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Mail tubes: the modern communications system of the nineteenth century

Pneumatic mail tubes were a wholly American creation. For about 60 years from 1893, they were used to transfer in bulk many millions of letters annually between sorting offices within several US cities. The scale of their engineering made them quite distinct in their construction and operation from the systems using small-diameter tubes, such as the British Post Office street tubes for carrying telegrams or the Paris *réseau pneumatique*. These used lightweight carriers, made originally of gutta-percha or similar material, which could hold at most only a few dozen messages. In contrast, the American mail tubes comprised underground tubes usually 8 in (206 mm) in diameter, along which were blown heavy steel carriers, each containing about 500 letters, at 10-second intervals.

The first pneumatic tubes

The first true pneumatic dispatch tube was laid down in London in 1853/54 by the Electric and International Telegraph Company between its offices in Founders Court, off Lothbury in the City of London, and the Stock Exchange, a distance of about 675 ft (206 m).[1] It was designed by the company's engineer, Josiah Latimer Clark (1822–98), and was a single tube 1.25 in (32 mm) in diameter from which the air was exhausted by a steam-driven pump in the basement of the telegraph office. It enabled carriers containing telegrams to be drawn from the Stock Exchange for onward transmission by wire, and supplemented the electric telegraph instruments that had just been installed there. The tube operated in one direction only, the carriers being returned by hand. Larger tubes 2.25 in (57 mm) in diameter were introduced in 1858, when it became possible to use compressed air to blow the carriers in the opposite direction, and expansion of the system was begun.[2] In 1870 the private telegraph companies were taken over by the Post Office, which continued to extend the London network and introduced the system to many other British towns and cities. Similar systems were introduced in Paris, Berlin, Vienna and other European cities, and to a smaller extent in the USA. The *réseau pneumatique* was rather different from the London system. Post offices in Paris were connected together in long out-and-back loops, with many intermediate stations where carriers could be inserted or

removed. In London nearly all branch telegraph offices on the system were connected directly to the Central Telegraph Office, with only a few intermediate stations, and the smaller systems in the other British towns were similarly arranged.[3]

Systems working at lower pressure, called house tubes, were installed for internal communication within the telegraph offices. This type of small-bore pneumatic tube was adopted in the United States from the mid-1880s onwards for speeding cash transactions in department stores and subsequently for inter-office communication.[4]

The idea of transmitting bulk consignments was a tempting objective, but required engineering on a more massive – and expensive – scale than small tubes. In London, the Pneumatic Despatch Company constructed in 1863 a large-bore asymmetric subway about 31 in (787 mm) in height between Euston railway station and the Post Office's North-Western District Office in Eversholt Street, a distance of about 1800 ft (656 m). Bulk mail was conveyed in wheeled containers until 1866.[5] This was considered by the company to be successful, and in 1866 it began construction of a larger pneumatic subway, about 4 ft 6 in (1.37 m) wide by 4 ft 1 in (1.24 m) high, to connect Euston with the Post Office's principal sorting office in the City of London, a distance of about 2 miles (3.2 km). After some delay it was brought into operation along its full length at the end of 1873. The Post Office made little use of it, largely because the massive wheeled carriages took too long to load and unload, nullifying the speed advantage, and service was discontinued after 31 October 1874.[6]

Moving the mail

It was in the United States, perhaps inevitably, that the first commercially successful large-scale pneumatic tubes were developed. From 1861 John Wanamaker of Philadelphia had built up one of the world's largest department stores, which in 1880 pioneered the use of pneumatic tubes for store service.[7] Wanamaker became US Postmaster-General in 1888 and began to urge their use for postal purposes.[8] As a result, the US Package and General Pneumatic Company was formed in Philadelphia in 1892. Its mechanical engineer was Birney C Batcheller (1865–1950), a graduate of Massachusetts Institute of Technology who had subsequently worked on designs for pneumatic artillery.[9] He designed the equipment for the initial experimental mail-tube line which ran from Philadelphia's general post office to a branch office about half a mile away. Tubes about 6 in (152 mm) in diameter were employed, through which ran carriers 18 in (457 mm) long by 5 in (127 mm) in diameter. A separate company, the Pneumatic Transit Company, was established to run the contract to operate the tubes. A formal opening ceremony took place on 17 February 1893 and service began on 1 March (Figure 1).[10]

