## Printing

It Was Our Middle Name

For most of GPO's first 15 decades printing was front and center. GPO was the offspring of the Industrial Revolution, which moved printing with moveable type from a large-scale handcraft to a fully industrial manufacturing process. From its first day GPO was a power shop, no wood or iron hand presses here, but a battery of large bed-and-platen presses, run by an elaborate system of belts and pulleys driven by a 40-horsepower steam engine. Electricity superseded steam power in the 1880s. In its first three decades GPO grew from 23 presses to more than 100, a number which would double in the next 30 years.

At the turn of the 20th century, typesetting, which had previously been entirely done by hand, was revolutionized by the invention of machines that cast metal type on demand. The new process not only saved time in the assembling of words, lines and pages, but eliminated the laborious task of "distributing" type (returning it to cases for re-use). The adoption of machine typesetting (at roughly the same moment when cheaper wood-pulp based paper became widely available) began a revolution, making printed books, pamphlets, and magazines more widely available than ever before.

In the early 20th century technological innovation again shifted from a process in which letters in raised relief (type) transferred ink directly to paper, to a process in which impressions are transferred, on the basis of chemical properties, first to a rubber roller and then to paper. Offset lithography opened the way for longer runs, the introduction of multi-color printing, and eventually today's digital printing.

Although GPO was not always the first to adapt these huge technological shifts, owing to its tremendous size and the huge investments at any given moment in existing technology and skills, once these shifts took place the "Big Shop" grew and diversified accordingly.

For this book, all the allied processes of printing, including composing, platemaking, proofreading, presswork, and photoengraving, are grouped in a single chapter. The images tell the story of more than 150 years of almost uninterrupted technological transformation.
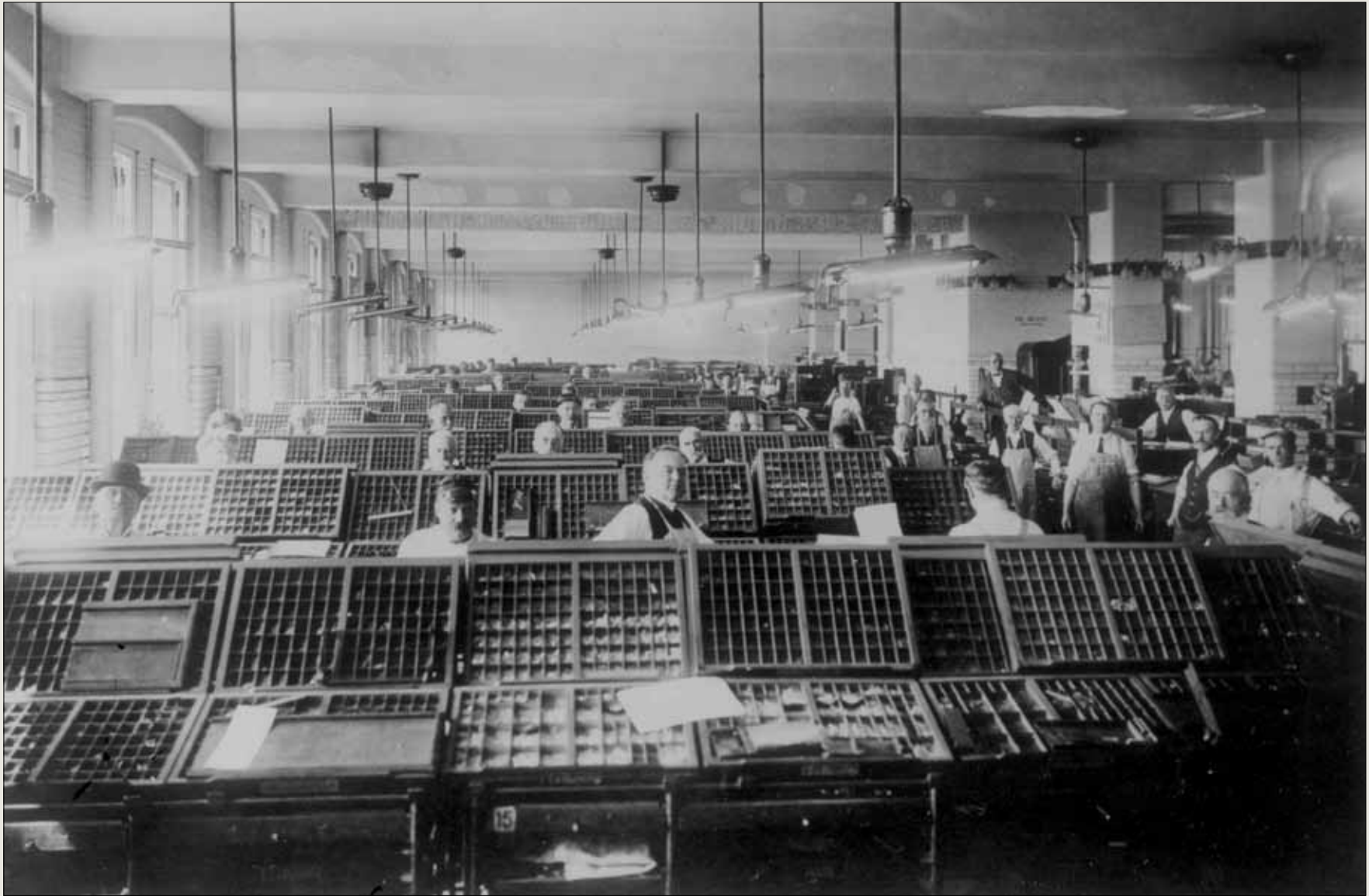
The building opened in 1903 (Building 1) was designed entirely with hand composing in mind. Although by the time of this photo, around 1910, machine composition had made its appearance and was rapidly gaining ground, a significant amount of type was still set by hundreds of hand compositors using a stock hundreds of tons of foundry type.

In 1904, the two most successful systems for setting type by machine were introduced to GPO: Monotype and Linotype. Monotype, which cast individual characters in metal, arrived with 28 machines "on trial." This photo shows 10 of the first Monotype operators, journeymen originally trained as hand compositors.

Monotype battery, circa 1930. Machine typesetting was an immediate success at GPO. From the original 28 Monotypes in 1904, the battery rapidly grew to over 100 by 1920. In 1916, the Lanston Monotype Company was boasting "the largest battery in the world" in its print ads. At that time two-thirds of all the type set at GPO was Monotype.

Monotype was a two-step system, as shown in this photo from the 1930s and the following. These operators typed copy on the keyboard which punched holes on a grid into a 4 ¹/₂" inch wide paper ribbbon. Their typing included letters, punctuation, and spacing, all of which was translated into the coded punches on the ribbon.

That ribbon was then read, employing compressed air much like a player piano roll, by the casting machine which interpreted the punches to guide a mold or "matrix" into position for metal to be injected to form individual letters of type, or "sorts." Photo circa 1940.

Casters could be set up for composition (producing galleys of sorts, properly spaced) or for sorts (producing letters, punctuation, etc.) that could be inserted by hand to correct mistakes in galleys). Photo circa 1930.

The GPO Monotype section was remarkable in many ways, starting with its sheer size, 120 keyboards at the peak. The keyboards required no electricity, only compressed air to operate. Because Linotype operators sat next to a pot of molten type metal, the machine was thought "unsuitable" for women to operate. The Monotype section, on the other hand, had female keyboard operators. Keyboard operators were considered journeymen printers. Operators of the casting machines were not. Photo circa 1910.

The two typesetting machines, Linotype and Monotype, made GPO's status as "biggest of the big" possible. The combination of fast and efficient presses, hot metal typesetting, and a seemingly unquenchable demand for printed documents came together at the beginning of the 20th century and made GPO's reputation. Photo circa 1950.

GPO purchased around 20 Linotype machines in 1904 and, after some dispute with the manufacturer, continued to buy the machines steadily through much of the 20th century. Photo circa 1920.

