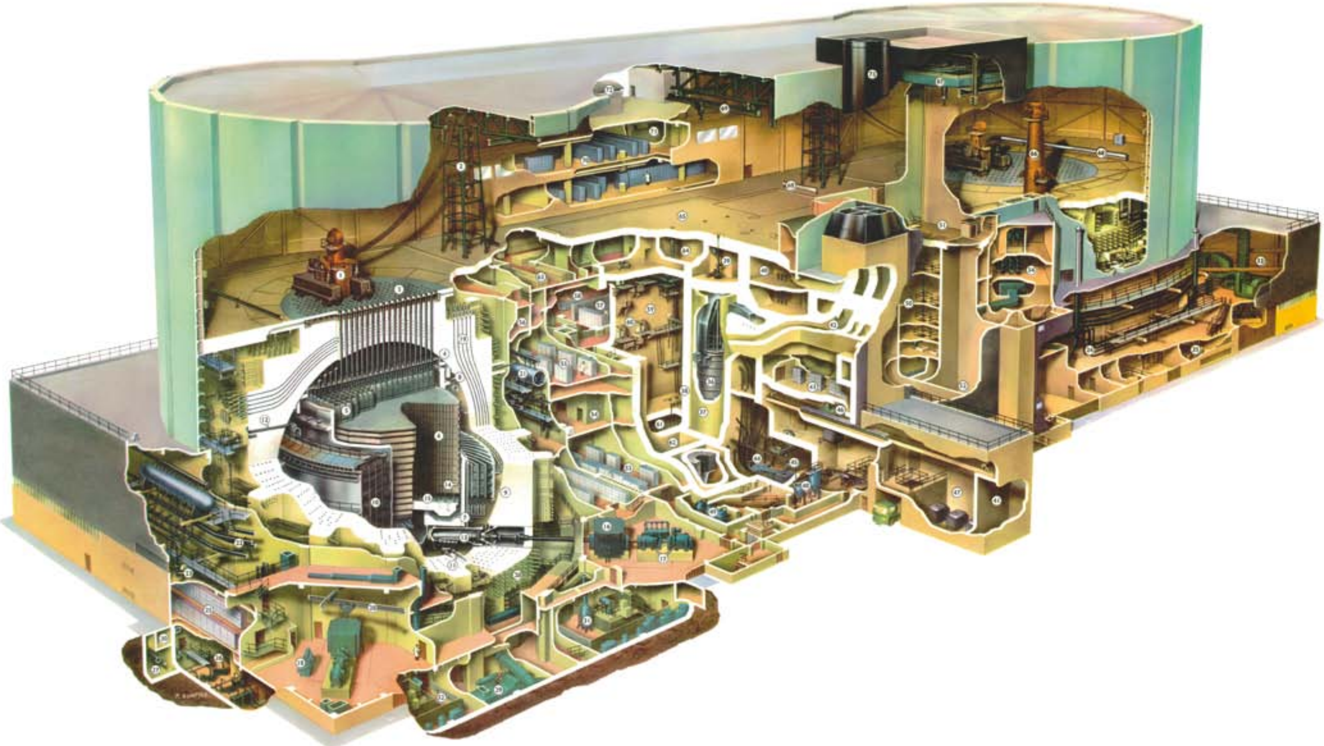
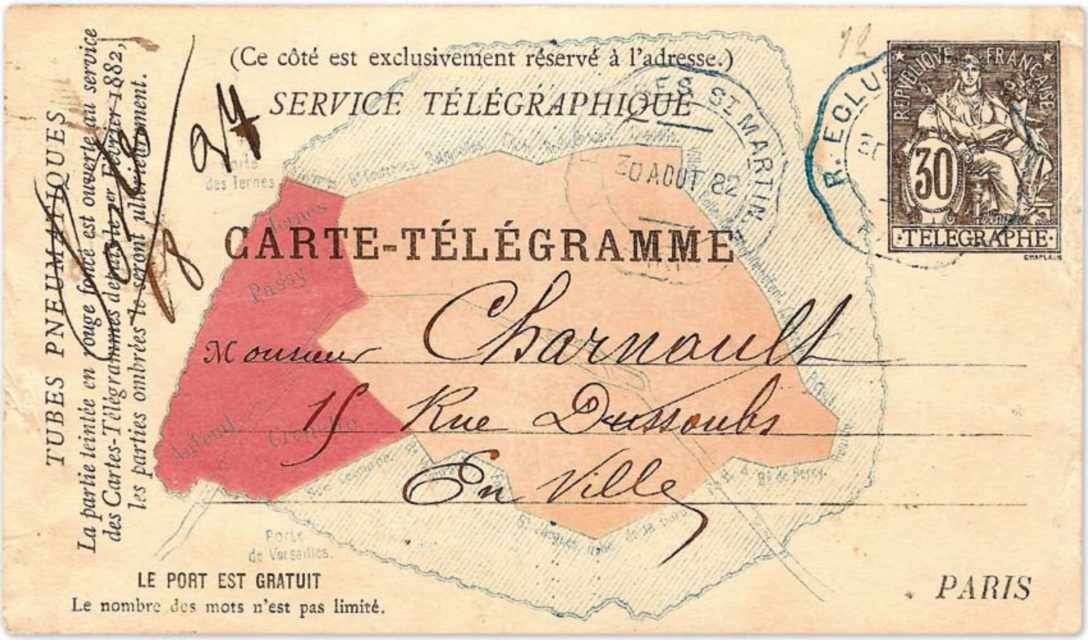
Cabinet

