

AFD Ep 447 Links and Notes - From Filing Cabinets to Xerox [Bill/Rachel] - Recording Nov 6, 2022

- [Intro - Bill] The filing cabinet is a second industrial revolution invention from the United States. It became important after the mid-century innovations in cheap mass-production paper, the mid-1860s invention of typewriters, and the post-Civil War explosion in corporate and governmental clerical work that we've previously covered. It was no longer good enough to fill up a shelf, safe, cubbyhole array, or just a book with records, especially with loose-leaf paper becoming more widely deployed. Storing and retrieving documents efficiently and consistently became an imperative. This became even more important once again at the start of the Third Industrial Revolution with the rise of Xerox. Today we'll cover both phases of this simple but iconic piece of office equipment and some associated technologies that made it relevant. For more on our coverage of earlier 19th century developments in paper production, typing, and the growing scale of corporate clerical filing, don't miss our episode 314 from June 2020, called "The Planned Economy":
<http://arsenalfordemocracy.com/2020/06/30/june-28-2020-the-planned-economy-arsenal-for-democracy-ep-314/> As always, everything is linked in our show notes released as a PDF with the episode at ArsenalForDemocracy.com. But now for today's topic let us begin where those developments left off and start off with the fundamentals...
- [Bill] What is a filing cabinet? https://en.wikipedia.org/wiki/Filing_cabinet
 - A filing cabinet can be made of wood or metal, but it requires several components to be a filing cabinet: A drawer slide for smooth opening, an outstop to keep the drawer in the cabinet, and handles to pull a drawer out. Optionally it may also include a lock for low-grade document security, a thumb latch to keep it from accidentally drifting open, or a device to keep files upright in the drawer when not filled completely. Today hanging files have come to replace manilla folders and so the problem of keeping files upright has mostly been eliminated. Design specifications and safety measures for filing cabinets sold in industrialized nations are typically regulated by trade groups on the private-sector side and procurement requirements on the government side.
 - Ideally the cabinet protects documents from fire or water damage and also has some kind of separator system such as file folders or something like that to keep the documents less jumbled.
 - It was invented in the United States in 1886 by inventor Henry Brown.
 - Brown's design was what we would today call a horizontal or lateral filing cabinet which means the files are usually stored perpendicular to the opening direction of the drawer and run along a wide cabinet face.
<https://www.officedesk.com/blogs/news/what-is-a-lateral-filing-cabinet>
 - This is differentiated from the later "vertical" filing cabinet you are probably picturing, which is much narrower and taller (ranging from 2-5 drawers on top of each other typically), and all the files face forward, not sideways. Fundamentally the technology of both types of filing cabinets, still widely in use today, is the same, and it's just a question of how the files are organized, or whether you need to store files with a different document dimension. Vertical cabinets tend to take up less floor space but dominate more of the room's airspace. Sometimes today filing cabinets are mounted on wheels so they can be rolled around.
 - Vertical filing cabinets were invented in the 1890s, not long after, by a major American office supply company called "[Library Bureau](#)," which had famously extensive contracts to supply the hundreds and hundreds of Carnegie Libraries being built all over the country. Library Bureau eventually had offices and factories all over, including New York and Chicago, as well as headquarters in

Boston, and also had some smaller operations in Europe in the early 20th century. Library Bureau eventually, in the 1920s, got merged into the infamous Remington Rand office supply and gunmaker conglomerate that had originated as a typewriter manufacturer. https://en.wikipedia.org/wiki/Remington_Rand