The Linotype, which produced a full line at a time (a "line o type" or slug) was well suited to so-called "straight work" — large unbroken blocks or columns of text. The *Congressional Record*, *Federal Register*, and U.S. patents were all big-volume Linotype products. Photo circa 1910.
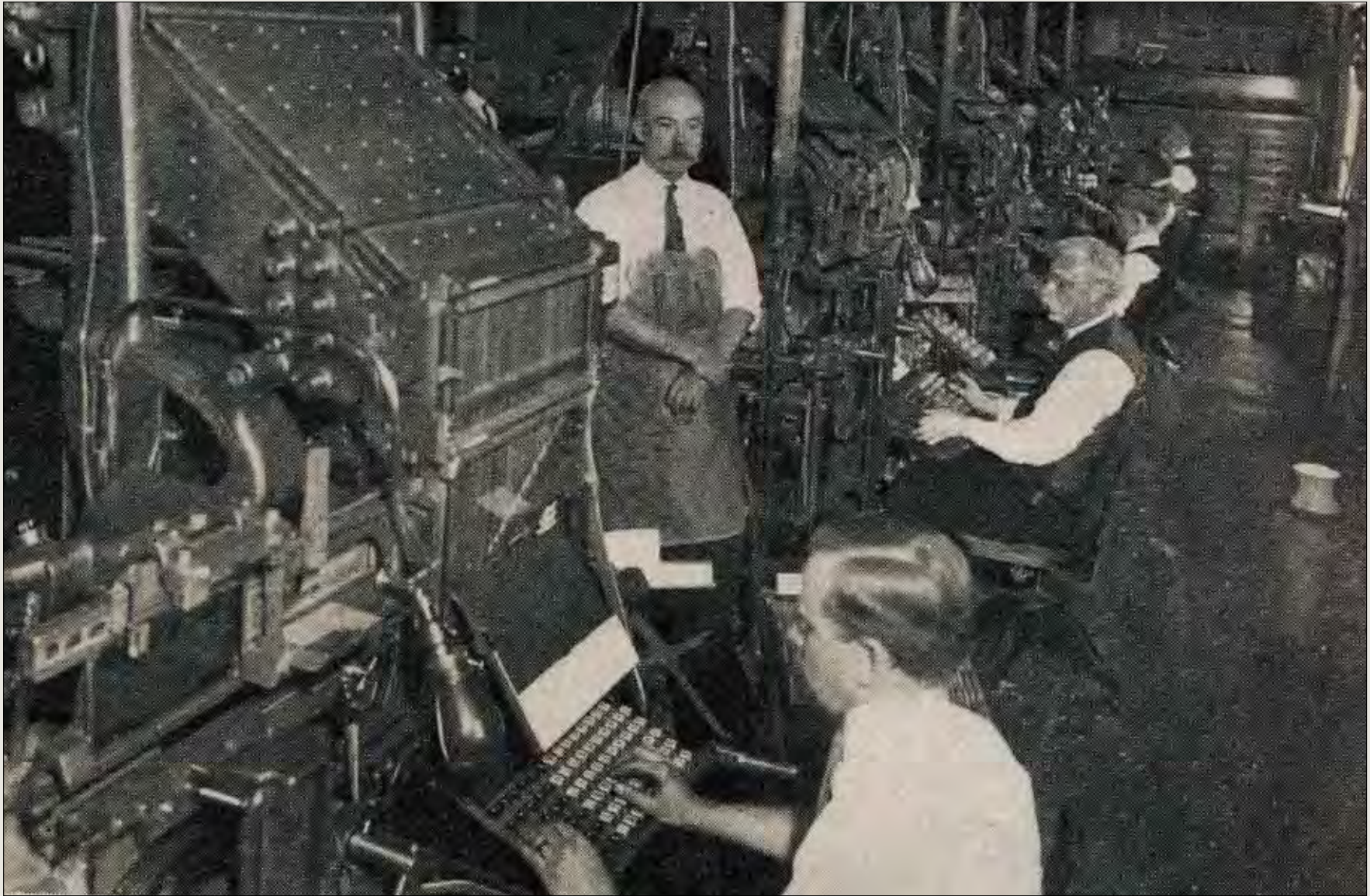
Hand compositors feared that machines would replace skilled workers. In fact, because of the vast increase in production made possible by the machines and the burgeoning demand for printed documents, GPO soon employed more compositors than ever before. This photo, from around 1910, shows GPO when this transformation to a fully industrial shop was underway. In the frame are younger men who may well have been trained specifically as Linotype operators alongside older compositors who had certainly been retrained as the machine composition sections grew. With industrialization came increased attention to safety and sanitary conditions and workers were constantly reminded to keep the shop floor neat and use the cuspidors (upper right).

By the 1920s and '30s, when this photo was taken, there were 100 or more Linotypes at GPO. Each machine weighed over 2400 lbs.

The operator keyed copy on the keyboard that had letters arranged according to frequency of use in the English language. Depressing the keys caused a brass key, a "matrix" to fall from a channel in the sloped magazine above into a row just in front of the keyboard. When a complete line had been keyed, the machine moved the line of matrices into position to correctly justify the line and create a mold for the typemetal to be injected into, creating the slug, a complete line of type. All this took less than a minute. Photo circa 1975.

By the 1960s, although offset printing and phototypesetting had made inroads, hot metal was still king. GPO's battery was a mix of machines made by the Mergenthaler Linotype Company and the Harris Intertype Company. The four machines at the right of this 1970s photo are Intertypes, favored by some operators for their easier loading system for magazines of matrices.

One of GPO's many Linotype and Intertype machines was the "General Pershing," a 1910 model 5 machine, first sold to a newspaper in Chaumont, France. After the U.S. arrival in World War I, the machine was requisitioned by the American Expeditionary Forces under Gen John J. Pershing. It became part of the 29th Engineers Mobile Printing Battalion, which printed Pershing's orders and other materials for the American forces from a group of trucks.
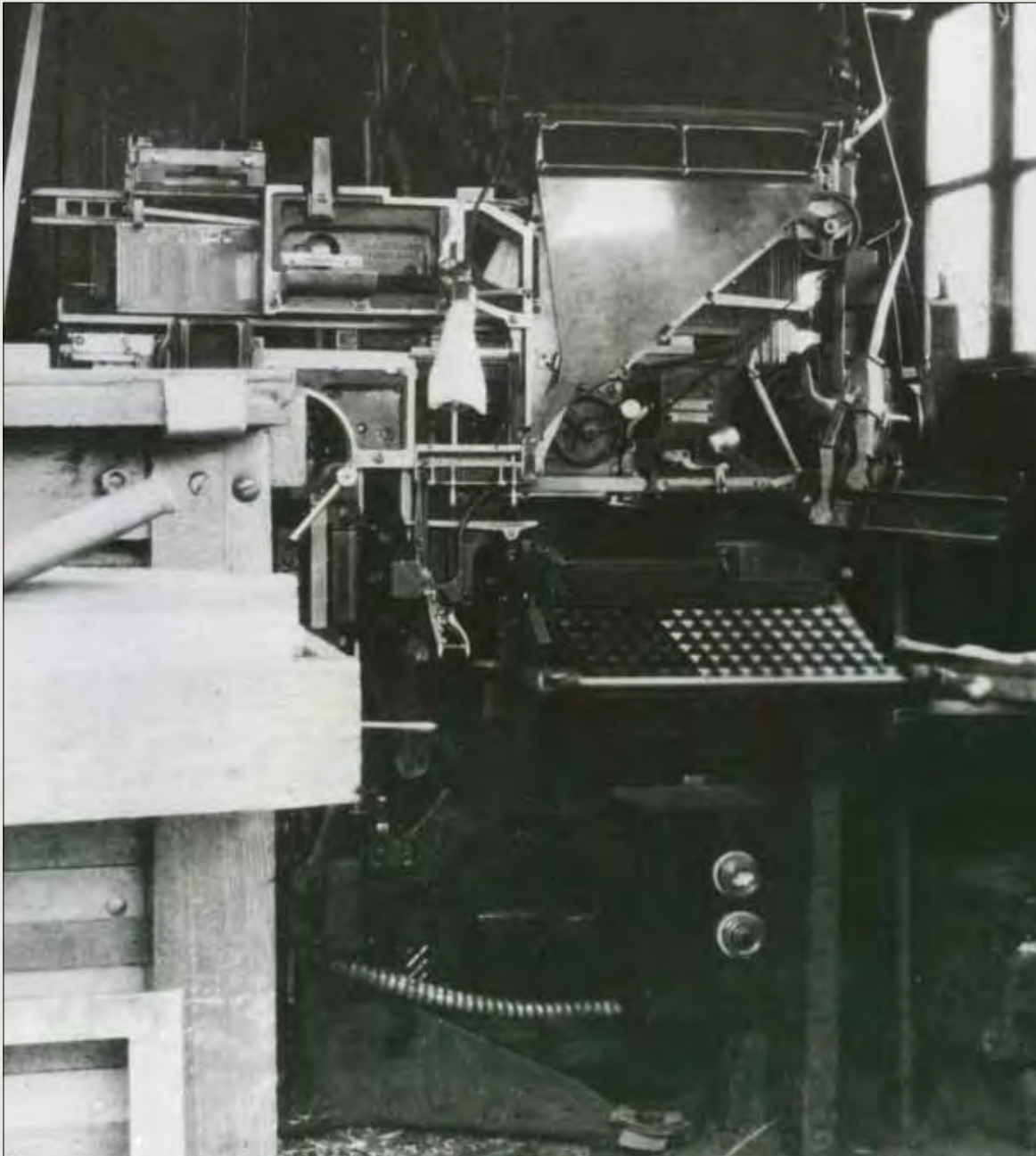
One of the battalion's trucks held the "General Pershing" Linotype.