Figure 1 Comparison of carrier sizes, 1898. On the extreme left is a telegram carrier used in Berlin, and next to it a 3-in telegram carrier from the London system. To its right is a carrier used on the pioneer Philadelphia 6-in mail tube and on the extreme right is the standard 8-in carrier used for all later mail-tube systems. (Published in Transactions of the American Society of Mechanical Engineers *in 1899)*

Figure 2 Most mail tubes were buried under the streets, but the Manhattan to Brooklyn tubes crossed the East River over the Brooklyn Bridge. This is the approach to the bridge on the Brooklyn side. (Published in Transactions of the American Society of Mechanical Engineers *in 1899)*

The Philadelphia installation was considered to be satisfactory, but owing to the financial situation in the USA at that time no extensions were made. In 1896, however, the US Post Office was able to recommend finance to enable the Philadelphia system to be expanded, and for mail tubes to be established in New York and Boston. Service in each city was organised by local companies working under contract to the US Post Office. In New York a businessman and journalist, John Elmer Milholland (1860–1925), formed the Tubular Dispatch Company, which planned and operated the initial New York system. The first 0.7-mile (1.1-km) line opened with some ceremony on 15 October 1897, with an extension opening on 26 February 1898. Another tube, from New York general post office to Brooklyn general post office and routed over the Brooklyn Bridge, began operation on 1 August 1898. In Boston, the Boston Pneumatic Transit Company was privately financed by lawyer and businessman W E L Dillaway; tube service there began on 20 December 1897. An extension to the Philadelphia system opened on 7 April 1898. Taken together, the total USA route length was now just over 8 miles (13 km) (Figure 2).

What was carried in the tubes? Mostly it was first-class mail – letters and postcards – but almost anything could be sent, provided it fitted into the carriers. During a pre-opening test of the first New York tube on 7 October 1897, the first carrier dispatched contained a Bible wrapped in the stars and stripes, a copy of the United States Constitution and a copy of President McKinley's inaugural address. Another carrier sent on the same day contained a live tortoiseshell cat. But the tubes soon showed what they could really do. On 23 December 1898 one New York tube alone, that between Grand Central Station and the General Post Office, carried more than 1,000,000 letters, 18,000 circulars, 46,000 newspapers, 12,000 pieces of merchandise and about 17,000 pieces of miscellaneous matter.[11]

The equipment described

All these installations used equipment designed by the Batcheller Pneumatic Tube Company, which was the original 1892 company renamed.[12] Following from experience of operating the original Philadelphia installation, the internal diameter of the tubes was enlarged to 8⅛ in (206 mm). This made for a useful increase in the capacity of the carriers while still allowing for a full carrier to be lifted and handled by a single individual. The tubes themselves were specially made, unlike the 6-in tubes, which had been adapted from standard water pipes. They were laid in pairs, one for each direction of working, at a depth of about 4 ft (1.22 m). Bends were to a standard 8 ft (2.44 m) radius and were initially made of seamless brass tubing. These were difficult and expensive to manufacture and were found to wear unacceptably quickly. Later, a method was developed of making bends from cast iron.

The carrier used was a steel shell 23 in (584 mm) long and 7 in (178 mm) in diameter with two bearing rings made of a composition of cotton duck and rubber. At the rear end was a hinged door the full diameter of the carrier, and its capacity was about 500 letters. The normal speed of a carrier in the tube was about 50 ft/s (15.24 m/s), though manual redispatching during long runs brought down the average end-to-end speed. The weight of a loaded carrier was about 30 lbs (13.61 kg) and this meant that the methods of starting and, especially, receiving them was an entirely different proposition from the small and lightweight telegram carriers for which quite simple arrangements were sufficient. For mail tubes, compressed air at around 5 to 10 lb/sq in (35 to 70 kPa) was used, and with a loaded carrier travelling at about 30 mph (48 km/h) a great deal of energy needed to be dissipated to bring it safely to rest.