A QUARTERLY OF ART AND CULTURE
ISSUE 41 INFRASTRUCTURE





Piece of mail delivered by pneumatic post, August 1882. The map of Paris shows in red an area of the city that had begun to receive the service earlier that year. Note the legend at bottom left stating that there are no limits to the number of words that the sender can write on the reverse.

INTERFACING WITH THE SUBTERRANEAN

MOLLY WRIGHT STEENSON

Near the end of François Truffaut's 1968 film *Stolen Kisses*, a heartbroken Antoine Doinel walks in the shadows alongside a post office in Paris. He passes by the slot for stamped mail, dropping a farewell letter to Madame Tabard into the slot marked PNEUMATIQUES. "I'm an impostor of the worst kind. I dreamed that a feeling might exist between us," his voiceover says as his fingers release the letter into the mail slot. It slips into the post office. A hand picks it up, puts it on the desk. As Antoine says "Adieu," another hand cancels the stamp on the envelope: bam, bam.

"Pneu. Ma. Tique," says Antoine.

His letter is sealed in a brass canister and dropped into the pipes of the pneumatic post. With a hiss of air, the canister rattles through the rusty iron tubes on the ceiling of underground vaults. Blue street signs announce the avenues above. The pneumatic tubes loudly exhale the canister. The montage ends with Madame Tabard's red-lacquered fingernails opening the letter.

. . .

Introduced to combat the shortcomings of the telegraphic network in Paris, the subterranean Poste Pneumatique (Pneumatic Post) moved physical messages under the streets of Paris from 1866 until 1984. Its network lined the interior of the vaulted grand sewers built during Baron Haussmann's regime during the Second Empire (1852–1870) and delivered physical messages across the city and to the suburbs faster and more reliably than the telegraph. What first began in 1866 as a private one-kilometer line between Paris's stock exchange and central telegraph office expanded to six stations and was made available for public use in 1879. By 1907, it reached all *arrondissements* and nearby suburbs, contained 210 kilometers of underground tubes, and annually handled approximately nine million "postal telegrams," so-called because they were treated with the urgency of a telegram and handled administratively by the telegraph division of the postal service (the two agencies had merged in 1878). At its height in 1945, the Parisian pneumatic tube network was the largest in the world, encompassing 450 kilometers and processing twelve million objects.[1] It began to decline through the 1960s and closed in 1984, thanks to reliable telephone and, later, telefax services.

But Paris was not the first city to employ pneumatic tubes in this way. First implemented in London in 1853, the technology quickly spread. Berlin began its *Rohrpost* in 1865, Vienna in 1867, and Marseilles in

1894, followed by most other major European cities. Brazil, Argentina, and Australia introduced tubes not long after. Philadelphia and New York implemented pneumatic tube service for first-class letters in 1893 and 1897, respectively, and a pneumatic tube line ran over the Brooklyn Bridge. Urban pneumatic tube installations existed for a surprisingly long time, remaining in operation until 1953 in New York and even 2002 in Prague (where the system was taken out of service only after a flood destroyed much of the tube infrastructure). They have also long operated as internal conduits for paper and other material in post offices, department stores, and warehouses, and are still manufactured and used for this purpose today in hospitals, banks, stores, and libraries. (In fact, in a particularly serendipitous moment, some of the research requests for this very article traveled by pneumatic tube in the New York Public Library.)

