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Johannes Gutenberg

A Marvelous Man Makes an Amazing Machine

by Dionna L. Mann
illustrated by Ivan Pesic

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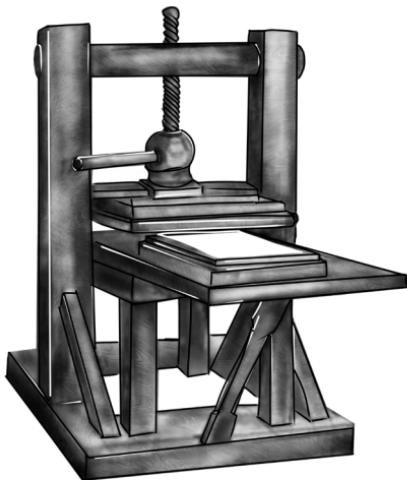
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Dionna L. Mann

illustrated by *Ivan Pesic*

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EDITORIAL DIRECTOR:

ROSIE McCORMICK

MANAGING EDITOR:

SOPHIE NUNNALLY

DESIGN:

IVAN PESIC

CORE KNOWLEDGE FOUNDATION

801 EAST HIGH STREET

CHARLOTTESVILLE, VIRGINIA 22902

www.coreknowledge.org

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1

The Beginning

It happened about six hundred years ago in Mainz, Germany. Else Wirich zum steinen Krame and Friele Gensfleisch zur Laden welcomed a baby boy into the world. In a Catholic church near where the waters of the Main and Rhine Rivers dance together, a priest christened their child with the name Johannes. He was born so long ago that no one knows the exact year. Historians believe it was between 1394 and 1404. In 1896, long after Johannes had made history, the city of Mainz declared his birthday to be June 24, 1400.

What's in a Name?

Throughout history, historians have spelled Johannes Gutenberg's first name many different ways, including Johannes, Johan, and Johann. The name Johannes—and its English equivalent, John—is derived from the Hebrew name Yehochanan, which translates to "Yahweh/Jehovah (God) is gracious."

To Else and Friele, Johannes would forever be their beloved second son. But to the rest of the world, he would become the innovative mind that would create something so important, it would push civilization out of the dark Middle Ages and into a new, enlightened era called the Renaissance. What he would create would be called miraculous, a new species of scribe, a machine that would forever change the way the Western world received, shared, and spread information.

Middle Ages

The Middle Ages, also known as the medieval period, was a period in European history that lasted for about a thousand years, from around 500 CE to 1500. It began after the fall of the great and powerful Roman Empire and resulted in a loss of culture and knowledge and an increase in poverty, disease, and religious conflict. The Middle Ages was replaced by an era called the Renaissance, which saw a revival of art, literature, and science.

Johannes was the youngest of three children born to aristocratic Germanic parents who were citizens of the Holy Roman Empire. He had an older brother named Friele, after their father, and an older sister named Else, after their mother. He also had a half-sister named Patze, from his father's first marriage. By the time Johannes came along, Patze was already grown and married to the mayor of Mainz.

The Holy Roman Empire

The Holy Roman Empire lasted for more than a thousand years, from 800 CE to 1806. The first emperor of the Holy Roman Empire was Charlemagne, or Charles the Great. He was crowned by the pope of the Catholic Church on Christmas Day, 800 CE. At various times, the empire included what is now Germany, the Netherlands, Belgium, Luxembourg, Switzerland, Austria, the Czech and Slovak Republics, and portions of eastern France, northern Italy, Slovenia, Denmark, and western Poland. The empire, despite its name, was not a very organized state of affairs.

Germany's History, in Brief

Germany is a country in Europe with a history dating back thousands of years. Roman emperor Julius Caesar (c. 100–44 BCE) was the first to call the land east of the Rhine River Germania, after the Germanic peoples who lived there. In the tenth century CE, the tribes of Germania came together under Otto I to form the central part of the Holy Roman Empire, gaining official recognition as a distinct region with Otto's crowning as emperor in 962 CE. In 1815, following the collapse of the Holy Roman Empire, the German Confederation was formed, consisting of thirty-nine sovereign states. On January 18, 1871, Germany became a unified state known as the German Empire. In 1949, Germany was split into two independent nations: the Federal Republic of Germany (FDR/FRG), or West Germany, and the German Democratic Republic (GDR), or East Germany. On October 3, 1990, East and West Germany reunited under West Germany's official name, the Federal Republic of Germany, which is what it's still called today.

emperor: the male ruler of an empire

Johannes and his siblings grew up in a large corner house in Mainz called the Hof zum Gutenberg. It had been in Johannes's father's family for three generations and had once belonged to the treasurers of the archbishop of Mainz. It must have been quite grand. It was a huge Gothic-style dwelling that took up the entire corner where two streets met. It was built like a fortress and had three stories, so there was enough room for Johannes's immediate family and his extended family at the Hof zum Gutenberg.

In Germany during Johannes's day, families didn't have last names, or surnames, like people do today. Instead, they added the name of their estate or house or hometown to the end of their first names to identify themselves. (This would be like referring to Elvis Presley as "Elvis of Graceland.") Though Johannes and his family lived at the Hof zum Gutenberg, he was not called Johannes zum Gutenberg, or Johannes of Gutenberg, until sometime after his father's death in 1419, when Johannes was likely in his twenties. Historians aren't sure what he was called before then, other than Johannes, nor are they sure why the family didn't adopt the name Gutenberg until then.

When Johannes was born, social class distinctions played an important part in European society. Children

treasurers: officials in charge of money

archbishop: the highest-ranking bishop in a district

inherited certain privileges depending on the social status of their parents and grandparents. At the top of the social ladder were the secular rulers, like the emperor and royal families, as well as nobles and high-ranking members of the church, like the pope and archbishops. On the next rung of the ladder were aristocrats called patricians, guild members, and bishops of the church. On the rung below that were knights and abbots of the church. Almost at the bottom of the social ladder were freemen, or independent peasants, and serfs, or peasants tied to a lord's land.

Johannes's father's family—the Gensfleisch family—belonged to the patriciate. Patrician families had special rights as citizens granted to them by the Holy Roman Empire. At one time, they controlled the city council. They owned a lot of land with large estates and usually had many servants working for them. They paid little or no taxes. Patrician families received "old" money from the town of their ancestors. That's because one of their wealthy ancestors had once loaned money to the town. The town agreed to repay the money, plus interest, from that time forward to the one who loaned the money and to their heirs from one generation to the next and the next.

secular: not religious

nobles: people of high birth or social rank

pope: the head of the Roman Catholic Church

aristocrats: people of high social status

abbots: leaders of monasteries

The yearly sum of money given to patricians was called an annuity. It came from the taxes the city collected from the tradesmen who belonged to the guilds, or trade groups, of the town. Paying annuities to patricians and their heirs was an old Roman tradition that often put the town's finances at risk because the monies paid out far outweighed the original loan.