The transmitters and receivers, as they were called, were necessarily quite massive. In the 1890s the cradle transmitter was usually employed. It consisted of two short sections of tube mounted in a swinging cradle so that either tube could be swung into line with the

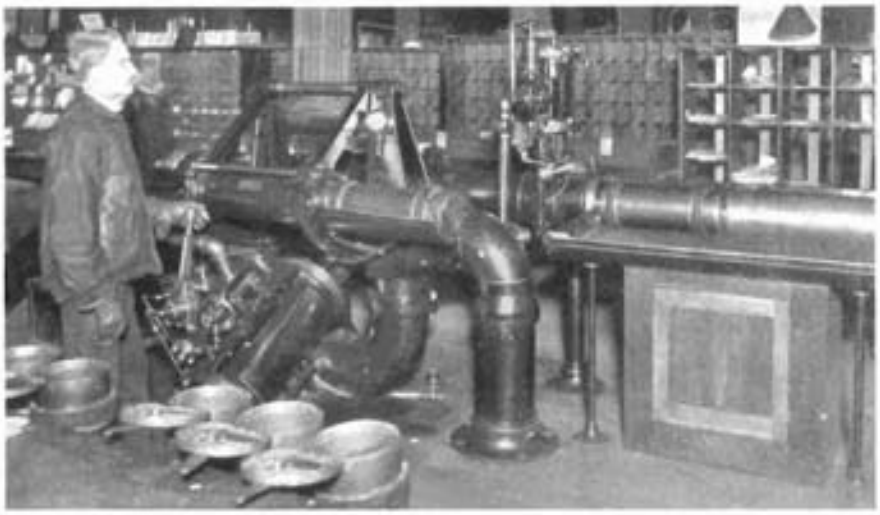

Figure 3 A mail-tube terminal at Boston, MA, general post office, 1898. Next to the operator is a cradle transmitter and, beyond it, an open receiver. (Published in Transactions of the American Society of Mechanical Engineers *in 1899)*

main tube, through which air flowed continuously. A loaded carrier was placed into the open-tube section and an air-operated piston pushed it into line with the main tube, where the airflow caught it. An oil-dashpot time lock provided sufficient headway, between 10 and 15 seconds, before the next carrier could be inserted. This was to ensure that the carriers did not catch up with each other, and to provide sufficient time for each carrier to be discharged at the receiving end. While the cradle was being swung the airflow was maintained through a bypass tube. The cradle transmitter was ergonomically rather an awkward design, and later the gravity transmitter was developed. In this the carrier was slid down a chute mounted at a lower level, past a counter-balanced flap into an airlock, being held on the slope by a second flap which was held closed by the air pressure beyond. Once the carrier was inside, the pressure in the airlock was automatically increased to the same pressure as the main tube, at which point the weight of the carrier pushed open the second flap. It then slid by gravity into the tube and was swept along on its way (Figure 3).

There were several types of receivers. At the end of the tube farthest away from the compressor, where the pressure was only a little above atmospheric, the open receiver was used. Here the end of the tube was closed with a sluice gate and air was allowed to escape through slots placed about 4 ft (1.22 m) before it. An arriving carrier would pass the slots and be gently stopped by the resulting air cushion. This increase in pressure operated a valve that opened the sluice gate, the residual pressure being just enough to push the carrier out to the delivery table. At stations closer to the compressor, where the pressure was higher, the closed receiver was used. This had a section of tube, called the receiving chamber, which was closed at one end and mounted on trunnions and was positioned against the end of the main tube. An arriving carrier would be brought to rest by the air cushion in the receiving chamber.