The renovation of Paris provided the foundation for a boom in communication and financial services supported by the infrastructure implemented during Haussmann's regime. His scheme included rebuilding the sewers so that they were vaulted, easily accessible, and hygienic. Starting in 1860, insulated telegraph wires lined the vaults of the sewers, along with conduits for potable water, electrical cables, gas, steam, and eventually, the Poste Pneumatique.[2] Wrote Louis Figuier, a historian of science who chronicled the industrial wonders of the nineteenth century, "Today, the Poste Pneumatique is perfectly organized in Paris. The pipes of the pneumatic post of Paris have found a comfortable and safe asylum in the vaults of the sewers."[3] He continued:

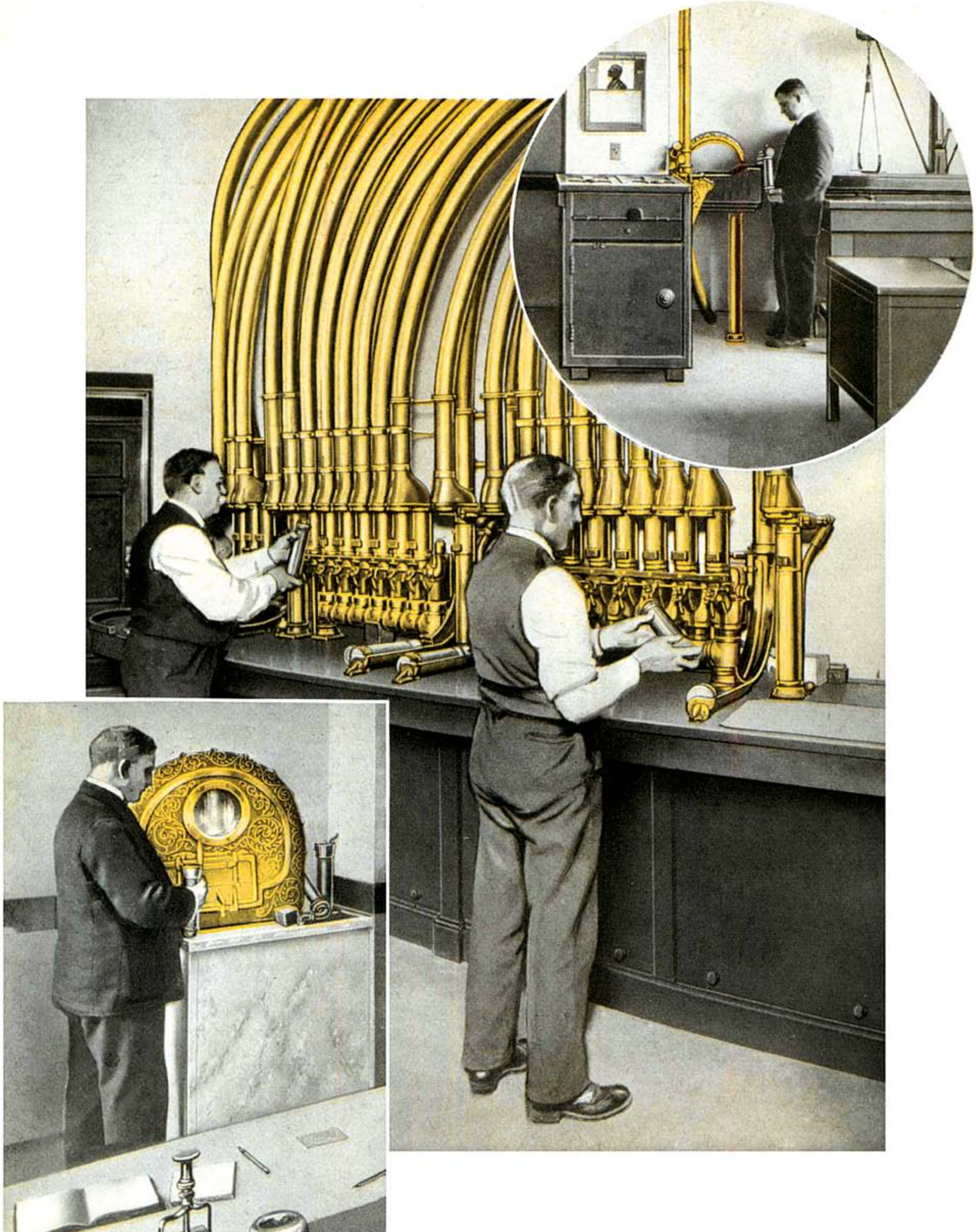
This vast pipeline that runs through the depths of the Parisian subsoil does not only contain the revolting stream of sewage in the sewers. It also receives the pipes for water distribution, the wires of the underground telegraph, and the bundles of telephone conductors. The tubes of the pneumatic post have also come to join them. Paris is the only city in the world with this magnificent subterranean construction, which meant, initially, receiving the stream of impure greywater, the litter of the ateliers, and the sludge from the street, but eventually giving shelter to the new devices science has created for the greater welfare of the inhabitants of the cities.[4]