In Johannes's birthplace, patricians could rub shoulders with the archbishop of Mainz who was an elector, that is, a powerful political and religious ruler of the Holy Roman Empire. Patricians in Mainz controlled the trade of cloth and precious metals that took place at their port on the Rhine River. This was big business back then. They were also in charge of Mainz's mint, which



produced a large quantity of the gulden, or gold coins, that were used throughout the Holy Roman Empire as currency. During the Middle Ages, Mainz was nicknamed “Golden Mainz” because it was such an influential city. Johannes’s father was a merchant, probably a cloth trader, and was a member of the Companions of the Mint society in Mainz.

While growing up in Mainz, Johannes was likely proud that his father was a patrician. He knew that when he came of age, he and his brother would inherit his father’s annuity. However, he would never be a full patrician. That’s because his grandfather on his mother’s side was a guildsman. Although they were just a notch below patricians on the social ladder, guild members, even rich ones, were considered working-class. The feudal system frowned on men and women from different social classes who married. But his parents married anyway, bringing together a family of patricians and a family of guilds people.

Johannes’s mother’s family was hardly poor. They owned multiple properties, and her father was a well-off storekeeper whose guild membership offered him his own social connections. Still, the interclass marriage led to some social disadvantages for Johannes.

For a son to inherit a patrician’s right to do certain work, both grandfathers had to be patricians. Johannes,

therefore, did not inherit his father's right to be an official companion of the mint. Furthermore, Johannes could not become a member of a guild by being his father's apprentice since his father was not a guildsman. It's unlikely that Johannes's father would have paid a master guildsman to take his son in as an apprentice. That would be crossing social borders and would put Johannes under contract to live with and work for the master for free for years.

So there Johannes was—surrounded by patricians and guildsmen but unable to receive all the benefits given to either group of respected men. Despite the social restrictions set before him, Johannes became a determined young man who would learn to do whatever he set his mind to.

Guilds

During the Middle Ages, guilds were organized groups made up of similar tradespeople and craftspeople. There were guilds for merchants, blacksmiths, shoemakers, bakers, goldsmiths, weavers, carpenters, and others. Guild members stuck together to protect their financial interests and to provide safety in numbers when traveling for business. Most guild members were men. But in some places in Medieval Europe skilled women, many of them silk weavers, were allowed to join a guild, though they were not allowed full membership.

weavers: people who weave yarn or thread together to make fabric

2

Taking It All In

In medieval times, children of aristocrats and wealthy merchants did not have to work at an early age like children of peasants were often forced to do. They were given educational opportunities. Though we don't know for sure what kind of schooling Johannes and his siblings had, there would have been many options available to them.

Being educated at home was very common. A child's mother was often their first teacher. Many historians believe Johannes's mother taught her children reading, writing, and sums. In wealthy homes, a private tutor was often invited to live with the family. They taught the children things like Latin, reading and playing music, embroidery, drawing, and painting. Johannes and his siblings may have learned that way, too. Johannes's parents may have also hired someone to teach their boys higher branches of science, like chemistry and anatomy. Perhaps it was their father who showed the boys how to ride horses, hunt, and fight with swords.



Girls and Learning Outside the Home

During medieval times, boys and girls did not always go to the same schools. While both boys and girls were taught at home, most schooling outside of the home was only for boys. Some upper-class parents sent their unmarried daughters to live with nuns at a convent to learn Latin and receive a religious education. In the later Middle Ages, some secular schools began to accept girls as well.

In Mainz, there were town schools where masters, or instructors, taught writing and arithmetic to children. Most of the students who attended these private schools were children of guild members. Mainz also had several cloister schools. These were grammar schools attached to Catholic churches. The instructors were monks. Patrician parents often sent their boys to cloister schools. Those attending learned all about Church doctrine, sacred texts, and how to read, write, and sing in Latin. There are no known records of Johannes's schooling, but it is quite possible he attended a cloister school at the St. Viktor monastery, three miles from his home.



monks: religious men who live in monasteries

However he learned as a youth, there is no doubt that Johannes became an educated young man. By the time he was grown, he had a keen mind, a head full of book smarts, and a mastery of the Latin language.

Educated Guess

Historical records reveal that a young man named Johannes de Alta villa graduated from Erfurt University right around the time Johannes's father died. Alta villa is a Latin way of spelling Eltville. Because Johannes lived in Eltville when he was a teenager, many historians conclude that Johannes Gutenberg and Johannes de Alta villa were one in the same. Thus, they say, Johannes Gutenberg must have attended Erfurt University.

Besides being book smart, Johannes became a skilled worker with his hands. How did he learn without being a true apprentice? No doubt, as a curious child, he spent long hours observing the craftspeople who worked inside the mint where his father had responsibilities.

It's easy to imagine him peering over their shoulders as they purified gold by using fire, a process known as smelting; studying their process as they created molds to turn the molten metal into blank gold coins; and taking note of the steps they took as they imprinted each gulden, of equal size and weight, with an imperial design by striking embossed stamps with hammers.

gulden: gold coin

Johannes must have marveled at the skills of the craftspeople. He must have enjoyed seeing how they worked together like ants in a colony to make objects of value. He must have learned by watching them work hour after hour, day after day, year after year. He must have, historians say, because by the time he was an adult, Johannes was not only book smart but also highly skilled in several trades.



3

Times of Trouble

When Johannes was a preteen, trouble in his hometown of Mainz began to brew. Guild members of the town were tense. They were a younger generation, angry with the unfair class distinctions of their society. They were upset with those they called “ancients,” older citizens who accepted the old-fashioned order of things. They were especially angry with the patricians of Mainz, who lived their lives of inherited privilege, didn’t pay taxes, and had a monopoly on trade. These younger guild members believed it was all unfair. Wasn’t Mainz their town, too, golden with opportunity for all?

Guild members joined together to disrupt the status quo. They demanded a voice in the city council. They wanted patricians to pay taxes. They were protesting, stirring the pot of civil unrest. Soon, their shouting became a roar. They threatened to cut off the heads of the ancients and burn down patricians’ estates if their demands weren’t met. Hatchets, torches, axes, swords, and pitchforks were being raised, ready to be used.

monopoly: complete control of an area of trade

status quo: the current state of things



Would the guild members follow through with their threats? Would the streets of Mainz flow red with blood? Would the Hof zum Gutenberg be burned to the ground?

How scary it must have been for Johannes to see what was happening outside the windows of his townhouse; to hear the grown-ups of his street shouting and threatening; to smell civil war brewing.

On August 15, 1411, the patrician families of Mainz, including Johannes's, fled. With his parents and siblings

at his side, Johannes boarded a boat and headed up the Rhine River to the town of Eltville, where Johannes's mother had inherited a family estate. Perhaps there they'd be free from any harm from the angry guild members.