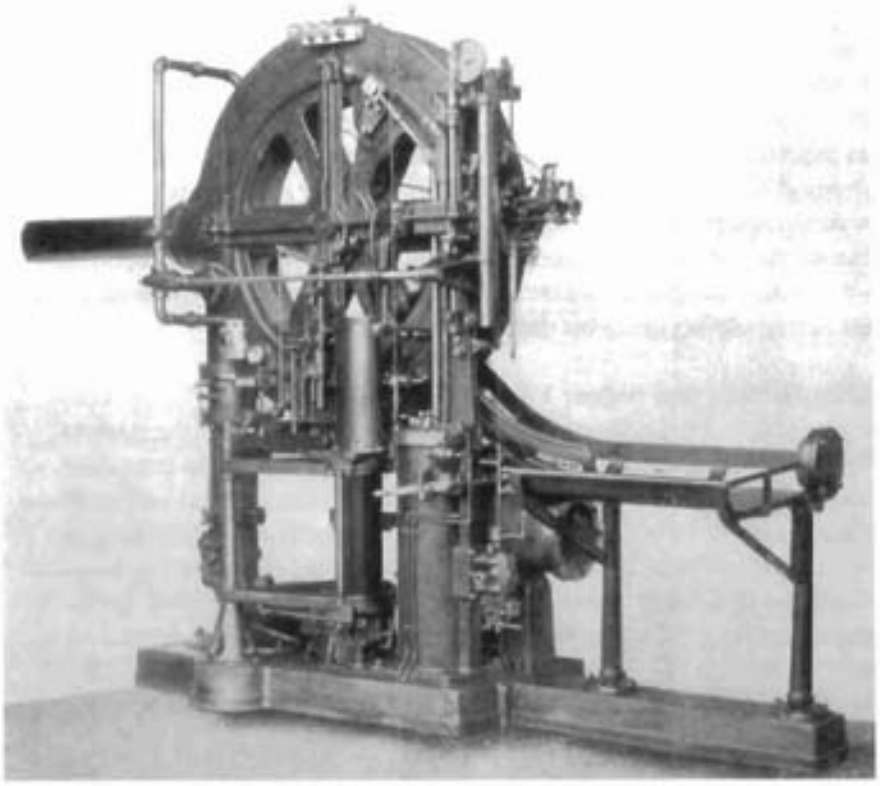

Figure 4 Intermediate station sender and receiver, 1898. Carriers arrived through the tube on the left into the horizontal diameter of the wheel. If required for that station, the wheel rotated through 45 degrees and discharged the carrier onto the table on the right. If the carrier was intended for another station, the wheel rotated through 90 degrees and retransmitted it through the outgoing tube below. (Published in Transactions of the American Society of Mechanical Engineers *in 1899)*

An air-operated piston worked by the increasing pressure then rotated the receiving chamber, allowing the carrier to be discharged by gravity, the chamber then rotating back to the horizontal.

The tubes were normally arranged so as to form separate sections between each pair of stations, requiring carriers to more distant stations to be manually retransmitted. On a few sections intermediate stations were located on the main line itself. Here the receivers were designed to detect carriers intended for that station and automatically discharge them, others being retransmitted. This was managed by fitting discs of varying diameter on the carriers, with detector needles mounted the appropriate distance apart inside the receiver. A disc large enough to touch both needles completed an electrical circuit and actuated the receiver. The nearest intermediate station to the sending station would require discs of the largest diameter, successively smaller ones passing through to actuate the farther stations in turn. For reasons of cost and operating inconvenience, such complex machinery was later dispensed with, all carriers being manually redirected at each station in turn as necessary (Figure 4).

The air compressors were installed in the basements of certain of the stations. At first they were driven both by steam engines or electric motors, but the steam engines were later phased out. Both reciprocating compressors and Root rotary blowers were employed.

In order to keep the carriers running smoothly, the tubes were lubricated periodically by sending round a specially perforated carrier containing oil. Nevertheless carriers did get stuck from time to time, causing a hold-up in service, so it was necessary to establish as quickly as possible where the blockage was. Batcheller developed an ingenious method of location by means of the velocity of sound. He designed a chronograph that was able to measure the time interval between the discharge of a pistol into the tube and the return of its echo, after which the distance could be calculated. This was demonstrated to be an extremely accurate method.

Competition and bigger tubes

For seven years the Batcheller interests had the field to themselves, but this situation could not last. Other companies in the pneumatic-dispatch-tube business wished to compete in mail tubes, but were not big enough to develop an independent system not contravening the Batcheller patents. However, in 1899 the stockholders of the Lamson Consolidated Store Service Company, one of the biggest in the field, purchased several other pneumatic tube companies and organised a new company, the American Pneumatic Service Company (APSC). It also took over the Boston Pneumatic Transit Company; W E L Dillaway, its President, became APSC's President.