In France, and after the machine was returned to the GPO, "General Pershing" was operated by Cpl. James M. (Jimmie) Kreiter. Here the machine is in use in a fixed location, Camp Babcock, prior to being mobilized in the truck.
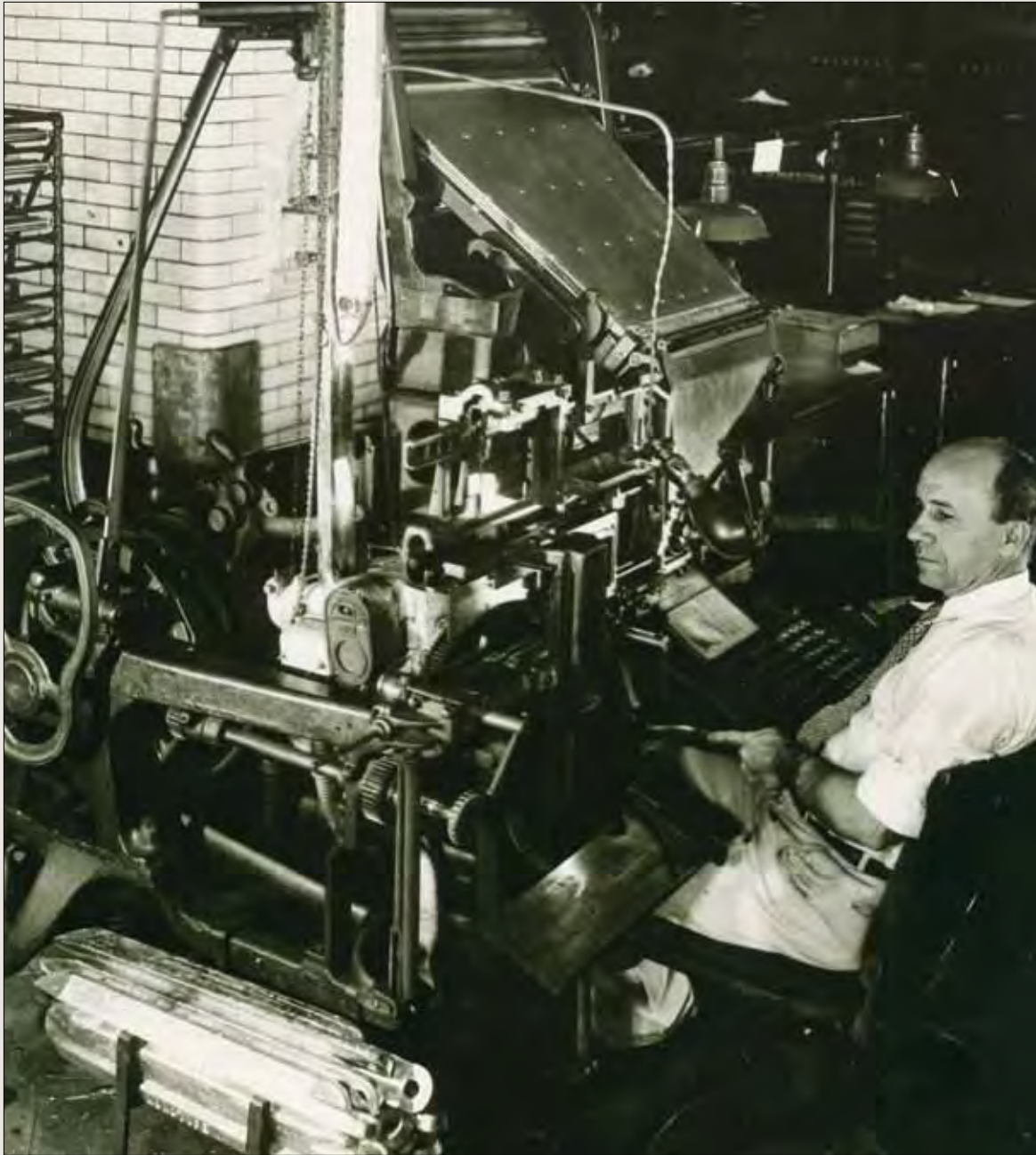
After the war, Kreiter remained at the GPO for the rest of his career.

"General Pershing" served in GPO's Apprentice School until the 1950s.

The Pershing Linotype was retired from service in 1950 and was placed in Harding Hall as a memorial to GPO's World War I veterans. In 2011 it became a prominent part of GPO's 150th Anniversary History Exhibit.

"General Pershing's" arrival at GPO in 1920 was not the end of its traveling days. In September 1936, the American Legion held its national convention in Cleveland, Ohio. It featured a parade that was watched by 500,000 people and lasted over 11 hours. One of the units in the parade was a White Motor Company truck with the "General Pershing" mounted on its bed, and Jimmie Kreiter at its keyboard.

The GPO unit was preceded in the parade by an automobile carrying Public Printer A. E. Giegengack, himself a World War I veteran and active Legionnaire.

Once type was set, either by hand or machine, a copy (a "proof") was printed from the tray that held the type (the "galley"), on a so-called proof press. This proof was then compared against the original manuscript for accuracy. Photo circa 1930.

Type being assembled into galleys, about 1910. When complete, galleys were bound tightly with string.

The Proofreading Section, or Proof Room, about 1908. Among the earliest photos we have of GPO.

The Proof Room earned the nickname "The Brainery." Copy was read for accuracy, but also for grammar, spelling, and style. This wider view from between 1905 and 1910 clearly shows the emphasis on good light (natural and electric) and the GPO practice of proofreading with pairs of readers.

A pair of proofreaders at work in the 1940s. One reader had the manuscript copy, one had the proof, on which corrections and instructions for the final appearance of the printed page would be marked.

The overall appearance of the Proof Room changed relatively little over most of GPO's history. This view is from the early 1950s. From this location in Building 1, proofreaders could see the Capitol Dome, and be aware when the light in the lantern went out, signalling that Congress was adjourned and the wave of night's work was on its way.

Compositors correcting galleys, probably Monotype. Once the proof was read and marked up, errors would be corrected by pulling the incorrect letters ("sorts") from the galley and inserting the correct ones. For Linotype, the entire line had to be recast. Photo circa 1950.

Compositors correcting Linotype galleys. Corrected lines were cast and substituted for flawed ones. Photo circa 1930.

Once corrected, the galley type was made up into page form, a process known as "imposing." Here compositors are at work at stone-topped tables imposing page forms in frames called "chases." Chases could be taken directly to the bed of the press, although in most cases at GPO, a series of plates, which exactly duplicated the set and imposed type, were struck. A further set of "page proofs" was often taken and checked before plates were struck. Photo circa 1930.

Plates being imposed for the press.
Photo circa 1930.

Once plates were struck, the imposed pages were often "pied" — broken up for the typemetal to be reused. If the order was for a particularly large run, or additional quantities were likely, the type was left standing and stored in anticipation of making further plates and pressruns. Photo circa 1930.
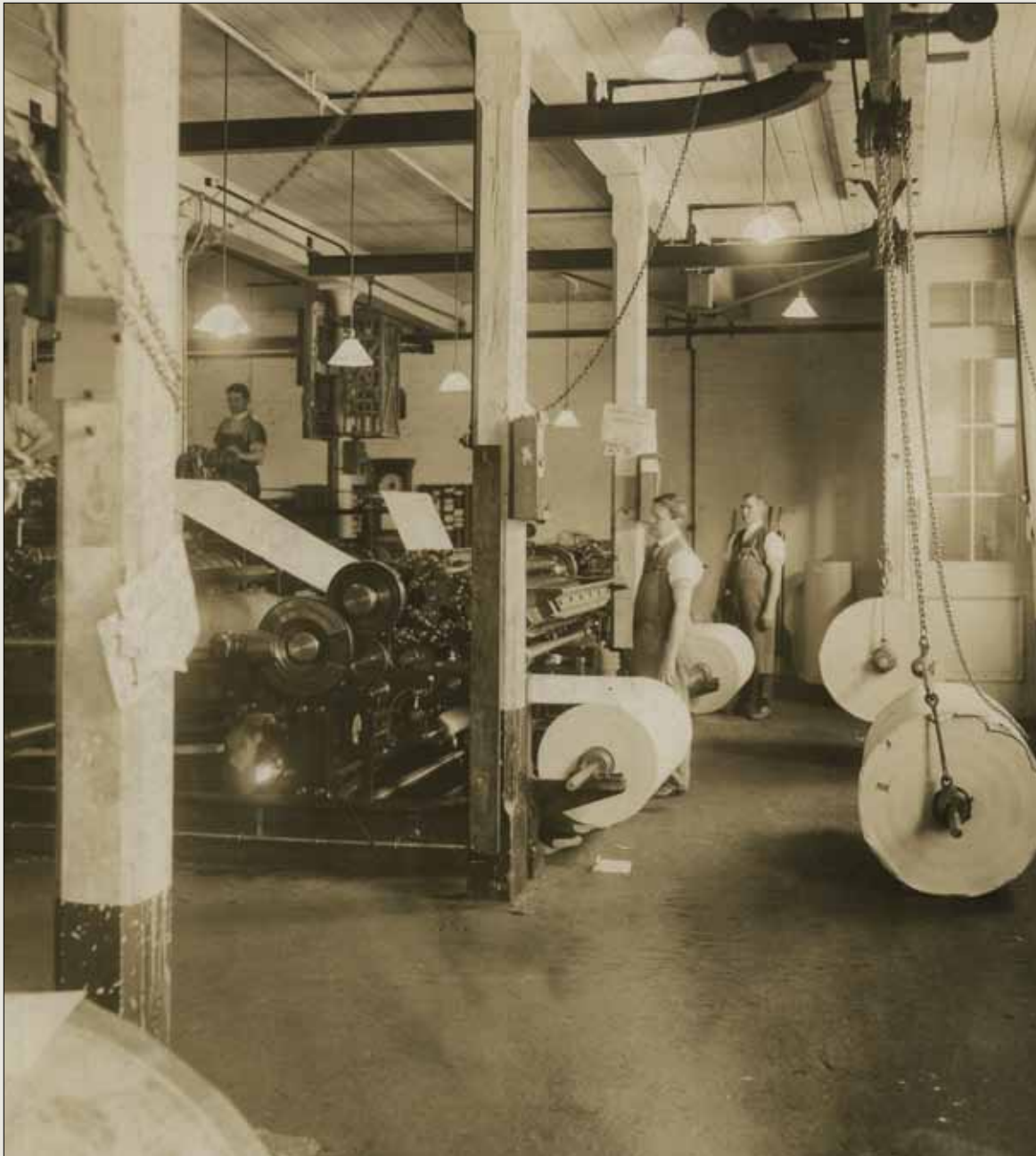
When GPO was created in 1861, the Industrial Revolution had brought a wide variety of innovations and improvements to printing presses. Over its history, GPO has employed a staggering variety of presses, first powered by steam, then by electricity. Presses are classified by the way paper is fed (either by the sheet or from a roll or web), and by the mechanism by which the type and paper come into contact (on a flat bed, a cylinder, a roller, etc.) In a very early photo, web-fed rotary presses are in use in the old (pre-1903) GPO building, probably about 1900.