- Library Bureau's 1903 advertisement for their vertical filing cabinets read as follows: *"Vertical filing, as originated and perfected by the Library Bureau, is the most complete, accurate and practical method ever invented for taking care of correspondence, catalogs, reports, invoices, orders, duplicate bills, and loose sheets, or papers of any kind for any business—large, small or peculiar."*
- [Bill - let's talk about the slippy-slidey part of the concept] Ball bearings and filing cabinet technology:
 - Although ball bearings were an important early First Industrial Revolution technology from the 1790s, it was not until 1883 that German inventor Friedrich Fischer invented the *standardized*, mass production balls for such bearings. Up until that point, bearing balls were produced for custom jobs with custom specifications, and they were often inconsistently milled. In order for other technologies to be developed or refined that integrated ball bearings into general mass production finished goods, the balls needed to be consistently manufactured at massive scale in pre-set sizes. It is probably not an accident that the invention of the filing cabinet, which does feature ball bearings for the drawer slides, occurs three years later. [https://en.wikipedia.org/wiki/Bearing_\(mechanical\)#Industrial_era](https://en.wikipedia.org/wiki/Bearing_(mechanical)#Industrial_era)
 - [Bill] Filing cabinets generally do not use lubricant oil for the drawer slide because of the problem of keeping the liquid in place, but they are kept sliding through the use of grease, today typically White Lithium. https://en.wikipedia.org/wiki/Lithium_soap Greasing something up, of course, was an ancient technique, not a modern invention. [https://en.wikipedia.org/wiki/Grease_\(lubricant\)#History](https://en.wikipedia.org/wiki/Grease_(lubricant)#History)
 - People might not know they're supposed to do this, but regular greasing of the drawer slides is considered routine maintenance to keep them in good working condition.
 - Wood filing cabinet drawers tend to swell up and stick seasonally because of their own properties as opposed to the drawer slides being stuck, unless the slides themselves are made of wood, which is less common.
 - <https://www.ovisonline.com/blog/Sticky-Drawer-How-to-Lubricate-Metal-or-Wood-Drawer-Slides.aspx>
- [Bill] The postwar monopolization of the filing cabinet market: *After World War II, the Home-O-Nize Company [spell it for listeners] was established in Muscatine, Iowa to provide returning veterans with jobs. Founded to produce steel kitchen cabinets, the company soon encountered the reality of the limited availability of steel. So the company began to make products for others. Finally a small amount of steel was secured and the company started manufacturing steel index card boxes. Soon after, larger cabinets began to be produced including filing cabinets. By designing to minimize the amount of steel, the product was an extremely cost-effective design and had huge commercial success. Home-O-Nize never did make kitchen cabinets and in 1961, the company name was changed to HON. Today, The HON Company, a division of HNI Corporation is the predominant North American manufacturer and marketer of filing cabinets.* https://en.wikipedia.org/wiki/Filing_cabinet They are still based in Muscatine, Iowa.

- [Rachel] As a bit of a side tangent, but speaking of index card storage, which was HON's first product line before settling into their big filing cabinet production business: In the 1950s the Rolodex was invented in the US at the New York-based stationery company Zephyr American. <https://en.wikipedia.org/wiki/Rolodex> The Rolodex is a rotating index card storage device used to organize and store business contact information. The name is a portmanteau of "rolling" and "index", and it is still used as a name for any system that performs the function of organizing contact information. It's such an iconic office accessory that a Rolodex has been displayed at the Smithsonian.
- [Bill] Anyway, back to our main narrative, HON, this postwar company in Iowa making filing cabinets after graduating from index card storage, hit their stride at just the right time because – although the advent of the Second Industrial Revolution had created a much greater need for document storage than ever before in history – the 1870s in turn had nothing on the paperwork of the period beginning in 1959, because of the invention and proliferation of the Xerox copier machine and eventually computer printers.
- [Rachel] People had been trying for many decades (and probably dreaming of doing it for centuries) to develop simple and rapid document copier technology – something that did not require typesetting or copying by hand or typewriter that was slow or risked introducing clerical errors. Xerox was not the first effort, but after we talk about some of its more primitive antecedents from the late 19th century, we'll explain what set it apart and why when it arrived on the scene in 1959, merging together photography, powered synthetic inks based on petroleum, electronics, and the previous century's paperwork revolution.
- [Rachel] MIMEOGRAPH/EDISON ELECTRIC PEN
 - https://en.wikipedia.org/wiki/Electric_pen As clerical work proliferated, an easy way to duplicate documents was needed. Thomas Edison invented the electric pen to meet that need. The pen was powered by a wet-cell battery that drove a reciprocating needle that made 50 punctures per second. The user wrote or drew the desired words or illustrations on a stencil much like using a normal pen. However, unlike a normal pen, the ink is applied to the stencil after writing. The ink is forced out of the perforations onto paper placed under the stencil. The main disadvantage was the wet-cell battery which had to be maintained by experienced telegraphists, so only clerks who were already familiar with wet-cell batteries, such as telegraph office clerks, were comfortable using them. (Related: [Apr 3, 2022 – From Electrochemistry to Electromagnetism – Arsenal For Democracy Ep. 420](#)) Other stencil-creation methods replaced the electric pen, and the typewriter made it completely obsolete by the late 1880s.
 - <https://en.wikipedia.org/wiki/Mimeograph>
 - The mimeograph machine uses the same concept of ink being forced through a stencil onto paper as the electric pen, but better methods for stencil creation were developed. Typewriters, operating in a stencil mode, were loaded with the stencil material, a coated tissue-like paper. The stencil mode moved the ink ribbon out of the way of the keys and the keys were allowed to strike the stencil material directly. The force of the strike removed the coating from the paper, allowing it to be permeated by the ink. Stencils could also be made by stylus to render illustrations rather than words. The stencil is then loaded onto the mimeograph machine, by wrapping it around an ink roller. As a piece of paper passes under the roller, ink is forced through the stencil onto the paper. A rotating drum moves the paper through the machine, enabling users to quickly create copies. Although commercial copiers and printers were released in the 1960s, mimeograph machines were a popular way to cheaply make copies, and they were a common sight in smaller offices, churches and schools well into the 1970s and 80s.