He anticipates what Rosalind Williams would write a century later in her *Notes on the Underground*: by burying canals, sewers, and urban infrastructure, cities could operate as a "unified system."[5] This new, united physical infrastructure of the late nineteenth century allowed for recently introduced transactional products like commercial billing, newspaper subscriptions, money orders, parcel post, and the National Savings Bank to circulate at the speed of steam through the city. In the Paris of the late nineteenth century, regulated subterranean systems transformed the underground world into a controlled, clean, and orderly network—information technologies realized in iron and brass.

. . .

An 1888 map entitled *Carte du Réseau des Tubes Pneumatiques de Paris* shows a 160-kilometer network that had grown from its initial course to a "modest development of 33 kilometers" by 1878.[6] The map shows telegraph offices and compressed air production facilities marked within an urban boundary drawn in the same manner as a medieval city wall, the pneumatic dispatch lines rendered as single or double lines showing their directionality, and the pipes that delivered air to support the network. The densest area of the map reinforces the importance of the stock exchange to the communication network of Paris. The Parisian Poste Pneumatique circulated on a fixed schedule through polygonal circuits (marked by letters on the *Carte du Réseau*) organized around primary telegraph installations. The polygonal model offered greater control and *surveillance*, a word the Postes et Télégraphes frequently used in descriptions of postal organization.[7] Berlin, by comparison, used a radial model, in which pneumatic postal installations sit at the end of spokes that relay their messages into hubs.[8] Where a radial organization meant greater convenience to a postal customer, the polygonal network cost less to run.[9]

Attraper un bleu—catching a blue—meant to receive a message via Poste Pneumatique, because of the folded blue stationery (known as *petit-bleu*) originally required for messages sent through the network. Official stationery, mandatory until 1898, declared rules pertaining to content and geographical boundaries, among other things.[10] As long as the sender only wrote on the provided paper and did not introduce other objects, he or she could write as many words as would fit. Since the pneumatic tube network served as an auxiliary system to the telegraph and not the post, its messages were officially handled as telegrams, but they moved across organizational boundaries as required to support the fastest communication speed. The physical, non-electrically transmitted nature of the messages made them seem more like postal objects: senders wrote on paper—and, later, postcards—and



affixed stamps that the Poste Pneumatique cancelled. Messages sent through the pneumatic system transferred from the telegraphic to the postal network when required; if, for instance, a pneumatic message did not meet regulations because it was too heavy, written on improper stationery, or carried incorrect postage, it was transferred to the postal service, where it would be processed as a conventional letter and levied a fee for the trouble. Conversely, if dropped in a standard mailbox, a *petit-bleu* was transferred to the telegraph desk when it arrived at the post office and proceeded through the pneumatic tube network. For the final leg of its journey to the recipient, the pneumatic missive was given to a *petit facteur télégraphiste*—a telegraph delivery boy—who would deliver it on foot. (In the late 1890s, bicycles began to be used, and, eventually, motorcycles.)

