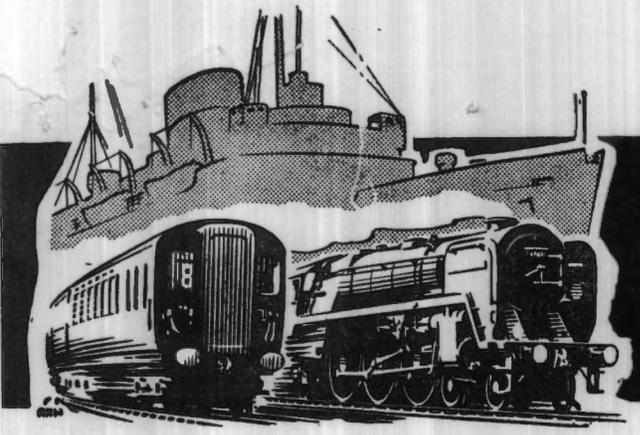

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BRITISH RAILWAYS

Southern News

WATERLOO STATION · LONDON S.E.1

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27th September, 1960

LORD MAYOR OPENS TRAVOLATOR

For thousands of City workers the long walk through "The Drain" is over.

Tonight they will step aboard Europe's first moving pavement, the Travolator, and glide 104 yards from the Bank underground station to the Southern Region's Waterloo and City line platforms to board trains for Waterloo.

The twin-track Travolator was being opened by the Lord Mayor of London, Sir Edmund Stockdale, today (11 a.m.) in the presence of the Chairman of the Southern, Sir Philip Warter.

The Lord Mayor was invited to turn a key to switch on the two 85 h.p. motors driving the Travolator's continuous-belt tracks, which move on 3,904 wheels, mounted in 8,000 ft. of structural steel work, at up to 180 ft. a minute.

The 312 ft. Travolator will allow the Southern to squeeze in another 17 rush-hour trains a day on the Waterloo and City line.

Until now it has been inadvisable to increase the service -- the platforms at the Bank were already congested by arriving passengers during the morning peak, but now the Travolator will clear them far more quickly.

To achieve this both tracks will be run upwards during the morning rush, when the few passengers going against the tide will walk downhill through the redecorated subway. One track will be run up and the other down during the rest of the day, including the evening rush. This will spare passengers, particularly the elderly and infirm, normally having to do the long uphill walk through "The Drain". The period when they will both be running upwards is from 8.30 a.m. to 10 a.m. for the time being -- although the arrangements may be altered as the result of experience.

The Travolator has taken three years to build -- although work was slowed down for seven months in 1958 by the capital expenditure restrictions.

It involved boring a tunnel 334 ft. long and mostly 16½ft. in diameter, diverting a maze of giant sewers, large mains, and cables, carrying out other extensive works below the surface of one of the world's busiest street junctions, and shifting about 20,000 tons of earth.

Small teams of men had to work in cramped spaces, fitting in their jobs with the train service which carries over 40,000 City workers a day.

Because of this, much of the work had to be done at night, when special "ghost trains" ran to Waterloo carrying some of the earth excavated from the site.

Other jobs -- such as diverting the mains and cables and building the roof of the new booking hall -- could only be tackled from the surface. Again, they were done at night: during the day the workmen's trenches were decked over with temporary

steel decking so that the City traffic could pass overhead. But pneumatic drills could not be used after 11 p.m., and on some nights when functions were being held at the Mansion House the work came to a standstill.

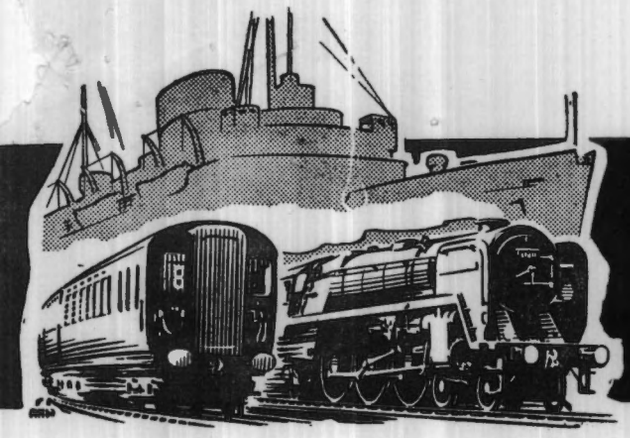
Sir Edmund's predecessor, Sir Harold Gillett, watched much of the work being done. At night he often went down to chat with the men about the job and sometimes he sent them out bowls of soup.