Regarding the new company's formation, the Lamson company stated:

> Up to the present time the pneumatic service of the company has been confined to small tubes. The use of the tube in streets for the carrying of mail, messages and parcels has not been included in our business, and this latter use presents an opportunity for the making of large profits.[13]

APSC pressed ahead with designing its own equipment, but the prospect of 'large profits' had to be postponed for a while. The US Congress needed to vote on the annual 'appropriation' that financed the operation of mail tubes. While tubes were considered to be successful in speeding the mail and reducing the number of mail vans operating in the streets, their cost was causing concern. Congress declined to make any appropriation for the fiscal year July 1901 to June 1902, but instead directed that an investigation be carried out by the Post Office into all aspects of operation and ownership. A committee was appointed under the chairmanship of Theodore C Search in June 1900. The Search Commission did its work with characteristic American thoroughness, and in December 1900 reported favourably. It concluded:

> This committee finds the pneumatic method of mail transmission a novel, a valuable, and a mechanically successful system, ingeniously elaborated and practically adapted in an admirable manner to the purposes of the Post-office Department.[14]

The committee recommended the retention of all the existing lines in Boston, New York/Brooklyn and Philadelphia, together with extensions in these cities and establishment of the service in Chicago and St Louis, to make a total in all of nearly 45 miles (72 km).

The Post Office was now in a curious situation. Mail tubes had been officially and enthusiastically approved, but from the following July they were without finance to run them. All mail-tube operations ceased from 1 July 1901 and the systems remained out of use for the entire year. The appropriation was restored from 1 July 1902: the existing tubes were returned to operation in the next few months and the contracts for the extensions and the new services in Chicago and St Louis awarded. Doubtless to the disappointment of Batcheller, all the contracts except for New York and Philadelphia went to APSC-controlled companies.

In September 1900, while the Search Commission was carrying out its investigation, APSC began the construction of a tube system for parcel delivery in Boston. It was designed by the company's engineer, Edmond A Fordyce[15] and comprised two lines of standard 10-in-(254-mm)-diameter cast-iron water pipe laid side by side, one for outward and one for return traffic. The carriers differed greatly from the Batcheller design. Rather than sliding on bearing rings, they ran on ten wheels, five each being mounted radially at each end; this avoided the need to bore out the insides of the tubes, which were left in the state as cast. The internal dimensions of the carrier were 30 in (762 mm) long by 9 in (227 mm) in diameter. The entire initial system of about 4.25 miles was in operation by August 1901.[16] It was worked in conjunction with a parcel delivery company, also owned by APSC, which carried the bulkier packages by road and delivered to individual addresses. Though the system was well engineered, the Boston parcels tube was a commercial failure and ceased being used for this purpose before the end of 1902. APSC later gave an explanation for this:

> Before we obtained contracts for mail service, we had constructed in Boston a system 10 inches in diameter [...] and were engaged in distributing parcels and packages from stores and for the general public as well. The necessity, however, of holding the parcels sent by tube until the bulkier ones arrived by wagon, so that there might be a simultaneous delivery, made this method of transportation, although lower in cost than any other device, if the tube could be worked to its fullest capacity, unprofitable when worked under any other conditions. After little more than a year's use, we were able to lease these lines to the Government, and they have since been employed in delivering mail.[17]

This was a tacit admission that, at 10 in in diameter, the tubes were not big enough. Fordyce stated that the wheeled carriers enabled ordinary water pipe to be used, reducing the expense of the system.[18] This implied that research had not been carried out into the average

size of parcels in order to determine the optimum tube diameter. If APSC had done so, a larger diameter would probably have been called for, which would have necessitated specially manufacturing the tubes. By persuading the Post Office to incorporate the system into the agreed mail network for Boston, APSC was lucky to minimise its losses in this venture. However, the full capacity of the 10-in carriers was not utilised, the standard 8-in carriers containing mail being placed inside the 10-in carriers for transmission on those lines.[19]