Eltville did offer protection. It was about ten miles away. It had a city wall with watchtowers. And Johannes's mother's estate was quite near the well-guarded residence of the archbishop of Mainz. So perhaps Johannes slept unafraid at night. Within a year of Johannes's arrival in Eltville, the archbishop of Mainz helped the guilds people and patricians come to a compromise, and he persuaded the patricians to return to Mainz. How happy Johannes must have been to find the *Hof zum Gutenberg* still standing, without the smell of fire on its stone walls.

4

Making His Way in the World

As Johannes grew into manhood, his brother and sister both married, and his parents passed away. Johannes's brother and his wife settled into the family's estate in Eltville. His sister and her husband settled into the Hof zum Gutenberg. Johannes, now in his thirties, thought it was about time he left home. He moved to Strasbourg, about one hundred miles away from Mainz, to make his own way. The Rhine River snaked along this metropolis, while the river Ill ran straight through it. This was a city where a young man with a head full of new ideas could make his mark on the world, a place to forge a future for himself!

Johannes's new city had much to offer. Perhaps he enjoyed visiting the cobblestoned Rue des Frères, the "street of the brothers," where all the action was happening. There were shops with shelves of pottery, markets with carts of fish, bakeries with baskets of bread, and so much more. He could smell wood being turned into furniture. He could hear the music of the crowd selling goods in the marketplace. He could see the town's scribes hustling about as they made their way to the scriptorium to copy books like the Bible.

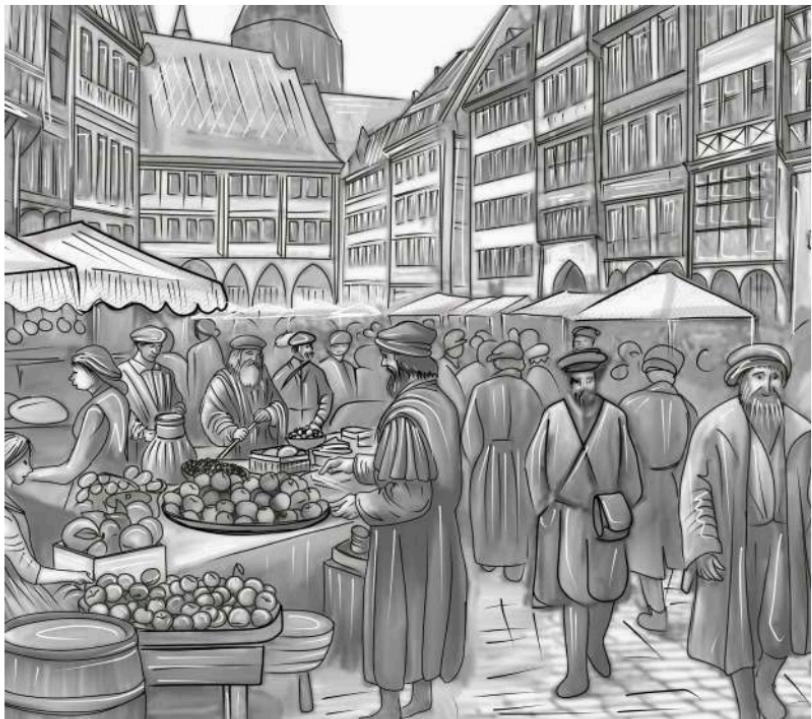
metropolis: a large city

scribes: people who copy documents by hand

scriptorium: a room in a monastery where scribes do their work

Strasbourg

Strasbourg, now located in France, began as a small settlement during the Bronze Age. The Romans turned it into an important outpost called Argentoratum in 12 BCE. In the fifth century CE, the Franks took over and renamed it Strateburgum, which over time became Strasbourg. Bishops were in charge from the fifth century until 1262, when the townspeople broke away from their rule and made Strasbourg a free imperial city of the Holy Roman Empire. During the Middle Ages, Strasbourg was an important part of northern European trade routes. When Johannes moved there, the north tower of Strasbourg's Notre-Dame cathedral was being raised as if to reach the heavens.



Johannes set up a home as a young, independent, upper-class man, not in the hubbub of the city's center, but on the outskirts of town. His home stood near the St. Arbogast monastery. Likely it was a modest place with room for a workshop. His servant Lorenz Beildeck lived with him, as did Beildeck's wife. Beildeck's wife took care of the cooking, cleaning, clothes washing, and such. Lorenz ran errands, assisted Johannes in his workshop, and performed other manual labor, like keeping the fires burning to heat the home. Living off his annuities, Johannes enjoyed fine food, medieval fashion, liters of wine, and nights of entertaining.

Johannes's Annuities

An annuity is a fixed sum of money paid to someone each year, typically for the rest of their life. As the son of a patrician family, Johannes received an annuity from Mainz, inherited from his father, and an annuity from a step-uncle. After the death of their mother in 1433, Johannes's brother transferred his annuity to Johannes in exchange for complete ownership of their mother's Eltville estate.

Johannes was quite the eligible bachelor, which caught the eye of a certain upper-class lady. Her name was Ennelin zur Yserin Thüre. Ennelin and Johannes began spending considerable time together, so much so that Ennelin's mother believed that Johannes and her daughter would soon be married. But when the wedding day never

came, Ennelin's mother was furious. She claimed Johannes had promised to take Ennelin's hand in marriage. To break that promise would cause Ennelin heartbreak and embarrassment. Ennelin's mother demanded financial compensation. When Johannes refused, Ennelin's mother took the matter to an ecclesiastical, or church, court.

Johannes swore to the court that he had never promised to marry Ennelin and therefore did not owe Ennelin's mother a single gulden. Ennelin's mother called in a witness, a local shoemaker. The shoemaker testified that Johannes had promised to marry Ennelin. Johannes cried foul. He verbally attacked the shoemaker's character, calling him a cheat, a liar, and a miserable wretch.

What was the result of the case? No one knows for sure since original documents have been lost to time. But there are records showing that the court ordered Johannes to pay the shoemaker fifteen gulden in compensation for smearing his good name in public.

Whatever happened between Johannes and Ennelin after the court case is left to the imagination. The historical record seems to indicate that Johannes remained a bachelor throughout his days.

Eventually, Johannes needed to find a source of income besides his annuities. Years had gone by without him receiving a single gulden from Mainz's treasury. That's

because Mainz had fallen into a terrible financial fix. The town was practically bankrupt. And with Johannes living a hundred miles away in Strasbourg, he couldn't simply walk into the Mainz city clerk's office and ask for his money. By 1434, Mainz owed Johannes 310 gulden. He could have purchased three stone-built homes with that kind of money!