Close-up of the same web press in the old building, about 1900.
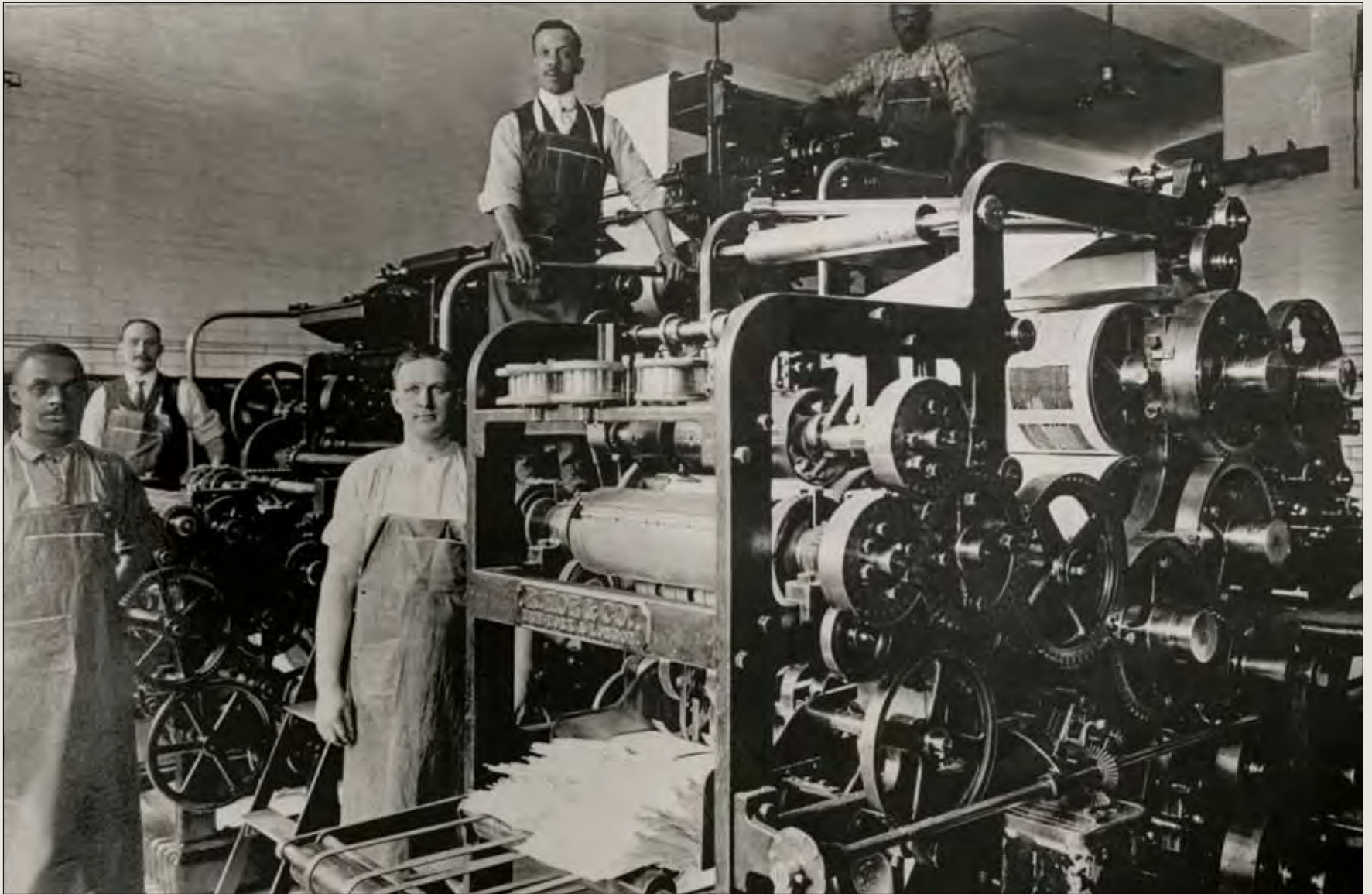
In another photo from about 1905, pressmen are working a Hoe web-fed cylinder press which was bought off the exposition floor at the St. Louis International Exposition in 1904. The press became know as Press #1, because it was the first to be assigned a brass plate with an equipment inventory number, a practice that probably started when Building 1 was occupied. The press eventually became a mainstay of postal card production, and remained in service until the 1980s, when it was donated to a museum.