Just before Sir Harold's year of office ended last November, he and the Lady Mayoress invited many of them to a beefsteak and kidney pudding lunch at the Mansion House.

A Southern Region spokesman said today: "At last, despite all the difficulties, financial and otherwise, we have been able to carry through this very important piece of modernisation, which is designed entirely to improve conditions for our City passengers.

"They have had a pretty trying time, particularly during the past three years, and we are glad it's over."

END.



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Southern News

WATERLOO STATION · LONDON S.E.1

WATERLOO AND CITY RAILWAY
PROVISION OF TRAV-O-LATOR AND OTHER IMPROVEMENTS AT THE BANK STATION

The Bank Trav-o-lator, which now links the Southern Region Waterloo & City line platforms with the high level circulating area and Bank underground station, is the first "moving pavement" in Britain.

But as it happens, something very like this installation might have been built more than half a century ago.

In 1903, five years after the Waterloo & City line railway was opened a Leeds firm prepared a scheme plan for an almost identical form of transporter for use on this site. It was abandoned probably because the tunnel was crooked.

So passengers continued to toil up the 1 in 7.4 incline of the 340 ft. long, 13 ft. wide, subway assisted by five steps at 40 ft. intervals which reduced the gradient to 1 in 14.

Long before the war it became obvious that this was not a sufficiently effective way of clearing the rush hour crowds.

The war and post-war capital expenditure restrictions held back the implementation of the first scheme to eliminate this long climb -- a three-way escalator for which Parliamentary Powers had been obtained in 1939.

When in 1955 the Southern Region was able to tackle this long-standing problem it engaged a firm of consulting engineers to approach the matter afresh.

It was during the development of the scheme which they prepared -- largely following the pre-war plan -- that it became apparent that something similar to what the Americans call a "speed walk" would be cheaper and quicker to instal.

The Final Scheme

The plan finally settled on to instal two Otis Elevator Company Trav-o-lators was also based on certain further advantages over the original scheme: it would carry the passengers further than could escalators; the existing subway could be retained, and construction would involve far less interference either to passengers or to the existing drainage and services.

The version of the Trav-o-lators developed in this country for this scheme are, in fact, based on the Otis' escalators used by the London Transport Executive. At their maximum speed of 180 ft. per minute each can carry 10,000 people an hour up an incline of 1 in 7.

Despite the comparative economy of the scheme fairly massive works were necessary to enable the installation to be carried out and to take full advantage of it.

As finally approved in March 1957 the scheme involved:-

(a) The construction of a tunnel of 16ft. 6 ins internal diameter opposite platform No.2, running approximately parallel to the existing subway, housing two Trav-o-lators, each 4 ft. wide, together with a machinery room and substation chamber.

(b) The construction of six new openings 9ft. in width, in the walls separating platforms 1. and 2. to facilitate the flow of passengers from No.1 platform to the base of the Trav-o-lator.

(c) Substitution of the existing timber platforms by concrete, platform levels being raised 2½" to make them 1'8" above rail level.

(d) Re-lining of platform tunnels and the existing subway including the provision of a false ceiling to take lighting cables, and provide drainage for seepage water.

(e) The diversion of all existing drains, cables and public services necessitated by the above works.

(f) The reconstruction of the high level subways leading to Walbrook and Poultry, including a new ticket office and the provision of certain staff amenities.

It also provided for the re-lining and re-decorating of the existing subway.

Construction

Work began in 1957 with the closing of the subways leading to Walbrook and Poultry. Between these two entrances a shaft was driven down to the level of the tunnel for the Trav-o-lator: from here an 8 ft. pilot tunnel was driven down the incline and later enlarged to 16 ft. 6 ins. in diameter. Excavation had to be carried out by night, the spoil hoisted out and removed by lorry until the line of the existing low level siding tunnel was reached. It then became possible to remove spoil by wagons at night via Waterloo. Cast iron segmental linings with lead caulked joints were used.

At the lower end this 282 ft. tunnel was enlarged from 16 ft. 6 ins. to 19ft. 6 ins. diameter for a further 52 ft. to accommodate the lower landing and return machinery. Beyond this point it enlarges by another 10ft. in diameter for a distance of 19ft. 9 ins. to provide a circulating area for passengers arriving at the foot of the Trav-o-lators and from the existing subway.

