ends, but certainly not their production: from the 1980s, the mass-production of this genre was accompanied by the production of limited editions of movable books.

In the past twenty years, a new generation of paper engineers (Robert Sabuda, David A. Carter, Ron van der Meer, Matthew Reinhart, to name but a few) have produced innovative paper devices to enrich three-dimensional books and animate ingenious and unimaginable paper sculptures among the pages of their works. Not simply books for entertaining the readers, but educational books simulating the operation of a machine, the secrets of nature and the human body. With the exception of a few cases, the books we can find on the market today are produced in China, Colombia and Singapore, where large publishers are based and who, thanks to the printing quality and the short preparation times, are able to assemble thousands of copies of each title by hand.

of the Modern Book, Broward County Main Library, from July 2014 to January 2015.
<https://www.youtube.com/watch?v=Bid3rOjY-QU>.

²⁴ In Italy his books are published by Cino del Duca and Le Edizioni Mondiali, both from Milan.

Recently another product has appeared, the *e-toy book*: this kind of electronic product has been omitted from this contribution as it presents technical problems that are beyond the limits of this article. The *apps* for *i-phones*, *electronic popables* with circuits activated by sensors, to move objects and animals, switch LEDs on in sequence and make the pages vibrate, using *augmented reality* techniques, are the latest market trends in the field of toy books.

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ABSTRACT: The article investigates the development of children's pop-up books, from the late 18th century to the late 20th century, focusing in particular on the artistic personality of some publishers/paper engineers (Dean and Son, Lothar Meggendorfer, Ernest Nister, S. Louise Giraud, Vojtěch Kubásta). The contribution also illustrates the operation of some paper-engineered devices designed and constructed by them. The investigation deliberately excludes the digital pop-up book, which has different characteristics and problems compared to paper books and is therefore beyond the field of interest of this essay.

KEYWORDS: Mechanical devices; Movable books; Moving picture; Paper engineer, Pop-up books.

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