## LEADING THE WAY WITH POSTAL MECHANISATION

At Rome, in November 1956, there was an exhibition of postal mechanisation organised by seven countries of Western Europe, the United Kingdom included. The first exhibition of its kind ever to be held, it was indicative of the growing interest which is everywhere being taken in mechanisation of the postal services. The Universal Postal Union, recognising this fact, has lately set up International Working Parties to study the problems which mechanisation presents. The British Post Office has been working on these problems for many years and lately has greatly increased its scale of effort.

There are very few Post Offices of any size in this country where mechanical devices are not already used. Automatic machines which cancel the stamps on letters at rates up to 600 a minute are commonplace. Belt conveyor systems for carrying letters and parcels about sorting offices are widespread and, in the larger offices in London and the Provinces, highly developed systems have been installed for many years. The Post Office Railway under London is an example of mechanisation which is without parallel anywhere in the world.

What we are trying to do now is to mechanise the processing of mail, that is the sorting and related operations, inside Post Offices. This is not easy. Despite the wonders of the age, a machine which can compare with the postman for all-round ability has not yet been developed and is never likely to be. The postman can not only sort letters and parcels - and collect and deliver them - but he can despatch and receive mails, document registered articles, keep records, and do a hundred other things. When people make a mistake addressing their letters he can often put it right! He can do wonders deciphering bad handwriting! What machine can compete with this sort of thing? When we come to mechanise we have to set about it by breaking the job down into its separate elements and tackling each one individually. Even then it is very difficult to make an impression. The experts have been at it for years without much success. One of the main troubles is the awkward nature of the raw material to be processed - envelopes, packets, parcels, magazines, etc., in an infinite variety of shapes and sizes and addressed in countless different ways, scarcely any two alike.

Another great problem is how to mechanise economically. Ideally, expensive machinery should be run continuously to spread overhead costs But in sorting offices conditions are about as unfavourable as they can be - bursts of intense activity, mainly morning and evening, with comparatively long slack periods in between. There is no hope of spreading the work so long as the public post late in the day for delivery early next day.

But the problem of mechanisation has to be solved in one way or another and the British Post Office is leading the way with its new machines. Let us look at some of them.

### PREPARING THE LETTERS FOR SORTING

First there is a series which are designed to mechanise the processes which go on in a sorting office up to the point at which letters are sorted. Amongst them is a machine known as a "segregator". It looks rather like a rocket built for space travel. It takes the mixed stream of mail brought in by the postmen from posting boxes and separates the letters from the packets and bulky articles ready for the automatic stamping machines.

Next in the series come the separator towers. They separate the large from the small letters for different treatment and work very much like fractional distillation columns!

Last in the series, and just beginning its field trials, is what we call a "facing" machine. This takes letters in random order and re-arranges them into neat piles with the addresses all facing one way and the stamps all in one corner. At the same time it picks out the printed papers paid at 2d.

and cancels the stamps on all the letters. This is the first time a prototype machine which will do all these things had been developed to the stage of field trial.

SORTING LETTERS BY MACHINE

Most important of the machines for handling letters is the electronic letter sorting machine which has already attracted much attention. It is a single-position machine which can be regarded, in a very real sense, as a building brick in the machine sorting edifice. It takes up comparatively little space and, if it becomes necessary to move it to another position in the sorting office, the job can be done within hours. We believe it to be the best machine of its kind anywhere. It is unique in that it has no set rhythm but works on the principle of the operator controlling the speed of the machine, as opposed to the machine controlling the operator. We think this is important for dealing with letters. If the operator gets a letter which is badly addressed he can pause for a moment while he deciphers it. If, on the other hand, he gets a run of letters similarly addressed - as often happens when sorting mail - he can put on a burst of speed.