As GPO grew in the early 20th century, the diversity of work, thus the diversity of presses, grew steadily. In this 1920s view, at least three types of press are visible — web cylinder presses in the foreground, sheet-fed cylinder presses, and the sheet-fed presses known as "bobtails" in the distance.
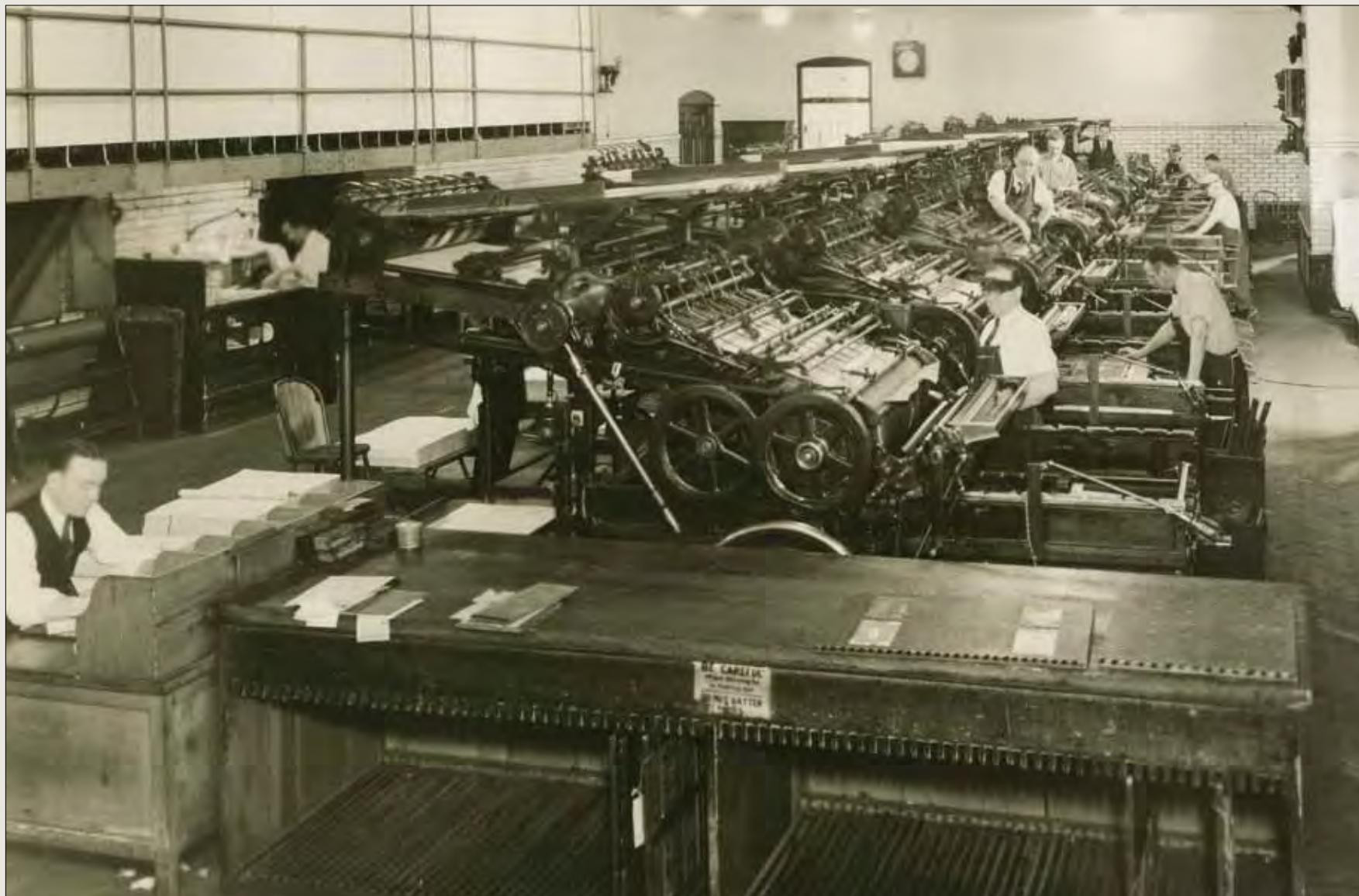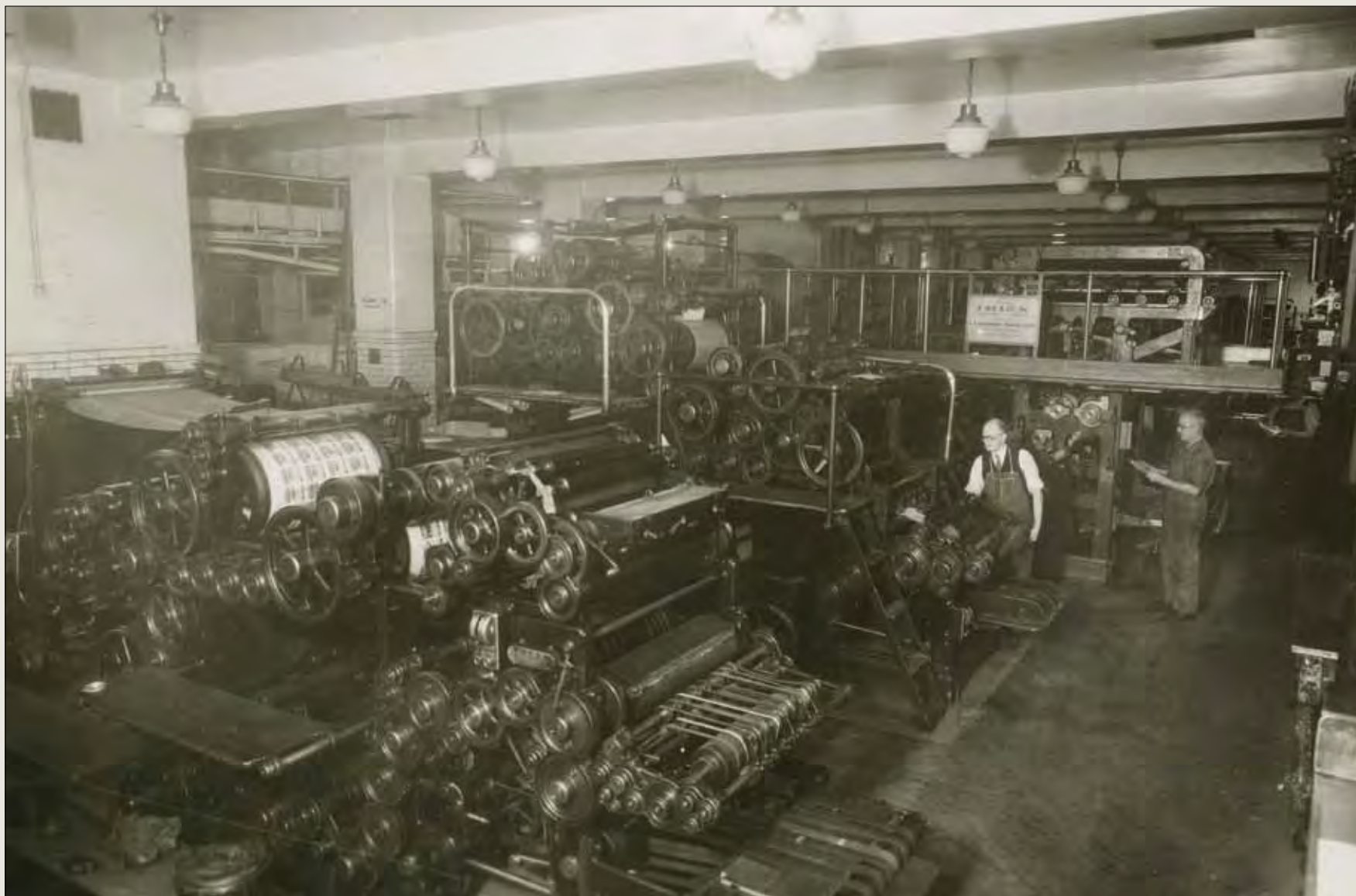
Rarely did GPO purchase just one of any press. These are sheet-fed cylinder presses. Photo circa 1930.
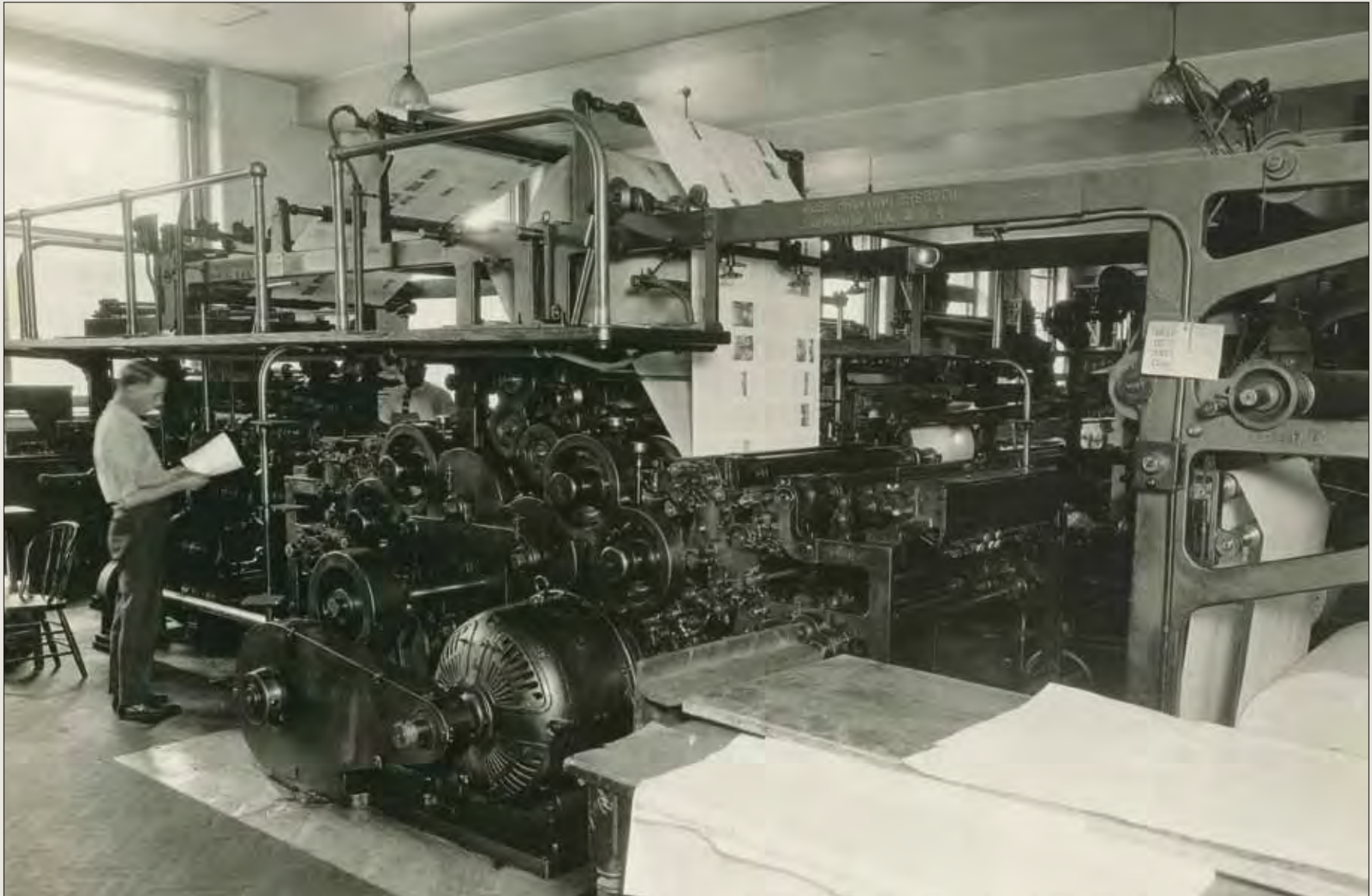
As machines grew in complexity and capability, they grew in size as well. These are Web-fed presses, probably about 1920.
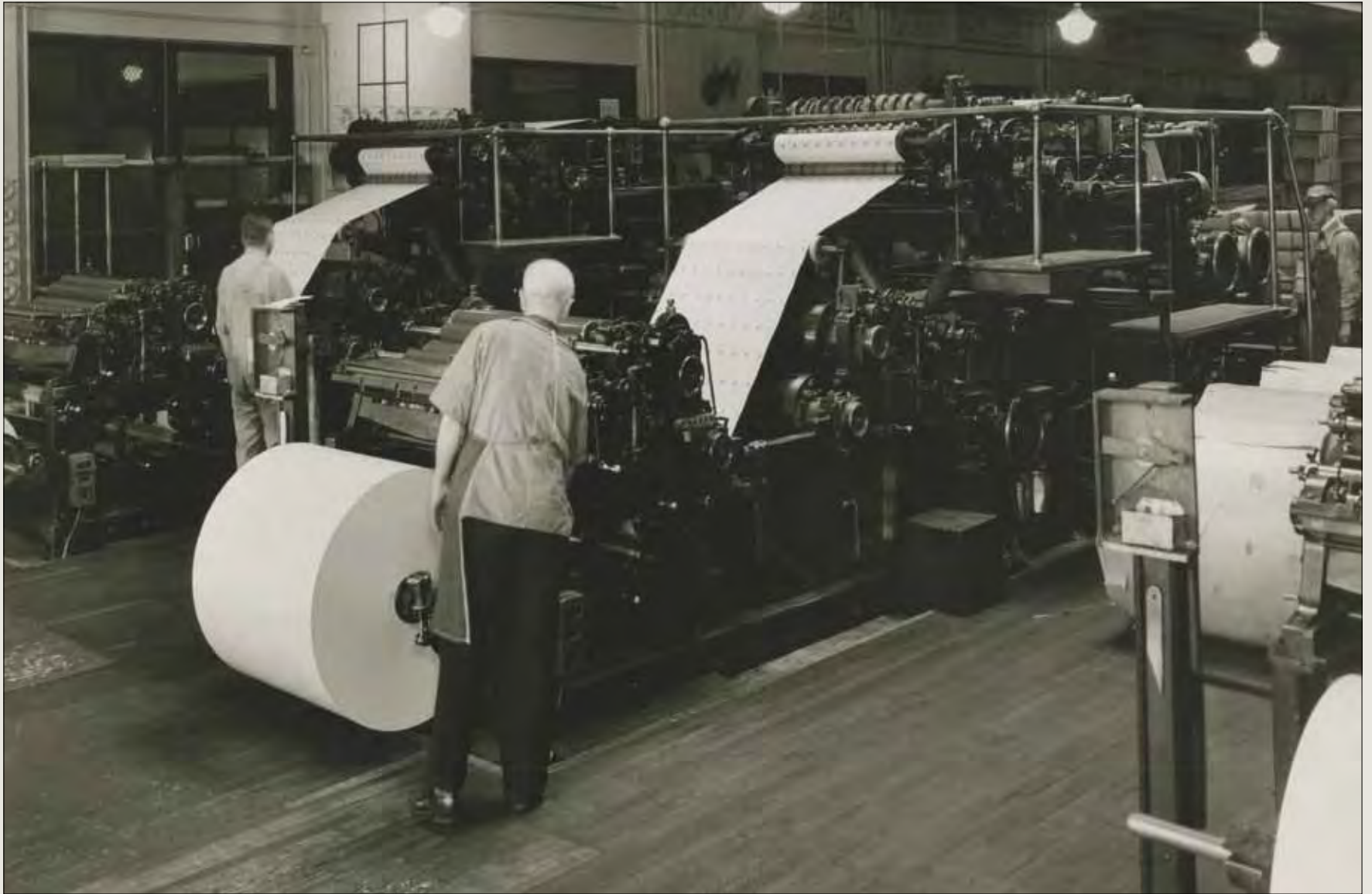
These presses printed money orders for the Post Office Department in Building 4, about 1950.