Accounts of the Poste Pneumatique dwell on the ingenuity of the sending and receiving devices in the Post and Telegraph offices. The *tubiste*—the Poste Pneumatique postal worker—pulled forward a lever, opening the connection to the lines of air. He cranked open a sealed door in a brass box sitting atop a set of air pipes. He removed any cylinders that arrived for his station, adding cylinders with his station's dispatches by dropping them lengthwise into the tube and closing the brass door. To send the canisters, he first turned a wheel that created a vacuum and then another to apply compressed air to push them through the tubes, ringing an electric bell to alert the next station of the departure. Receiving a message worked in a similar manner: having heard an electric bell announcing the departure, the receiving *tubiste* in turn rang his electric bell when he felt *le bruit de choc*—the noise of impact—as the tube arrived into the chamber. He then closed the air valve, opened the brass box, and removed the cylinders.[11]

Like pistons in the engine of the pneumatic post, each iron-sheeted pneumatic tube cylinder was 4.5 cm in diameter, sheathed in durable leather, and sealed with natural rubber to keep the missives inside from getting damp. A carrier held thirty to thirty-five messages and weighed 350 grams when full.[12] Five or six cylinders formed a train (a metaphor used in almost every account of pneumatic post) that departed every three minutes to the Hôtel des Postes or stock exchange, every five minutes to the primary networks, and every fifteen minutes for the less important networks. As the most important and busiest stop on the network, the Place de la Bourse (Paris's stock exchange) exchanged more traffic than any other on the pneumatic post network, with twelve paired machines for sending and receiving, compared with the usual one or two pairs for most offices. Every three months, the direction changed so as to keep dirt from accumulating in the tubes.[14]

Pneumatic systems breathe. Air compression required inhaling and exhaling pumps powered by gigantic steam engines, such as those in the basement of the Hôtel des Postes, completed in 1884. The primary set operated from seven am until eleven pm, the secondary stood by in case of outage, and, during the night, a slower, water condensation engine provided the necessary compressed air for late arrivals and pneumatic dispatches to and from the suburbs. In another room, four nineteen-meter-long tanks stored the air for the system.

The Poste Pneumatique was prone to errors and accidents. Charles Bontemps, an engineer in the French postal service who worked on the Poste Pneumatique from its earliest days, wrote of the system: "Amongst the special causes of accident may be mentioned, the accidental absence of a piston within the train, breaking of the piston, the freezing up of a piston in the tube, and even forgetting the presence of a train, which has caused the entire service to be one train late throughout the day."[15] The means of correcting such problems merited equal treatment in his description. "Intimately connected with the working of the tubes is the removal of obstructions which occur from time to time, causing not infrequent serious inconvenience and delay," wrote Bontemps.[16] Ordinarily, to clear a blockage, the *tubiste* reversed air pressure and drew the carrier back to the station.[17] For the cases where that did not work, Bontemps created another mechanism: the *tubiste* fired a pistol into the tube, which created a sound wave that traveled at 330 meters per second to the location of the obstructed tube. The wave reverberated upon a rubber diaphragm, completing an electrical circuit. A recording cylinder marked the vibration of the diaphragm from the electrical contact and a chronograph counted the time in seconds on the cylinder. By reading the sound waves and second markings and applying a simple formula, the engineer calculated the location of the obstruction within two meters. Accessing the blockage required making a trip to the sewer near the blockage, opening the closest flange in the tubes, and removing the stuck receptacle. It was a better state of affairs than the situation in Berlin, where "large quantities of liquid spirits of wine were introduced into the tubes for the purpose of detaching the ice from the walls of the tubes."[18] Beyond such measures, excavation was required.

opposite: Page from the Boston-based Lamson Company's brochure advertising Lamson pneumatic tubes for conveying papers and merchandise, ca. 1920.