Fanzine makers also used mimeograph machines to cheaply create and distribute their 'zines.

- [Rachel] <https://en.wikipedia.org/wiki/Xerox>
 - Although the concept of printing images using an electrically-charged metal plate and dry powder “toner” was developed in 1938 by a physicist named Chester Carlson, it took 20 years to become a commercially-viable product. Joseph C. Wilson, the heir to the photography equipment company The Haloid Photographic Company, saw the promise of Carlson’s idea and signed a development deal with him. Haloid also coined the term “xerography”, from the Greek words for “dry writing”. Haloid changed their name to Haloid Xerox in 1958 and then Xerox Corporation in 1961. The first commercial copier machine, the Xerox 914, was released in 1959. It featured a document feeder, scanning light and rotating drum. It was wildly popular and brought in almost \$60 million in revenue by the end of 1961.
 - In the 1960s, Xerox teamed up with the UK’s Rank Organisation to develop the Xeronic Computer Printer. It was delivered in 1964 as a special order to Lyons Computers Ltd. for use with their LEO III Computer. In 1963, Xerox also came out with a desktop copier machine, the Xerox 813, the successor to the Xerox 914. In 1966, the Xerox 2400 was introduced. The 2400 in the name referred to the number of prints it could make in an hour. It also featured an automatic paper feeder, a paper slitter and perforator, and collator, able to sort copies of multi-page documents, without the need for human collation.
 - [Bill] In 1969, Xerox began to apply all these technologies together with lasers to develop the laser printer for computers, which was not finished until 1976, after which even more paper documents would be generated. Because there still weren’t “personal”-sized computers in an office context at this point to use these laser printers, and IBM had not yet released their famous rival office PC, Xerox also developed the Xerox Star personal computer for networked office use and more or less invented the basic metaphorical language concepts (and many of the associated visual object icons) we still associate with these computers to present-day, such as talking about “the desktop” of the computer and having a little icon of pieces of paper for a file of writing. They also developed many of the modern features of personal computing, such as a window-based Graphical User Interface, a mouse-like pointing device, and a bitmapped display. However, they weren’t successful because of the high pricepoint and the vision of networked computers that most potential customers did not yet realize was going to be the corporate future; a Xerox-Star office setup, complete with network and printers, would cost \$100,000, well out of the reach of most offices. Apple later bought the rights to Xerox’s GUI, and were able to make a more affordable personal computer, the Apple Macintosh, released in 1984, which is why so many of these symbols survived even with Xerox Star being unsuccessful itself. It’s not surprising that an office-technology titan like Xerox would formulate all the metaphors for the user-interface around office supplies.
https://en.wikipedia.org/wiki/Laser_printing#History
 - [Rachel] Another branch of the development lab was able to create Long Distance Xerography or LDX, by connecting two 914 copiers using the public telephone network. The LDX system was introduced in 1964. Many years later, this work was commercially available in Xerox’s telecopiers, the precursor to the modern fax machine.
 - In the 1970s, Xerox released a color printer, and continued to create copiers and printers capable of printing more pages per minute. Xerox was such a printing

powerhouse that Xerox became a verb for creating copies. They did have a corporate mis-step in the 70s though; in 1979, Xerox purchased Western Union International as the basis for its proposed Xerox Telecommunications Network (XTEN) for local-loop communications. (This was something we did not get into in our recent episode #434 from July 2022 on Western Union:

<http://arsenalfordemocracy.com/2022/07/11/july-10-2022-western-union-arsenal-f-or-democracy-ep-434/>) In 1982, Xerox, regretting the purchase, sold the WUI assets to MCI at a loss.

- [Bill] So let's close the loop now and reunite the two threads of this episode. These Third Industrial Revolution electronic technologies from Xerox dating back to 1959, rather than eliminating paperwork, vastly increased the volume of paper documents being generated, reproduced, transmitted, filed, etc. The aforementioned HON was there to step in and meet the exponentially growing need for filing cabinets, both in offices and in people's homes. As we mentioned earlier, they are still the leading maker of filing cabinets in North America. This is a massive business.