Some of the web-fed presses in GPO's Main Pressroom in the 1930s. Many of these machines were as large as a Washington studio apartment.
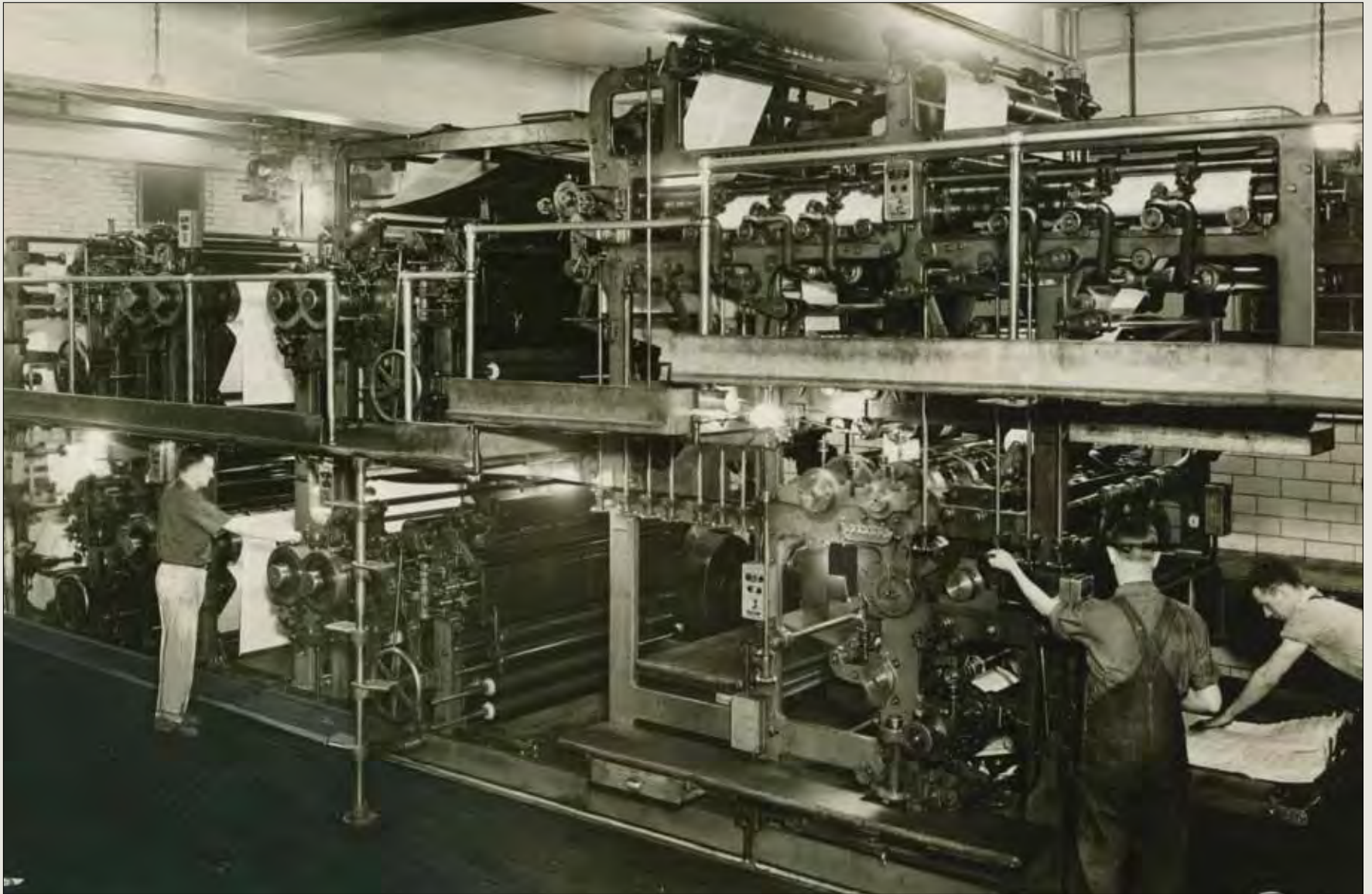
The center of attention in the Pressroom from 1873 onward were the generations of presses primarily occupied with printing the *Congressional Record*. These presses were used in the 1930s…
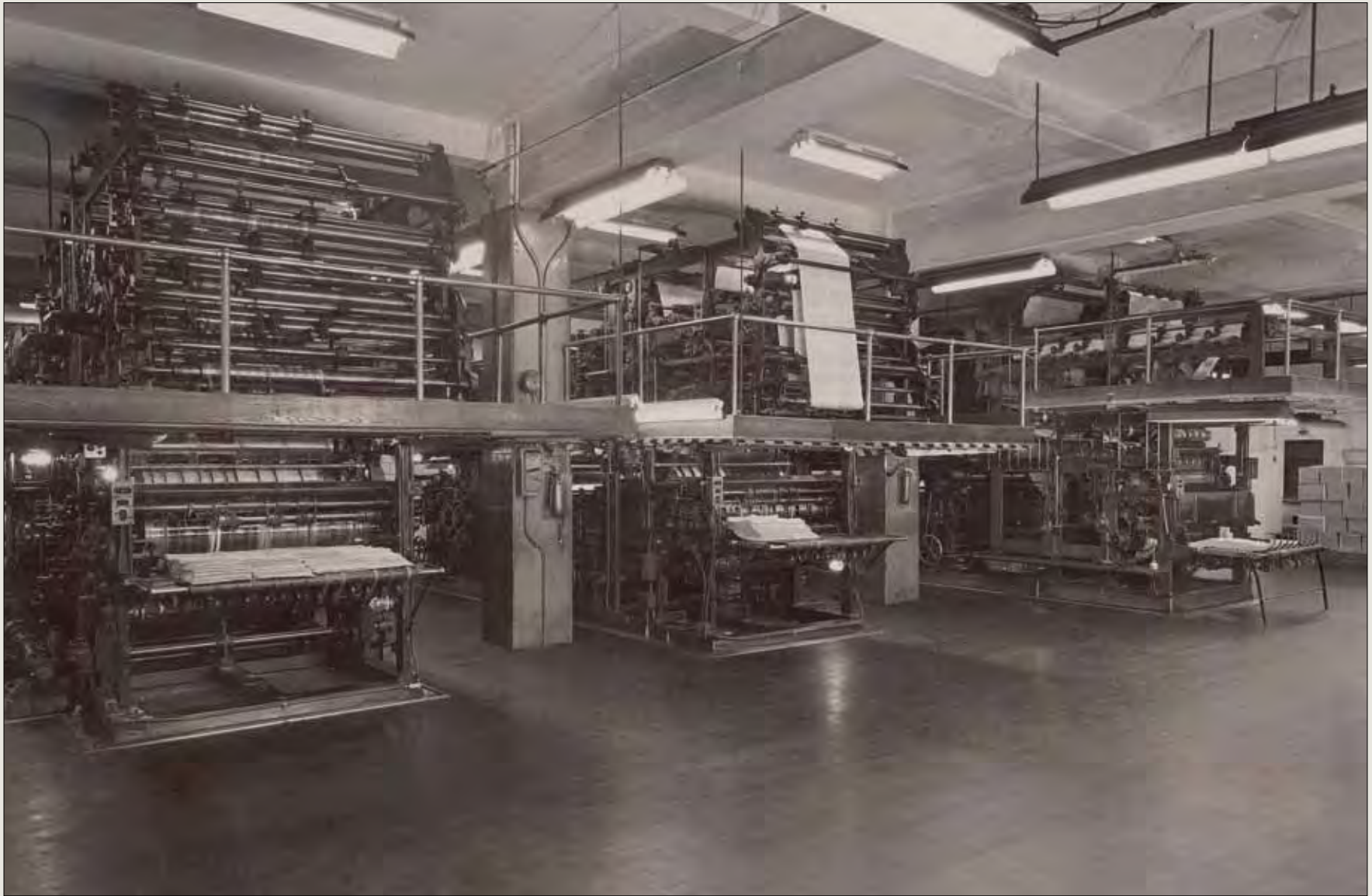
… and these were the next generation (still letterpresses) in the 1950s.