And so Johannes wrote to Mainz's city clerk, Niklaus von Wörstadt, demanding the town pay what he was owed. Wörstadt sent back a signed letter promising that Mainz would pay him the 310 gulden that he was owed as soon as possible. However, more time went by without Johannes receiving anything from Mainz.

One day, Johannes had his chance to fill his emptying money purse. Wörstadt was visiting Strasbourg. So Johannes marched down to the city hall with Wörstadt's signed letter stating what Mainz owed him. He demanded that Wörstadt pay up on behalf of Mainz, right then and there. If he didn't, Johannes would have Wörstadt thrown into Strasbourg's debtor's prison. Of course, Wörstadt didn't have 310 gulden in his money purse. So Strasbourg officials had Wörstadt locked up!

It didn't take long for Wörstadt to promise to pay Johannes his outstanding annuity as soon as he returned

to Mainz. With that, Strasbourg officials had Wörstadt released. Wörstadt kept his promise. In short order, Johannes had his 310 gulden. He would need that money, too, for Johannes had caught the entrepreneurial spirit and was about to embark on a new creative venture—one that would require every gold coin to his name.

Did You Know?

A gulden or guilder was also called a florin. Its currency sign was f. or fl. A master craftsperson made about twenty to thirty gulden a year.

5

The Top-Secret Mirror Project

With all that gulden at his disposal, Johannes turned his full attention to a top-secret mirror-making project that had been tumbling around inside his head like cream in a butter churn.

The mirrors Johannes wanted to make were no ordinary mirrors. Every seven years, they were used by thousands upon thousands of religious people on a pilgrimage to Aachen, a great city of the Holy Roman Empire. People made the journey to Aachen from all across Europe. Their goal was to view relics that they believed held radiant, healing power. For ten days, the people would gather at Aachen's magnificent cathedral, where four important relics were put on display: a robe believed to have been worn by Mary, the mother of Jesus; the swaddling clothes in which she is said to have wrapped the baby Jesus; the loincloth that the adult Jesus supposedly wore when he died; and a piece of cloth thought to have once held the head of John the Baptist.

pilgrimage: a journey to a holy place

relics: objects associated with saints or martyrs

cathedral: the main church of a district



The people believed that if they gazed at the relics, they could be healed of sickness. They also believed that a polished metal mirror, usually set in a special frame called a pilgrim badge, could be held up to catch a relic's reflection and capture its healing power. The power, they

believed, could be stored there by covering the mirror and taking it home to heal sick loved ones unable to make the journey. Many people would pay a high price for that kind of healing power.

Aachen's metalworkers knew from the past that they couldn't keep up with the demand for these mirror badges during the year of the pilgrimage, no matter how early they started making them. And so the guilds of Aachen allowed craftspeople from outside the city to help supply the mirror badges. Johannes intended to take advantage of this opportunity.

His plan involved cutting down on the production time so he'd have plenty of time to make tens of thousands of mirror badges—thirty-two thousand, to be exact—before the upcoming pilgrimage of 1439. Most historians believe Johannes's plan to mass-produce the mirror badges involved inventing a brand-new machine that would print, press, or stamp the decorative images onto the badges themselves. No one knows for sure, though, because of the top-secret nature of his plan. Anyone he shared his plans with was sworn to secrecy. But we do know he wanted to make more mirror badges than any other metalworker ever had or could. If his plan worked, he'd be set for life!

No Ordinary Souvenir

Medieval pilgrim badges were small, flattened metal objects, typically made of a tin or lead alloy and decorated with religious imagery. They were sold at holy sites as souvenirs of pilgrimages. The mirrors were a later addition, becoming popular at sites where the crowds were too large for visitors to see the relics up close.

Badges for a particular site often featured designs that were typical of that site. Because Mary's robe was considered the Aachen cathedral's most important relic, many Aachen mirror badges included an image of the robe or of Mary herself. Another common image found on Aachen badges was Jesus's face. But the most important part of a mirror badge was the mirror itself—a reflective piece of a highly polished convex metal, clamped in place within a usually ring-shaped frame. The curved shape of the mirror allowed for a wide-angle view of the relics, which people believed would help it better absorb the relics' healing power.



convex: curved outward

6

The Partners

Every new business needs capital, or an investment of money. And it was no different for Johannes's mirror badge project. He poured his money into his new business until there was little left to pour. He convinced three other upper-class Strasbourg gentlemen to invest their time and money as well. These partners were Andreas Ditzehn, who Johannes had previously taught how to cut and polish gemstones; Hans Riffe, a local prefect; and Andreas Heilmann. They all signed a business contract and agreed to keep Johannes's operation top secret.

Johannes and his partners also agreed to share the profits once the mirror badges sold. Johannes would get 50 percent, Riffe 25 percent, and Ditzehn and Heilmann 12.5 percent each. The going rate for one mirror badge was about half a gulden, so if the men sold thirty-two thousand mirrors, they would bring in sixteen thousand gulden—about five million U.S. dollars today! No wonder these men were so willing to invest. Andreas Ditzehn was so sure of Johannes's plan that he sold

practically everything he owned to put more money into the business. He even borrowed money from a friend's housekeeper.

Day and night, Johannes and company worked to have the mirror badges ready for the 1439 pilgrimage. Together they perfected the secret process of mass-producing the badges. They purchased and smelted the metal. They cast the badges. They polished each mirror until it shone. They assembled all the intricate pieces. They filled crates with mirrors, ready for transport to Aachen. As the time for the pilgrimage drew near, Johannes and his team had produced most of the thirty-two thousand mirrors for the big event. No doubt Johannes's team rubbed their hands together. Their big payday was upon them! Unfortunately, what happened next was unforeseeable.

The plague, a contagious, deadly disease, began to spread like wildfire across Europe. It was an outbreak! To keep the disease from spreading in Aachen, city officials decided to cancel the pilgrimage. The city rescheduled the pilgrimage for the following year. Johannes, his men, and their money purses must have felt deflated. Their payday would be delayed. But they had no choice but to wait out the pandemic.

The Plague

The plague is a highly contagious disease that spread across Europe throughout the Middle Ages. It first arrived there in full force in 1347, heralding a pandemic that lasted until 1351. This pandemic was called the Black Death because its victims typically developed large black boils that oozed blood and pus all over their bodies before they died. The plague took the lives of nobles and serfs alike, men and women, young and old. During these few short years, it killed at least twenty-five million people in Europe—a third of the population. Waves of the disease would come, then subside, then surge again throughout the rest of the 1300s, and occasional outbreaks continued for hundreds of years after.



The plague knocked at Johannes's door. Andreas caught the disease and was sure not to survive it. Close to death, Andreas worried about keeping Johannes's secret plans safe. He had secret documents and mechanical

parts inside his home, and he did not want his brothers to discover them after his death. He sent word to Johannes to come and get everything. Johannes sent his servant to retrieve the secret items.