All the planned mail-tube extensions in Boston were running by 1 September 1903, while operations began in Chicago and St Louis during 1904.[20] However, the companies in New York and Philadelphia could not find the capital and the planned extensions there were not started. During 1905 the New York operating companies ran into financial difficulties and were purchased by APSC, which in this way came to control all the mail-tube companies, except that in Philadelphia. APSC also purchased at this time the rights to the Batcheller patents for the entire United States except Philadelphia. B C Batcheller himself joined APSC in 1907, becoming Chief Engineer.[21] Extensions to complete the network in New York at last went ahead, this work being completed in 1911. During that year a separate 2-mile, 8-in line was laid in New York for the US Treasury Department.[22]

British proposals

During the decade of expansion in the United States, efforts were made by both the Batcheller Pneumatic Tube Co. and APSC to export the technology to Britain. Proposals were laid before the British Post Office in 1901 for mail-tube systems of varying diameter for London, but were turned down as being too costly. Several new ideas were put forward during the next two years, but nothing came of them. A new impetus was introduced when, in the winter of 1903, John E Milholland, the President of Batcheller Pneumatic Tube, came to live in London. By chance he found himself the near neighbour of Colonel R E B Crompton, the pioneer electrical engineer. Inevitably the two met. Crompton had become keenly interested in motorised road transport and the problems of traffic congestion. Together they developed Milholland's ideas for a large network of parcel tubes for London.[23] Crompton also introduced Milholland to Sir John Wolfe-Barry, the prominent consulting engineer, and Batcheller's assistant engineer, Kenneth Stuart, came over from the USA in order to prepare detailed designs and financial estimates.

At the suggestion of Crompton and Wolfe-Barry, a parliamentary Bill was prepared for the 1905 session, its cost financed partly by Crompton's cousin John Crompton.[24] It sought to incorporate a company with capital of £4 million called the Metropolitan Pneumatic Despatch Company, which would construct a 95-mile

(152-km) network of double lines of 12-in (305-mm) pneumatic tubes connected by 172 stations, largely contained within a 4-mile radius of central London. The Bill was opposed by the Post Office and by the London County Council and other local authorities, largely because of the disruption that would be caused by excavation in the streets. It went before a House of Commons Select Committee on 16 May 1905, but after hearing evidence for nine days the Committee found the preamble of the Bill not proved.[25] The company submitted a modified Bill for the following session, but this was withdrawn at the request of the Postmaster-General. Further proposals were developed, but the Post Office had by then become aware of experiments with an underground narrow-gauge railway in Berlin and the extensive network of 2-ft-gauge underground electric freight railway tunnels in Chicago, on which revenue-earning operations began in 1906. After an internal review, the Post Office opted in 1911 for an underground electric railway for mail handling in London.[26] This eventually began operating in 1927, the key to its success being the adoption of mechanical handling devices and modular wheeled mail containers to capitalise on the speed of the railway.

Why did mail tubes fail to be adopted in London? It is clear from the submissions that the 1905 Bill was too ambitious. Though it used an adaptation of existing technology, the proposed system was otherwise completely experimental; and, to plan a 95-mile network as one scheme, when the US mail tubes had only achieved a little over 50 miles in total after 12 years, seems in retrospect overoptimistic. There were also the differing postal conditions between the USA and Britain to be taken into account. In the USA the mail tubes were used almost exclusively for first-class mail. This comprised only letters and postcards, for which the postage rate at the time was 2 cents for each ounce.[27] By comparison, in Britain the letter rate was 1d for four ounces, less than a quarter of the American rate. This meant that a very large number of bulky packages also went at letter rate and, being charged the same, needed to receive the same treatment as ordinary-size letters. This alone made a 12-in, or even an 18-in, tube inappropriate if the intention were to reduce the number of road vehicles and relieve street congestion. And at that size a railway would begin to make more sense.