The capabilities of presses extended well beyond simply putting ink on paper. Presses could fold, emboss, score, or cut, and sometimes do simple stitched binding. This photo from the 1960s shows issues of either the *Congressional Record* or *Federal Register* coming off the press bundled, wrapped, and ready for mailing.
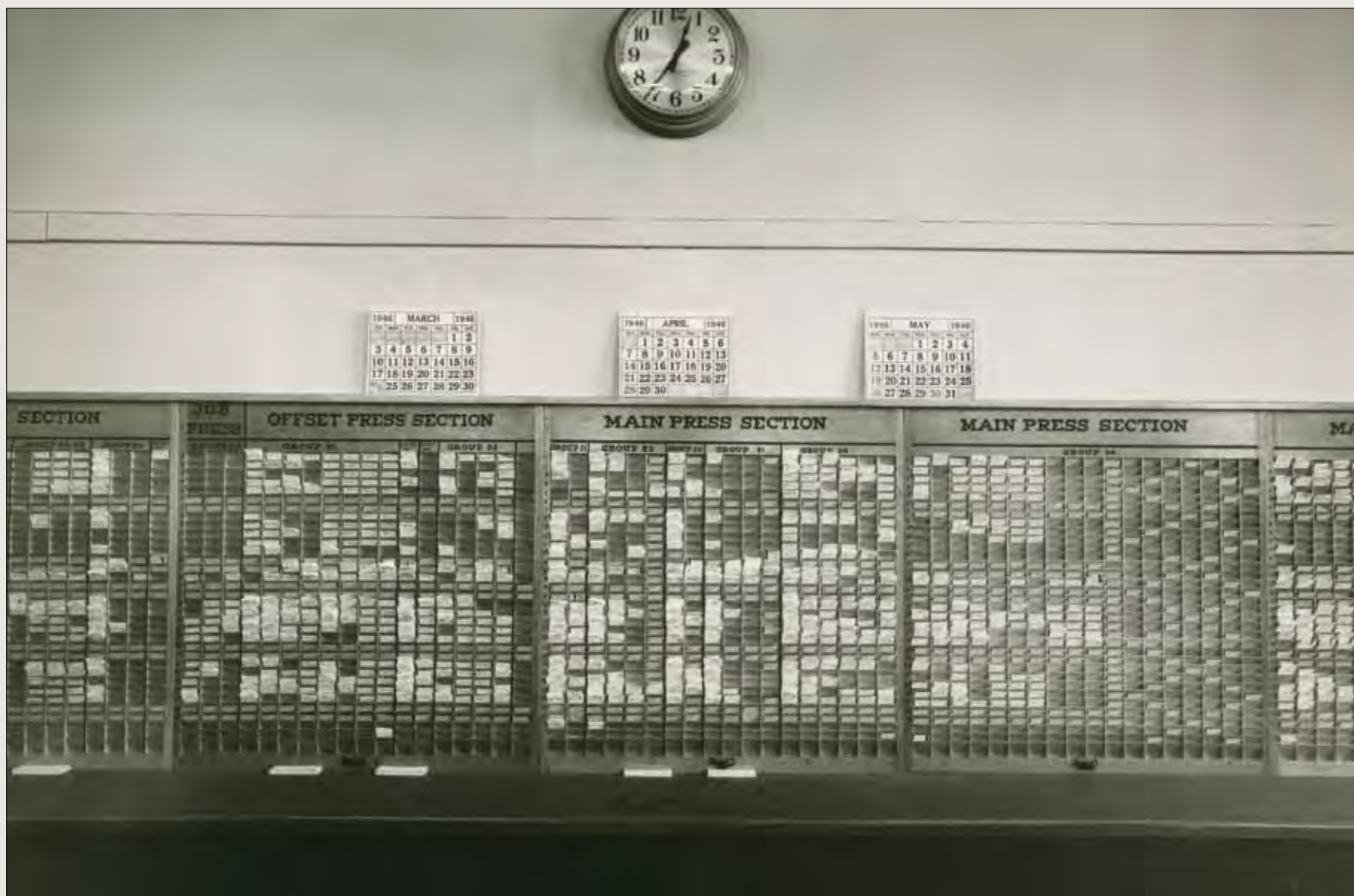
A mind-boggling amount of work passed through the GPO pressrooms every week. Schedulers in the plant had to arrange jobs for the presses that would do the work most efficiently, and ensure that work was moving through the plant smoothly. These giant tote boards were used to track what work was queued up for what press at any given moment. Photo circa 1940.

In the early years of the 20th century the next huge technological breakthrough after machine typesetting was offset printing, in which an impression of the imposed page was transferred to a photosensitive plate, which then transferred ink to a rubber blanket from which the paper was printed. It was a process that speeded up production and extended pressruns, but because of the vast size of GPO's plant investment, and skepticism on the part of printers about the quality of the product, it only made inroads during and after World War II. Here offset plates are being prepared, during the 1950s.