The material elements of the steam-age Poste Pneumatique represent what Sigfried Giedion extolled as "construction." "Construction based entirely on provisional purposes, service and change is the only part of building that shows an unerringly consistent development," he wrote.[19] It characterizes the work of nineteenth-century French engineers working with iron: not the Beaux-Arts stylings of stone, but rather the iron backbones of production, commerce, and transportation.[20] "If a comparison is permitted," he wrote, "iron suggests both muscular tissue and skeleton in a building ... lead[ing] to new laws of design."[21] By turning the vertical musculature and skeletal tissue of iron construction into a horizontal infrastructure, structure and support become circulation. Baron Haussmann's renovation scheme for Paris is at its most original, wrote architectural and urban historian Françoise Choay, "in the dual concept of a circulatory and respiratory system."[22] Circulation meant societal advancement, wrote Wolfgang Schivelbusch in *The Railway Journey*. "The formula is as simple as can be: whatever was part of circulation was regarded as healthy, progressive, constructive; all that was detached from circulation, on the other hand, appeared diseased, medieval, subversive, threatening."[23] By this token, the pneumatic tube network is a system that breathes, eats, circulates, fires synapses, and excretes; its structures are lungs that store air, pumps that move their charges, circuits that fire electrical impulses, devices that read them, mouths that swallow, and cloacae that expel. Giedion asks, "Is construction something external?"[24] In answer to the pneumatic tubes, we might instead say that it is at once intrinsic and holistic, with bowels and orifices to serve different publics—and privates.

If "history passes through the sewers," as Victor Hugo wrote in *Les Misérables*, then perhaps modernity passed through the pneumatic tubes. In the Poste Pneumatique, we see a constellation of elements that create a physical image of a bodily engine or locomotive, forged in iron and brass, powered by steam and air, hurtling pistons and trains through its circulatory systems. A physical auxiliary to the electric telegraph, its materiality supports the exigencies of communication, speed, and commerce. In the nineteenth-century construction of the Poste Pneumatique, the future took shape.

The author wishes to thank Brigid Doherty, Ed Eigen, Spyros Papapetros, Alexis Cohen, Brady Forrest, and Ana María León.

1 Anne-Laure Cermak and Elisa Le Briand, "Le Réseau avant l'Heure: La Poste Pneumatique à Paris (1866–1984)," in *Les Cahiers Pour L'histoire De La Poste* (Paris: Comité pour l'Histoire de La Poste, 2006), p. 97.
2 Ibid., p. 21.
3 Louis Figuier, *Les Merveilles De La Science, Ou Description Populaire Des Inventions Modernes* (Paris, 1891), p. 511. Author's translation.
4 Ibid.
5 Rosalind H. Williams, *Notes on the Underground: An Essay on Technology, Society, and the Imagination*, new ed. (Cambridge, Mass.: MIT Press, 2008), p. 70.
6 Figuier, op. cit., p. 515.
7 Architect Julien Guadet stated the need for surveillance in his design for the Hôtel des Postes (1880–84). See "Conférence sûr le nouvel Hôtel Des Postes," in *Mémoires et compte rendu des travaux de la Société des ingénieurs civils*, no. 45 (1886), p. 523.
8 Sandra L. Arlinghaus, *Down the Mail Tubes: The Pressured Postal Era, 1853–1984* (Ann Arbor: Michigan Document Services, 1986), p. 9.
9 Ibid., p. 32.
10 Figuier, op. cit., p. 515.
11 Ibid.
12 Charles Bontemps, "Experiments on the Movement of Air in Pneumatic Tubes," in *Minutes of the Proceedings of the Institution of Civil Engineers*, no. 43 (1876), p. 122.
13 Figuier, op. cit., pp. 513–514.
14 Bontemps, op. cit., p. 131.
15 Ibid., p. 134.
16 Ibid.
17 Ibid., p. 132.
18 US Postmaster General Annual Report, US Post Office Department (Washington, DC: 1891), pp. 152–154, quoted in Arlinghaus, op. cit., p. 12.
19 Sigfried Giedion, *Building in France, Building in Iron, Building in Ferroconcrete* (Santa Monica, CA: Getty Center for the History of Art and the Humanities, 1995), p. 87.
20 Ibid., p. 94, p. 100.
21 Ibid., p. 101.
22 Françoise Choay, *The Modern City; Planning in the 19th Century* (New York: G. Braziller, 1970), p. 19.
23 Wolfgang Schivelbusch, *The Railway Journey: The Industrialization of Time and Space in the 19th Century* (Berkeley: University of California Press, 1986), p. 195.
24 Giedion, op. cit., p. 87.