In 1911, when the British Post Office finally rejected pneumatic mail tubes for London, the New York/Brooklyn system had just achieved its maximum extent of 26.5 route miles (42.4 km). Together with the systems in Boston, Chicago, Philadelphia and St Louis the total route mileage in the USA was about 54.5 miles (87.2 km). They had survived Congressional scrutiny in 1901 and 1908 and a year's shutdown in 1901/02. In spite of their high cost of operation, the appropriation for the fiscal year 1910/11 being $923,000,[28] they were regarded in a favourable light by the US Post Office (Figure 5).

Pictures by post

The expansion of the mail-tube systems during this time mirrored closely the rise of a hobby that for a few years became almost obsessive in the United States – the sending and collecting of printed picture postcards. In December 1901 the US government eased the regulations for privately printed cards and from 1907 allowed the 'divided-back' card, meaning that the address and message could appear together on the reverse side of the picture. As well as printed topographical scenes, many cards were of real photographs taken by the sender. The highest-quality cards were produced in Germany and over three-quarters of picture postcards sold in the USA during the boom years came from Europe. Coupled with a postage rate of only 1 cent, sales took off. For the fiscal year ending 30 June 1908 the US Post Office reported that nearly 678 million cards were mailed. The outbreak of war in 1914 caused the hobby to decline, as the supply of cards from Germany ceased. US-printed cards were of lower quality and less collectable, while at the same time the use of the telephone was spreading rapidly. For a few years, though, the mail tubes played their part in feeding a hobby that for many was almost an addiction.

A shutdown and a reprieve

However successful mail tubes were in transmitting mail, their costs began to be subject to closer scrutiny. In 1913, at the beginning of Woodrow Wilson's presidency, Albert Sidney Burleson was appointed US Postmaster-General. He was opposed to mail tubes, citing the following reasons:[29]

- The introduction of parcel post
- The use of automobile motor trucks
- An increase of letter mail to a point beyond the capacity of the existing tubes.

An internal Post Office inquiry in 1916 appeared to support Burleson's views

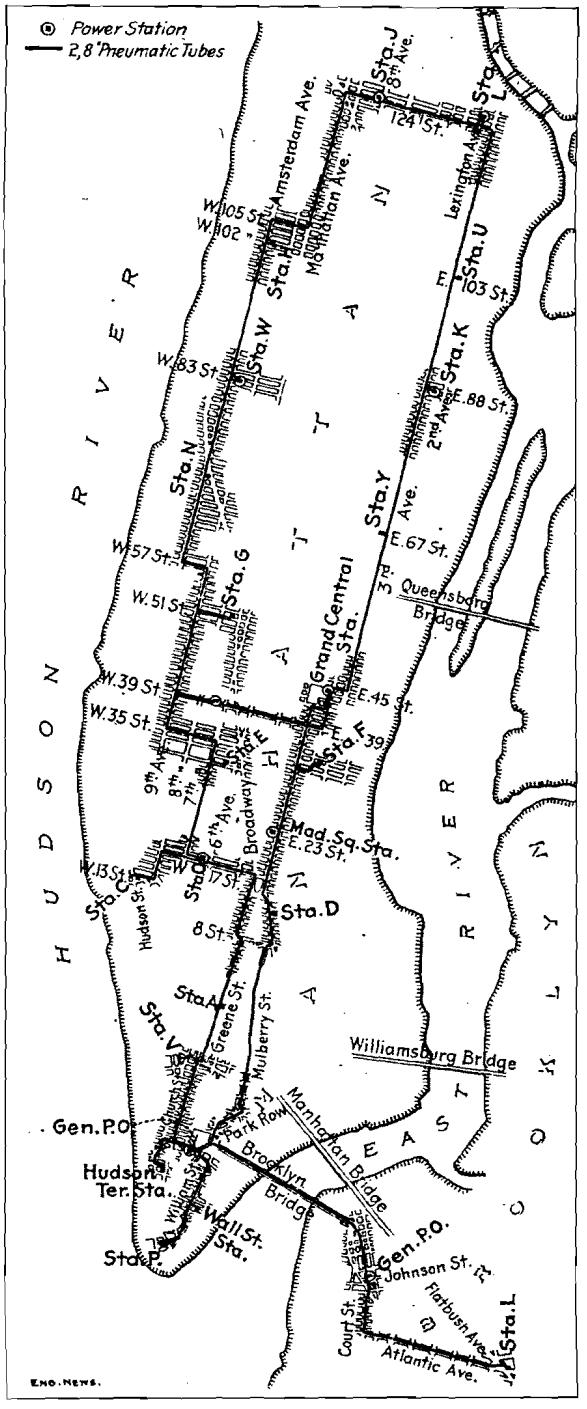

Figure 5 The New York mail-tube system at its maximum extent in 1911. The system survived almost intact until closure in 1953. (Published in Engineering News *in 1911)*