Soon after Andreas's untimely death, his brothers asked Johannes to let them take their brother's place in the business. They felt Andreass's share in the business was now theirs. But Johannes did not want to let them in, so the brothers took Johannes to court. To protect the ideas behind his invention, Johannes paid the brothers a small sum to buy out Andreas's share of the business.

And that, unfortunately, is the end of that story. There are no records that tell us what happened next. After the plague, did Johannes and his remaining partners make their fortune selling the mirrors? Some historians believe they did. Others believe they melted everything down to start working on Johannes's next idea—one that would take the world by storm.

No Kissing Allowed

In the 1400s, a kiss was a major part of the homage ceremony in which knights pledged loyalty to their lord, the king of England. Members of Parliament felt such kisses were necessary to make the pledges of the kings' subjects legally binding. But during the plague of 1439, such kisses were temporarily banned to protect the Crown from the deadly disease.

7

A New Kind of Scribe

In Johannes's day, the Latin Vulgate Bible had only ever been copied by hand by trained scribes. These scribes were often monks. A scribe spent countless quiet hours inside a scriptorium. They'd sit in wooden chairs before angled writing tables. A master copy of the Bible was close at hand. Using a Gothic Latin style of penmanship called calligraphy, they would guide their quills from an ink horn onto parchment or vellum. Carefully, word for word in neat little rows, they'd make their copies. Page after page, each line of text lined up straight as a compass needle. Their only light was from the sun during the day or candles at night. In summer, beads of sweat poured down their backs beneath itchy robes. In winter, their fingers must have ached with no real source of heat to warm their bones.

It took about one year for the Latin Vulgate Bible to be completely copied by hand, bound, and made ready for an artist to add the illuminations, or color decoration. Because of all the hours it took to produce a handwritten Bible, a copy cost between sixty and one hundred gulden. A common laborer made only about two gulden a year.

quills: pens made from feathers

parchment: a writing surface made from the skin of a sheep or goat



So only the ultrarich could afford a Bible. And yet, it was considered the most sacred book in Europe. So it's easy to see why Johannes's newest idea involved finding a better, faster way to copy the Bible. If he could reduce the time and effort needed to copy it, he could reduce the cost. More people would be able to own their very own Bible.

Johannes was eager to tell others of his idea: a new kind of printing press. Instead of a scribe having to write all the words by hand, the printing press would stamp words onto a writing surface using ink. Such a printing press had never been seen in the Western world!

Many were thrilled by Johannes's idea, especially the Catholic Church, which was excited to print and sell many religious texts. This would be Johannes's first big printing project. If his idea worked, his process would revolutionize the way the Bible had been copied for centuries.

The Chinese Method

The Chinese had used a woodblock printing method for centuries. They carved raised text in reverse onto a block of wood, applied ink to the characters, and pressed paper onto the block. It was a painstaking process that only the most skilled Chinese typographers could accomplish. The world's oldest dated book printed in this way is believed to be a copy of a Buddhist text called the Diamond Sutra. It is a 17.5-foot scroll that was printed in 868 CE for a man named Wang Jie.

One of the more impressive parts of Johannes's idea was creating movable type. *Type* refers to every character—each letter, number, and punctuation mark—on a page. Johannes carved raised characters on the ends of individual metal bars. The characters were carved in reverse. That way, when they were inked and pressed, or stamped, onto a surface, a person would be able to read it. A person called a typesetter could rearrange these individual metal stamps to print many different pages. And because the type was made of metal, it could be reused repeatedly for years to come.

ABCs

The Latin alphabet of twenty-three letters originated in ancient Rome sometime in the 600s BCE. The English alphabet is derived from the Latin alphabet. The letters J, U, and W were added in the medieval period to give us the twenty-six-letter alphabet we use today. In classical Latin, the letter I could also represent the J sound, and V could represent U and W.

One of the biggest challenges was creating the font for the metal stamps. Johannes wanted the text to look as beautiful as a handwritten copy. He knew that would involve tracing and then carving out intricate letters onto the surface of a tiny steel bar. Every upper- and lowercase Latin letter. Every number and punctuation mark. Thin and thick strokes, fancy swirls, and decorative curls. He'd then have to sand, smooth, test, and perfect every character until each one looked like it had been drawn by a monk's stylus.

Uppercase and Lowercase

Typesetters working on printing presses like the Gutenberg Press stored their type in shallow wooden boxes or cases within their sloped worktables. It was common to keep the box with the capital type on top of the box with the type that was not capital. Thus, the capital type was in the "upper case," and the rest of the type was in the "lower case."

To test his work, Johannes would place the tip of his metal stamp into a candle's flame. Once it was hot enough, he'd stamp it onto a writing surface. The burn mark would tell him what the character would look like

once it was inked and pressed onto the paper. This was called a *smoke proof*.

Gutenberg's Font and the History of Type

The font Johannes created for printing the Latin Vulgate Bible is a black-letter or Gothic font, created to imitate handwritten manuscripts of the time. This handwritten style is called textura because it looks textured and woven. Johannes's type, often called B42 because of the forty-two lines on each page of his Bible (the source of the B), is also tall, narrow, and set close together. It has thick and thin strokes that resemble the marks of a medieval scribe. In its day, it was considered easy to read.

To make a copy of the Latin Vulgate Bible, Johannes would need 290 individual characters carved onto tiny metal bars. But that wasn't all. He'd need dozens of each of those characters to print a single page from the Bible. Take the first two verses of the Latin Vulgate Bible as an example:

In principio creavit Deus caelum et terram. Terra autem erat inanis et vacua, et tenebrae super faciem abyssi: et spiritus Dei ferebatur super aquas.

—Genesis 1:1–2

This alone would require 126 individual pieces of type, including twenty e's. If that wasn't enough, a single page of Johannes's Bible would have about five hundred words, or 2,600 characters. Johannes wanted to print two pages side by side on each sheet of paper, which would later be folded in half when it was time to bind the book. That meant his press would have to print 5,200 characters at one time!

Always the problem-solver, Johannes wondered if he could make dozens of copies of each character without hand-carving each one. Could he mass-produce his type? A solution formed in his creative mind.

Johannes began by carving a character, like the letter *e*, onto the surface of a hard metal bar. He'd hold the bar, carved side down, against a softer piece of metal, like copper. Then he'd hit the steel bar with a hammer. The blow to the hard piece of metal would punch the carved design into the softer copper. The indentation could then be used like a mold, filled with hot liquid that would harden into a metal bar with the same character carved on the end.

The process, called *casting*, was nothing short of genius. Now Johannes or any one of his type casters could make as many as four thousand letter e's—or any other character—in one day!