Offset was a photographic process. The page forms were prepared from photographic negatives, which were assembled by special compositors called Negative Strippers, seen at work here in the 1950s.
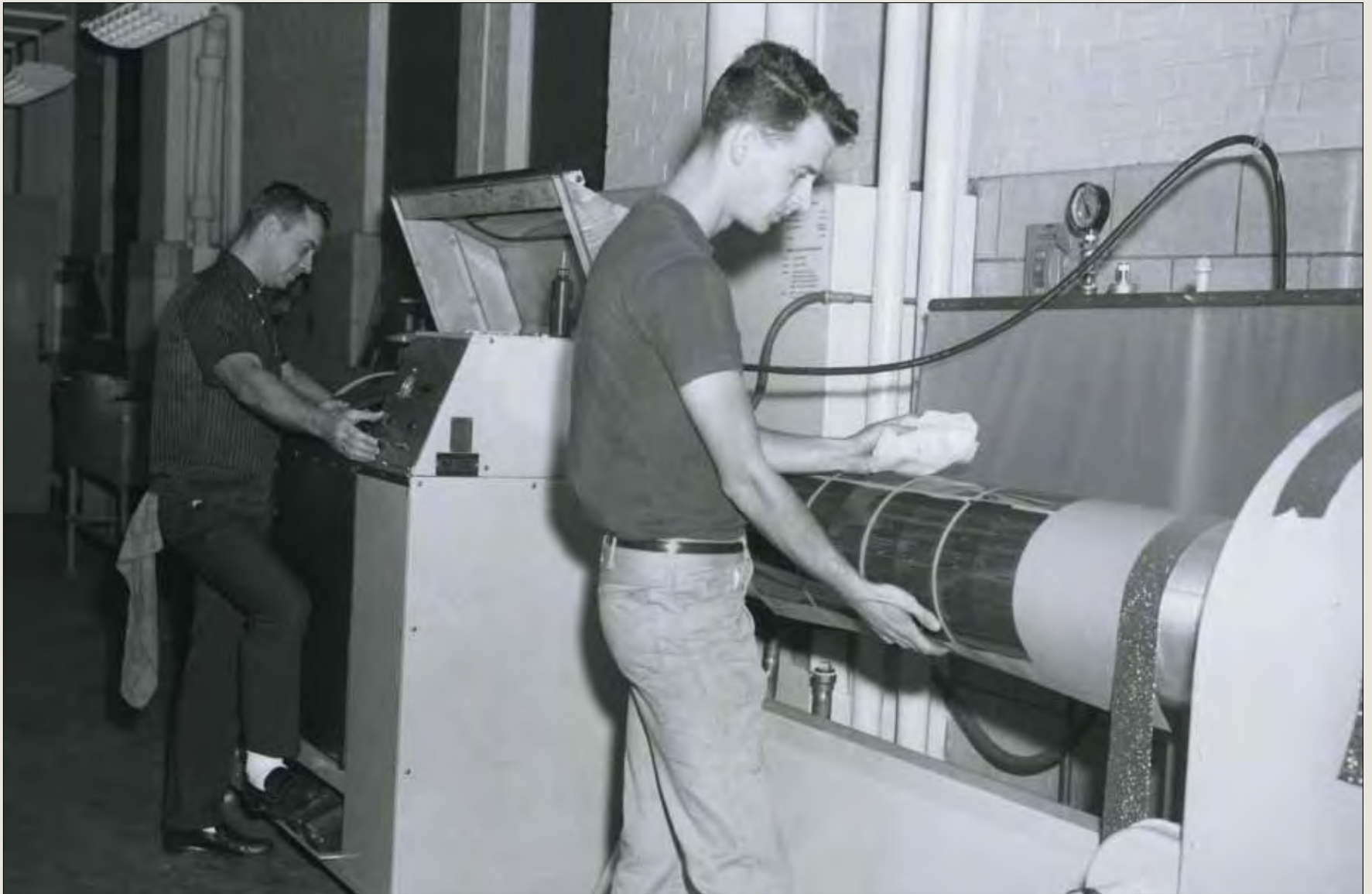
Offset plates being developed during the early 1960s. The apprentice in the foreground, Robert Schwenk, would later become GPO Production Manager.

Offset technology opened the way for later developments in electronic typesetting, as machines that cast type were gradually replaced by machines that produced various kinds of photographic output. The machine in this photo from the 1950s composed very primitive photographic type from punched tape.
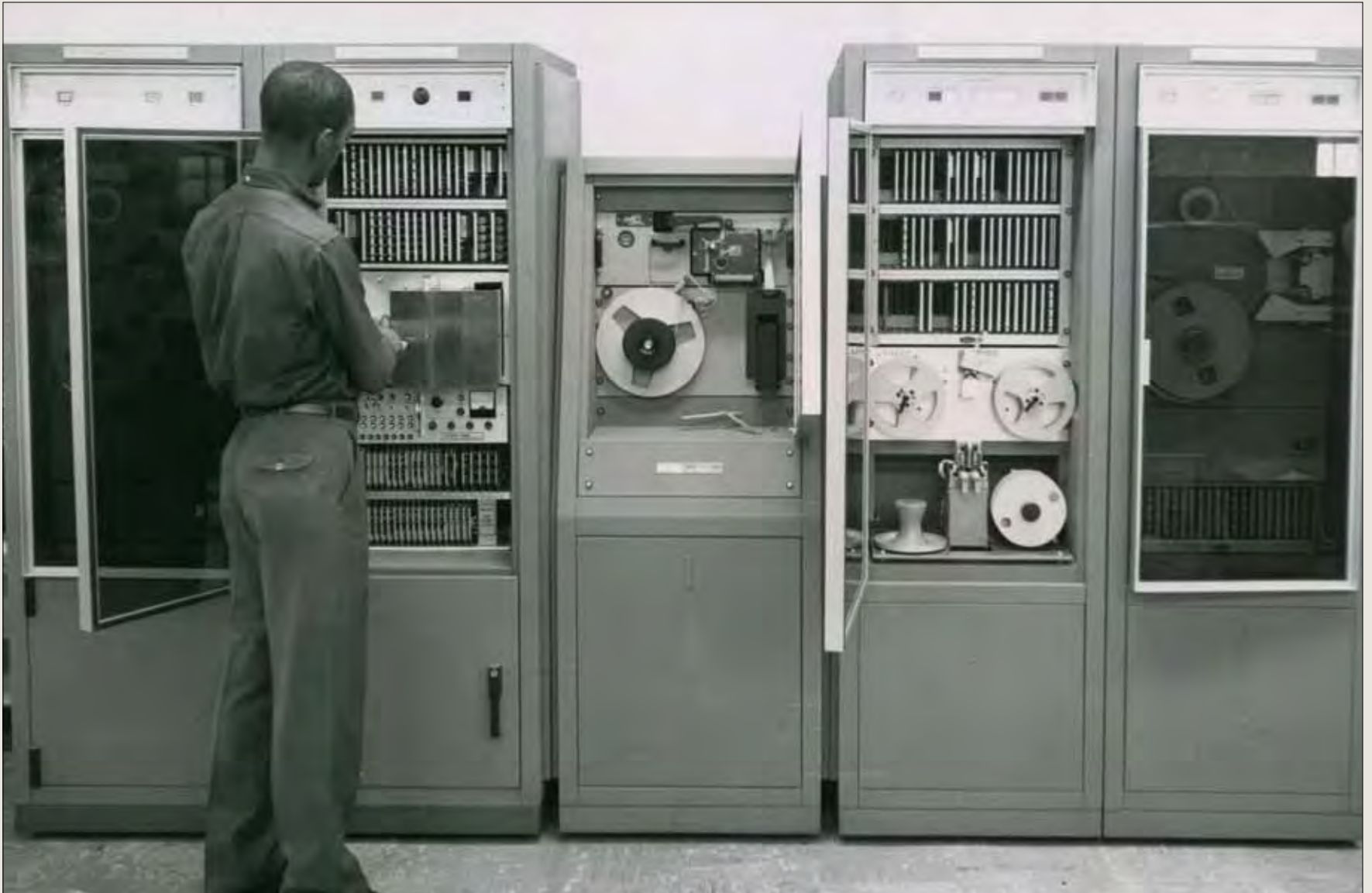
GPO's first large-scale venture in photocomposition was a system developed jointly by GPO, the Mergenthaler Company, and CBS Laboratories. Dubbed "Linotron" it composed pages from magnetic tape input at a rate that took the hot metal measure of "lines per minute" the next step, to "pages per minute." It was introduced in 1967.

By the 1980s, hot metal typesetting at GPO was on its way out. Linotype and Monotype compositors were retrained, and the shift to offset continued. In 1979, the *Congressional Record* began to be printed from offset plates derived from Linotype forms. On January 6, 1982, the last issue printed from Linotype composition was sent to press. Hot metal production ended completely in 1985. These compositors are correcting the last pages of the *Record* set in hot metal.

Since the introduction of Linotron in 1967, GPO has seen many generations of computer composition systems, in most cases either developed or greatly expanded by in-house programmers. This is the Video Keyboard Section in the 1980s (a descendant of the Monotype Keyboard Section of 60 years earlier).

Publishing agencies or GPO planners might decide that the composed pages should be retained in the Plate Vault, in case additional copies were required. Here galleys are stored in special steel racks. Photo circa 1920.

In this photo from the 1930s, composed plates are logged before being stored in the Plate Vault.