and he proposed to discontinue service in all cities except certain parts of New York, where special conditions were thought to apply. Considerable opposition from the mail-tube companies, supported by influential members of the business community, prompted a further investigation by a Joint Commission of Congress.[30] Reporting in March 1918, the Commission came broadly down in favour of the continuance of mail tubes, though there was a minority report against. Burleson's attitude remained robust – he was reported as having told a US Senator on one occasion, 'I don't know a damn thing about the tubes.'[31] Working behind the scenes, Burleson managed to persuade President Woodrow Wilson to condemn them. At the last minute, the mail-tube provision was struck out of the 1918 Post Office Appropriation Bill. Without the necessary finance, all mail-tube services in the USA ceased at midnight on 30 June 1918.[32]

This might have been the end, but the tube companies, with considerable capital tied up in the installations, continued to campaign for their reinstatement, backed by business interests and public opinion. However, with no tubes operating, B C Batcheller decided to sever his association with them and resigned as APSC's chief engineer in 1918.[33]

Burleson was replaced as Postmaster-General by Will H Hays in 1921, and a more favourable political climate made it possible to reassess the speed and economy of mail tubes. The money was found for New York; service there restarted on 2 October 1922[34] after a shutdown of more than four years, and over the next few months operation was resumed over practically the entire former system. Pressure by business leaders in Boston enabled a resumption of 2 route miles there from 1 August 1926,[35] the former parcel tubes not being included, but the systems in Philadelphia, Chicago and St Louis remained out of use. There was a flurry of interest in 1930 to restart these systems and establish mail tubes in other cities as part of an expansion of air-mail services,[36] but this came to nothing. To some extent, therefore, Burleson's thinking was vindicated, however much he might have been driven by prejudice rather than analysis.

Both the New York and Boston tubes continued to operate throughout the 1930s and 1940s, but official opinion was turning against them. A steady increase in the overall quantities of mail handled meant that the tubes were carrying an ever-smaller proportion of the total. For example, it was estimated that in 1917 the New York tubes were carrying 48 per cent of all first class mail,[37] but by the early 1950s this had dropped to about 30 per cent.[38] The Boston service, by then costing $98,000 annually to operate, ended on 30 December 1950.[39] In the same year the New York company had had to spend $350,000 on modernising its electrical equipment. This additional amount was amortised over a ten-year period. The increase of $35,000 made the annual rental $360,000, with staff and other costs bringing the annual total for operating the tubes to $1 million. This came under

Congressional scrutiny in 1953, with the result that the Post Office Department cancelled the contract. Mail-tube service in New York was suspended without ceremony on 1 December 1953 and the decision was confirmed a month later.[40] This time it was final.

Conclusion

At the beginning of the twentieth century pneumatic tubes were seen by many as one of the innovations that would revolutionise modern life, alongside such novelties as monorails, airships and gyroscopically stabilised cars. While the others have made no significant impact, small-bore pneumatic dispatch tubes have retained a niche market, and mail tubes did at least remain viable in one of the world's principal cities for over half a century. They came into use when the alternative in congested city centres was to use horse-drawn wagons, and their advantages in speed and efficiency were easy to demonstrate. The motor vehicle was more cost-effective in the short term, and if it had arrived a decade earlier it is questionable whether mail tubes would have been adopted at all. The one trial of parcel tubes in the USA was commercially unsuccessful, and there can be little doubt that the London parcels tube would likewise have been an expensive failure. Only the particular circumstances obtaining in New York ensured that mail tubes were more than just a footnote in the continuing history of pneumatic dispatch.

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40 *New York Times* (30 December 1953)