Johannes likely spent many days and nights imagining, sketching, designing, and figuring out every problem and solution to get his printing press up and running. While his employees worked at building the larger wooden mechanical part of his machine, Johannes worked at making all the type. Day after day, he chiseled. He filed. He smoothed until every master character was as clean and precise as a monk's handwriting. It was detailed, precise work that took steady hands, careful eyes, and likely a ton of do-overs.

Unfortunately, none of Johannes's plans, sketches, or blueprints for his printing press have ever been found. So the exact design and function of all the individual parts of the Gutenberg Press are unknown. Most historians believe Johannes modified a screw press, a machine once used to crush grapes to make wine. If so, then Johannes's printing press would have operated like one big screw that, when turned, lowered a sheet of paper and pressed it onto inked type.

It took Johannes and his people about ten years to finish designing, building, testing, tweaking, and rebuilding his new printing press. But he was sure his hard work would pay off in the end. After all, everyone knew that fine things like wine and cheese took time before they were ready for tasting.



Johannes: Inventor Extraordinaire

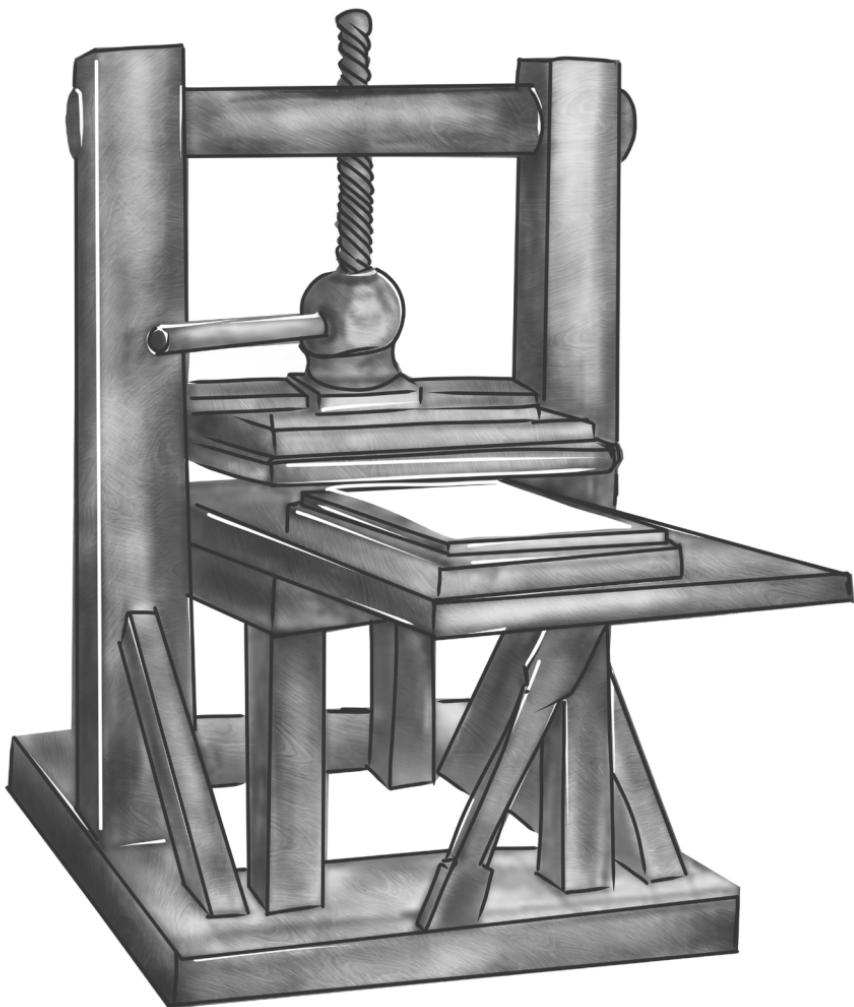
Johannes's printing press with movable metal type was made up of many different inventions. These included:

- *an alloy, or metal mixture, made from lead, tin, and antimony that could easily be cast into durable type;*
- *a mold for casting replicas of metal type with the same height and spacing;*
- *a composition platform for assembling the movable type into a special tray, table, or box;*
- *ink made from lampblack and linseed oil that would stick to metal type; and*
- *a screw press that created enough pressure to print evenly on a writing surface but did not twist or smear the ink.*

antimony: a silvery-white metallic element in the periodic table

replicas: exact copies

lampblack: fine black soot



Many museums have built working replicas of a press they believe similar to the one built by Johannes.

8

Assembling Success

Around 1448, Johannes was back in his hometown of Mainz, where he had set up a new workshop in the Hof zum Gutenberg. Many in Mainz bought into Johannes's new venture. Relatives loaned him money. A monastery loaned him money. And a well-off man named Johann Fust loaned him gobs and gobs of money. Everyone, it seemed, believed in the value of Johannes's idea. They were convinced that once his machine was ready, they'd all receive a handsome return on their investment. Johannes worked furiously to make all their dreams a reality.

He began purchasing all the materials he would need to build his machine and cast its thousands of pieces of metal type. It took time and effort to acquire the right kind of wood, the quantities of metal, and all the other ingredients for the many intricate parts of a brand-new printing system. He gathered craftspeople to help him build what had never been built before.

By 1454, Johannes likely had two workshops up and running—one at the Hof zum Gutenberg and a much larger one inside a distant relative's estate called the Hof zum H umbrecht, also in Mainz. Just about everything—equipment, tools, workers' wages—inside this larger workshop was paid for by Johannes's biggest investor, Johann Fust. It was there that Johannes would produce the first printed copies of the Latin Vulgate Bible.

This printery was a beehive of activity. At least twenty people, all trained by Johannes, were hard at work inside. There was a forge for casting type. There were storage lofts for stacks of vellum and paper. There was room for making ink, cutting paper, and drying printed pages. There was space for six different workstations, each with its own printing press, set of type—as many as 7,800 pieces per station—and team of press operators.

With precision and skill, the press teams began to move the sheets of paper through the printing process. Typesetters arranged the characters of the text in a tray resting at the bottom of the press. Inkers inked the type by firmly gripping the wooden handles of two large ink balls made of goose skin and stuffed with horsehair. They rocked and rolled the balls into ink, then rubbed them together until the ink was smooth and even. Then they'd come straight down with the ink-covered balls and dab, dab, dab just the right amount of ink onto the type.

As the type was prepared, a sheet of paper was fastened to the upper part of the press, called a frisket, by attaching it to two pins. These pins held the paper in place and marked where it should be reattached when it was flipped for printing on the other side. This made sure the margins lined up. The press operator would then fasten a specially designed sheet of leather over the paper. The leather sheet exposed the center of the paper where the words would be printed, but it covered the margins. This made sure the margins stayed clean. With paper and type ready, the screw press was cranked to lower the paper onto the inked characters. Then the screw was reversed to reveal the freshly printed page, which was removed and carefully hung up to dry. At each workstation, the teams repeated this process until they had copied a single page as many times as they desired. Then they would rearrange the type to start printing the next page.