At the same time six new openings, each 9ft. wide, were cut in the dividing wall between the two platforms to facilitate the flow of passengers etc. to the base of the Trav-o-lators.

At the upper end of the Trav-o-lator tunnel the machine chamber and booking hall is approximately 100 ft. long, 35 ft. wide, and 30ft. deep. Because it lies in the filling over the Walbrook and its tributaries it was decided to use a reinforced concrete raft as a foundation.

To keep down interference with traffic overhead and the movement of passengers the construction of the walls was carried out in a series of headings driven round the sides of the chamber. The dumpling and excavation for the floor were then removed and the floor constructed in strips as the excavation

proceeded. The whole of the area of the booking hall and machine chamber was completely "tanked" with 1¼ ins. asphalte applied hot.

The 3ft. reinforced concrete roof slab, which varies from 3ft. 6 ins. to one ft. below the road surface, was constructed in strips about 8 ft. wide in open trench. The road traffic during construction was carried on temporary steel decking which often had to be removed at night to allow construction to proceed and the roadway made good each time early enough to enable road traffic to proceed during the day.

About 10,500 cu. yds. of material was removed and some 5,000 cu. yds. of plain and reinforced concrete placed. Eight hundred tons of cast iron segments were used in the construction of the tunnels.

Most of the cables and other public services were diverted by trenching in the roadway. But a 5ft. diameter sewer crossing the booking hall area had to be diverted by tunnelling a new 5ft. diameter drain of cast iron segments lined with concrete and with an engineering brick invert. An additional pipe subway with a new shaft had to be constructed under the main concourse and the London Transport Executive's main feeder track cables had, too, to be diverted.

The Equipment

The two Trav-o-lators, although similar in principle to the American "speed walks", are the first of their particular type in the world: they are designed to heavy duty requirements to carry large numbers of passengers ascending and descending. Every weekday 42,000 passengers will be using them, a very large number of them concentrated into the rush hours.

The Trav-o-lators use a continuous flat platform travelling at a lower angle of incline than an escalator, which is normally banked 30°.

The Bank Trav-o-lators have an incline angle of 8° 07' 48" or 1 in 7. There is a vertical rise of 42 ft. over an incline length of just under 297 ft. The overall length, which includes horizontal portions at top and bottom landings, is just under 302ft. 6 ins. and is 40 ins. wide tapering out to 48 ins. at a point below the handrails.

The maximum speed can be adjusted for passenger traffic down to a speed of 90 ft. per minute, and in addition to a "crawl" or "inching" speed of about 36 ft. for maintenance purposes.

Each Trav-o-lator has its own drive unit in a motor room beneath the upper landing.

It consists of a high efficiency worm gear with multi-start worm, connecting up a large diameter coupling to the shaft of a variable speed three-phase 85 h.p. commutator motor.

The coupling forms the drum of an electro-magnetic brake, which is spring applied and magnetically released. It is designed to stop the Trav-o-lator smoothly under all conditions.

The continuously-rated motor is of the Schrage type with pilot motor operated brush gear.

An individual automatic magnet-operated control gear of the contactor type is used to start and stop each of the Trav-o-lators: each control gear will start or run its Trav-o-lator either upwards or downwards at maximum speed or the other speeds referred to.

Each control embodies switches for operating the "service"brake on the drive machine and the pilot motor controlling the main motor brush gear.

All magnets operate from a D.C. supply obtained from a rectified A.C. supply.

Up-Down buttons are provided for local control by each Trav-o-lator, and there are five emergency switches on the balustrade deck panelling between the two tracks. They are spaced suitably along the incline.

There is also a key-operated Up-Down and Stop switch at the top and bottom landings.

To save undue wear during the off-peak periods, the normal control over speed will be by means of a selenium cell, which cuts the "travel strip" speed to 90 ft. per minute when

the Trav-o-lator concerned has carried no passengers for a predetermined time. This device can be over-ridden by switches at the lower landing and on the station platform, which can be used to reduce the speed to this 90ft. per minute in the downwards direction if the station platform is becoming congested.

Each Trav-o-lator strip consists of 488 individual platforms, each 40 ins. x 16 ins. surfaced with special quality aluminium.

Each rides on four ball bearing wheels of phenolic and canvas materials. The platform wheels run on tracks which form the contour of the Trav-o-lator and are designed to confine side movement within narrow limits. The platforms are connected together and driven by two roller chains manufactured to very fine tolerances: the chains are assembled in matched lengths. At each end of the Trav-o-lators the close-cleated platforms pass through a comb plate.