Paper or Skin?

Vellum was considered one of the finest writing materials in Europe during Johannes's day, and Johannes wanted to print his Bibles on it. However, vellum was expensive because it was made from the skin of calves. Printing one copy of the Bible on vellum would have required about 170 calves! Thankfully, in 1453, a paper mill opened in Basel, Switzerland, one of the first to mass-produce paper using linen pulp made from rags.

Imagine the sights and sounds that must have thrilled anyone visiting Johannes's workshop at the Hof zum H umbrecht. The tings and clicks of metal bars of type being arranged into a tray on a composing table. The snap of the tray being fixed into the press bed. The bop-bop-bop of the ink-covered bulbs. The clunk-plunk of the screw press being cranked. The sweet sound of ink and paper kissing as the upper platen met the press bed. It was an exciting place to be—nothing like a dull, dim, quiet scriptorium.

How proud Johannes and his workers must have been when several copies of the first page of the Bible hung drying inside the workshop. Each one looked exactly like the other, with forty-two lines of beautiful black lettering in two neat columns. Each one looked like the handiwork of a scribe, though it had been inked by a machine.

Day after day, month after month, Johannes's printing presses churned out pages of the Bible—leaf after leaf, folio after folio, Bible book after Bible book, from Genesis to Revelation—until every word of the sacred text had been composed by metal type and copied. What they were left with was 180 copies of the Latin Vulgate Bible, each volume weighing at least fourteen pounds, containing 1,286 pages, and about 17 inches tall by 12 inches wide.



A Customizable Bible

Johannes's Bibles would have been sold as sheets of text only, and the illuminations, rubrication (red lettering), and binding would have been done later, paid for by each book's owner and completed by an illuminator and binder of their choice.

Looking over their years of work, Johannes, his workers, and his investors—really, everyone in Mainz—must have realized that behind the workshop doors was a brand-new invention that was going to forever change the way information was shared. And word of it was spreading like wildfire.

Far and wide, people were praising Johannes's magnificent machine and the pages it could produce. They were calling it a new species of scribe, a tool of light to scatter the darkness of ignorance, a spring allowing truth to flow freely.

In 1455, the future Pope Pius II was in Frankfurt on official business. While there, he had the opportunity to see twenty printed pages of Johannes's Latin Vulgate Bible. He was amazed. In a letter to Cardinal Juan de Carvajal, the personal representative of the current pope, he described what he had seen: the type on the pages was so clear, it could be read without glasses! The script flowed like the quill of a scribe! It was everything that had been promised. The one behind the machine was *vir mirabilis*—a remarkable, marvelous, miraculous man! Johannes, of course, knew it was no miracle but rather years of work, investment, determination, and trial and error.

The future pope was so impressed that he requested to purchase a copy of Johannes's Bible for the cardinal. To his dismay, he was informed that all 180 copies had already been sold in advance. Johannes's Bible was a bestseller!

Perhaps Johannes, now in his fifties, would be able to sit back, enjoy the fruits of his labor, and wait for his money purse to bulge. But that was not to be.

The Gutenberg Bible

The Gutenberg Bible is also known today as the forty-two-line Bible, the Mazarin Bible, and the B42. Only about 180 copies were printed, some on vellum and some on paper. As of 2024, forty-nine Gutenberg Bibles, only twenty-three of which are complete copies bound in either two or four volumes, are known to have survived the passing of time. All the survivors contain the beautiful font of Johannes's metal-cast type. Some of them have no decoration on their pages, while others are highly decorated.

The Gutenberg Bible in the Huntington Library, Art Museum, and Botanical Gardens in San Marino, California, pops with ornate coloring and decoration. Its vellum pages are adorned with capital letters that are crowned in shining gold leaf and filled with patterns of blue, red, brown, and gold. The margins are decorated with brilliant peacocks; colorful vines with curls and swirls, leaves, tendrils, and flowers; and spheres of sparkling gold. Each illuminated page is a work of art. Henry Huntington purchased the copy in 1911 for \$50,000, equal to more than \$1.6 million today!

9

The Fall

Johannes was still in debt as the first printing of the Bible neared completion. He had borrowed a lot of money from a lot of different people. It seems that for the most part, he was diligent about repayment. At least, there's no record of anyone throwing him into a debtors' prison. But in 1455, Johannes found himself kicked to the cobbled streets outside of his workshop. The man behind Johannes's eviction was his biggest investor, Johann Fust.

How could this have happened?

Fust had loaned Gutenberg eight hundred gulden on two separate occasions, or 1,600 total. When Fust gave Johannes the second loan, Johannes signed a contract that put up the entire contents of his Bible workshop as security. In other words, if Johannes could not repay the loan to Fust, Fust would own everything within that workshop—the workers, the printing presses, the Bibles, everything.

diligent: careful and hardworking

Johannes had little reason to worry when he signed the contract. After all, Fust had been investing in Johannes's business from the beginning, and the demand for the Bibles seemed more than promising. But shortly after Johannes received the second loan, Fust demanded that Johannes repay him—loans plus interest, in full—right then and there. Fust wanted 2,026 gulden! And Fust told Johannes that if he couldn't repay him, Johannes would have to hand over his workshop and all that was in it.

Johannes couldn't repay the debt yet, but he also didn't think it was fair to turn over the keys to his workshop to Fust. So Fust took Johannes to court.

In court, Fust accused Johannes of using his money on other things besides printing copies of the Bible. Johannes told the court that Fust had agreed to invest and to share the profits once the Bibles sold. Furthermore, Johannes told the court, Fust had not even given him the entire eight hundred gulden for the second loan. So why should he hand over the keys to his workshop?

Inquiries were made. Contracts were shown. Witnesses were called. Expense figures were produced. When all was said and done, the court sided with Fust, and Johannes was kicked out of his own workshop. Johannes lost his business to his investor. He lost the keys to his workshop. He lost the workers he had trained in a revolutionary printing process. He even lost his Bibles.

Everything now belonged to Johann Fust.

Fust quickly put Peter Schöffer, a craftsman who had been working with Johannes for a few years, in charge of Johannes's workshop. They named the printery Fust and Schöffer. Worst of all, after Fust's death in 1466, not only did Schöffer inherit Johannes's printery, but he also took credit for inventing most of the printing process.

Thankfully, word had already spread, and everyone in Europe seemed to know that the brand-new printing press with movable, reusable metal type was invented by Johannes Gutenberg. No one could take that away from him.