Just beyond the toothed combs and beneath the fixed floors are located pairs of sprocket wheels over which the chains pass.

The top sprockets on each of the Trav-o-lators, mounted on substantial shafts, are driven by the motors, each through its reduction gear via a duplex roller chain. These top sprockets also carry the disc emergency brake which stops the Trav-o-lator if the drive chain breaks.

The cotton duck and rubber handrails which incorporate a continuous steel tape are driven separately at the upper landing newel wheel by a single chain from the drive shaft. They are supported on the return side by a series of ball bearing phenolic rollers.

The "travel strips" are designed for intensive service with safety factors based on a working load of 300 lbs over 4.45 sq. ft. of the area available for passenger loading.

The Trav-o-lators are each carried by main frames of constructional steel supported on substantial concrete foundations extending the whole length of the inclined and horizontal portions.

A number of additional safety devices are installed, including a centrifugal-type excess speed governor broken chain

devices and a broken handrail switch. Warning light indicators in the machine room show when the broken chain devices are nearing a point at which they will operate.

An electric fan in the machine room passes air through the Trav-o-lator pit for cooling purposes and normally discharges it at ceiling level in the ticket hall. The direction of the flow can, however, be reversed.

The Trav-o-lator tunnel has a false ceiling of Celactite corrugated waterproof lining to which is attached an inner lining of Stelvetite sheeting. The side walls at the foot of the Trav-o-lator have a blue grey mosaic vitreous glass finish.

On each side of the "travel strip" there is a shallow skirting with flat sloping panels above. There is deck panelling between each Trav-o-lator and between the tunnel side walls of the Trav-o-lators, of double armoured plywood with aluminium on the visible side and galvanised sheet steel on the reverse. The panels are faced with a grey coloured plastic.

Special advertising frames have been installed on both sides of the tunnel harmonising with the general scheme of decoration.

In the Trav-o-lator tunnel continuous fluorescent trough lighting is provided at deck level with a central trough of fluorescent lighting in the ceiling at the foot of the Trav-o-lators. Between the deck panelling adjacent to the tunnel lining provision has been made for the installation of specially designed lighting to obviate any glare from the aluminium "travel strips".

Beneath the Trav-o-lator there are fixed lights and plug-in points at 30 ft. centres, both at 50v for the use of maintenance staff.

On both station platforms and in the existing pedestrian subway fluorescent strip lighting has been installed and also in the new Walbrook-Poultry subway. The tungsten lights in the booking hall are in flush circular fittings.

The inclined subway -- the old "Drain" -- has also been re-decorated and the walls retiled in pastel blue. Station

tunnels have also been renovated and their walls finished in vitreous glass mosaic of blue grey, while the inter-platform openings have a grey finish.

The name of the station has been worked at 18 ft. intervals into the mosaic covering of the platform walling. The ticket hall has a special mosaic finish and the new subways to Walbrook and Poultry are finished in blue tiles.

All direction signs, specially manufactured by the London Transport Executive, are fed from two alternative electric supplies to cover the possibility of power failure, as is the lighting system generally.

There is a public address system operated from the signal cabin.

The actual speed at which the Trav-o-lators will be run can only be decided by trial and error. In fact, it is intended to run both tracks up during the morning peak but one each way during the rest of the day.

The original "Drain" is being retained and has been renovated. The handrail, which in the past was set to one side to form a narrow path for the few people walking against the tide, has now been placed in the centre of the subway.

To take advantage of the speed at which the Trav-o-lators will be able to clear the platforms, the train service interval during peak periods will be cut from 3 minutes to 2½ minutes, which should do a good deal to alleviate crowding on the line.

The scheme was developed and the whole of the work designed and carried out by Mott Hay and Anderson, the Consulting Engineers, under the general direction of Mr. A.H. Cantrell, B.Sc., M.I.C.E., Chief Civil Engineer of the Southern Region, British Railways. The contractors for the tunnelling and general engineering work were Messrs. Mitchell Brothers, Sons and Company Ltd., and the contractor for the supply and installation of the Trav-o-lator was the Otis Elevator Company. The electrical equipment, including the motors and control gear, were manufactured and installed by Associated Electrical Industries (Rugby) Ltd.

END.

September 1960.