After Fust took over, many of Johannes's craftspeople took their printing press skills far and wide. They began casting their own sets of individual letters to march like little soldiers inside all kinds of books, both sacred and secular. The spread of printshops quickly changed the Western world. They printed Bible translations in common languages. They printed books revealing scientific discoveries. They printed political leaflets filled with new ideologies. They printed books of fiction to entertain. Affordable books, pamphlets, flyers, and booklets—all kinds of reading material for everyday people—were everywhere thanks to the Gutenberg press. But none of that helped put gulden in Johannes's pocket. By 1458, Johannes was completely broke.

ideologies: collections of ideas or beliefs

The Renaissance

The Renaissance was a cultural movement in Europe that began around the fifteenth century, immediately following the Middle Ages, and ended around the beginning of the seventeenth century. It was considered a period when classical literature and art, intellectual thought, and scientific invention bloomed. Many historians agree that the Gutenberg press, with its contributions to the spread of knowledge, was the invention that made it all happen.

What Now?

*Some historians think that after he lost his business, Johannes set up a one-man printery. Certain clues suggest he printed copies of the *Catholicon*, a popular Latin grammar book and dictionary, in 1460. But Johannes did not leave a printer's mark on his work, so no one knows for sure.*

Despite his financial downfall, Johannes did not spend his last days begging in the town square. On January 17, 1465, the archbishop of Mainz made Johannes a courtier in his court. Johannes lived out his golden years at the Algesheimer Hof of Mainz, one of the estates the archbishop used as a residence. As a member of the court, Johannes would not have paid taxes, and he would have been given enough money for clothing, grain, food, and wine.

Likely, though, the most important thing for Johannes was being recognized by the archbishop as a fine gentleman worthy of honor. It's nice to imagine an

elderly Johannes being a member of the archbishop's court, bending the ear of visitors while sharing a meal fit for a king. What stories he might have told—of stamping mirrors, of chiseling type, of joining paper with ink.

In 1468, Johannes's great mind finally came to rest. He was buried in a church cemetery in Mainz, not far from where he was born.

More than five hundred years after the first Gutenberg Bible was printed, the world has not forgotten Johannes Gutenberg or his printing press. He is honored every year in Mainz, Germany, with a four-day celebration called Johannisnacht. Every surviving Gutenberg Bible is considered a treasure. Each page printed on a Gutenberg printing press is considered a work of art, proof of genius at work.



Sold!

In 1987, a Gutenberg Bible sold at auction for \$5.39 million to Maruzen Co. Ltd., a large bookseller in Japan. That's a lot of gulden!

The cities of Strasbourg, France, and Mainz, Germany, both claim Johannes as their famous son. Both have sculptures to honor him and museums to remember his work. One statue in Strasbourg shows him holding a scroll-like page from the Bible. It reads “And there was light” in French. The inscription is appropriate for a man whose machine ushered in a new era of knowledge, shedding light on the darkness of ignorance.

Missing Portrait

In artwork, Johannes is often depicted as having a long, forked beard. However, no one really knows what Johannes looked like or how he groomed his facial hair.

Discussion Questions

1. Imagine the time in which Johannes was born. What do you think it was like to grow up in a world where it was uncommon to own a book? How would you feel if you didn't have access to books?
2. How did learning Latin as a youth help Johannes with his work as an adult? What other experiences from Johannes's childhood helped him later in life?
3. How was young Johannes affected by the civil unrest of Mainz? How do you think he felt? How do you think the protesting guilds people felt? If you lived at that time, which side would you have been on?
4. How did Johannes's family's social status—half patricians, half guilds people— influence Johannes's career choices? How did it hurt and/or help him?
5. If you lived back in Johannes's day, would you have made the pilgrimage to Aachen, and would you have purchased a mirror to view the relics there even if it cost you your life's savings? Why or why not? Why do you think so many people did this?

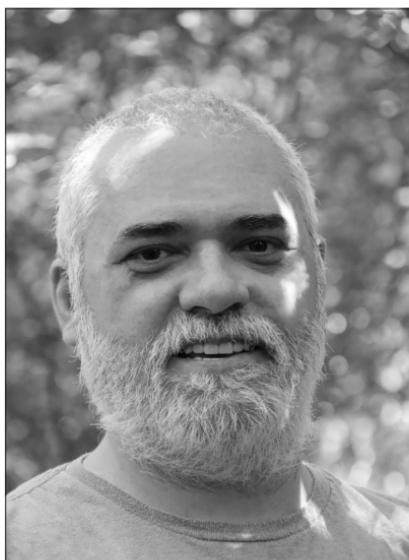
6. What qualities do you think Johannes needed to create his movable metal type for his printing press? Think of the many problems Johannes had to solve. How do you go about solving problems?
7. Why would it have taken teamwork to produce the first Gutenberg Bible? Would you have liked to be part of that team? Why or why not?
8. Why do you think Fust wanted to dissolve his partnership with Gutenberg? How do you think Johannes felt about being kicked out of his own workshop?
9. Do you think the archbishop would have invited Johannes to live at his estate if he had not invented the printing press? Why or why not?
10. What characterized the Middle Ages? In your opinion, how would a printing press have the power to push civilization out of the Middle Ages and into a new, enlightened era? In your answer, consider the inscription on the statue of Johannes in Strasbourg—"And there was light."—and why those words were chosen.
11. Compare the invention and influence of Johannes's printing press to that of the Internet today.

Meet the Author



Dionna L. Mann is a children's book author of fiction and nonfiction. Her work has appeared in *Ladybug*, *Cricket*, and *Spider*. As a work-for-hire author, she's written for Scholastic, Lerner, Capstone, Sports Illustrated Kids, and other educational markets. Dionna loves discovering lesser-known individuals who shine within the margins of African-American history and sharing their stories with young readers. Dionna's debut novel, *Mama's Chicken and Dumplings*, was released from Margaret Ferguson Books, an imprint of Holiday House Books for Young Readers, on August 6, 2024. Find Dionna online at dionnalmann.com.

Meet the Illustrator



Ivan Pesic was born in Blace, Serbia, in 1975. In 2000, Ivan moved to Belgrade, Serbia, where he studied graphic design in college. Unhappy with the political and economic situation in Serbia, Ivan emigrated to Virginia, USA, in 2005. Ivan and his wife, Alisa, have two children, Tara and Luka. His work can be seen in many galleries in Virginia, Washington D.C., North Carolina, and Georgia. Ivan has also donated his paintings to public schools and charity organizations. The primary medium Ivan uses is acrylic and oil paints; however, he also likes to experiment with different mediums and techniques.

MEET THE ILLUSTRATOR

Aside from painting, Ivan has done pencil drawings, wall murals, mixed media art, photography, graphic design, and more. In his work, he reconstructs dreams, fairy tales, nursery rhymes, lullabies—the pieces of our lives and memories that are a part of us. Every piece of his artwork tells a story, stories with a hero, a villain, with action, movement, and other elements that give his work life and energy. Ivan's work can be viewed on his website: www.ipartstudio.com.

Credits

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Ivan Pesic

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