The ideal sorting machine, of course, would work without an operator, reading the addresses on letters and sorting automatically. It is a question, however, whether such a machine will ever appear. We might, nonetheless, get some way towards it. Work is going on on the development of a new technique - coding. At the present time a letter has to be sorted by hand several times between posting and delivery. Suppose, the first time it was sorted, we could put some marks on it, in machine language, indicating the destination? We might then hope to do the subsequent sorting handlings by automatic machine without an operator. This is what we are aiming at. There is, however, no simple solution. Many problems will have to be solved and new kinds of machines developed before we can produce a workable sorting process of this kind. The job is, however, being pushed forward as rapidly as possible.

MECHANISATION OF PARCEL SORTING

This presents problems of its own and various attempts have been made to solve them. A new mechanised parcel sorting office will open in Leeds next year, the first of its type. The machinery for it includes a new type of press-button sorting machine which has been developed in the United Kingdom. It is the best we know of.

Size is a great difficulty with parcel sorting machinery. We are already trying to develop new machines which will take up rather less space.

MAIL HANDLING BY CONVEYORS

Over twenty-five million letters are posted in this country every day and hundreds of thousand of mailbags are in circulation. The movement of these quantities of mail inside sorting offices presents a problem in itself. Belt conveyors can play an important part in it and cut out much walking about by the postmen. To supplement the belt conveyors new applications of the industrial chain type conveyor are being developed. An installation in the parcel office at Southampton, for instance, has self-gripping hooks specially devised by the Post Office. Mailbags, as they come out of the mail vans, are clipped upside down into the hooks and travel, suspended from the chain, to the work point in the sorting office. There the postman merely cuts the string round the neck of the bag and the parcels discharge themselves. The empty bag passes on to fall automatically at a predetermined collecting point. Conveyors of this type lend themselves to a variety of uses. In the future we may expect to see them used extensively for the movement of loose mail about sorting offices - as in installations which will open at Exeter and Leeds this year - and also for the carriage of mailbags overhead between Post Offices and railway stations.

PUBLIC COUNTERS

For the counters a variety of machines is being developed and they will appear in increasing numbers. The range of self-service machines is also

being extended with the introduction of new and improved patterns of machines selling stamps singly and in books, and others selling stamped letter cards and envelopes.

MECHANISING THE CLERICAL WORK

Not least important in our programme is the mechanisation of the clerical work which goes on inside Post Offices. A wide range of conventional office machines is in use and being extended all the time. One of the most important developments in this field is the scheme to deal with payroll work for all the Post Office staff in London by means of computers. Equipment value close on £½m. has been ordered for this purpose. When the computer installation is fully operative we shall have what will almost certainly be the largest centralised payroll scheme to be done by computers in the world.

BUILDINGS

The Post Office and Ministry of Works have jointly set up a small group of experts to do research and development work on the design of Post Office buildings. The introduction of new machinery will introduce fresh problems of building design which the Joint Group will tackle both to ensure that the machinery can be fitted in to best advantage and also at least cost.

RELATIONS WITH TRADE UNIONS

Co-operation between the British Post Office and the Trade Unions is probably as close as in any country in the world. The Unions are represented both on the Post Office's top level Committee which deals with matters of forward policy arising from mechanisation, and on the Mechanical Aids Committee, which has the broad responsibility for developing the new machines. Union views are in this way brought to bear at an early stage. This is most useful from every angle. A great debt is owed to the farsightedness of the Union representatives. They make it possible for mechanisation to proceed with full regard to the interests of the staff whose lives and working conditions may be affected by it. Those of use who have the privilege of working closely with them look upon them as a part of the mechanisation team!

TEAM WORK

This, in my view, is the key to success. Designing postal machinery calls for a joint effort on the part of all concerned. Inside the Post Office, administrators, postal experts, and staff of the Engineering Department, with their research laboratories at Dollis Hill and development laboratories at Mount Pleasant, are joined as a team. Externally there are the closest relationships with private industry and with research bodies such as the Applied Psychological Research Unit, of the Medical Research Council, at Cambridge. Team work ensures that such machines as are developed are not just laboratory curiosities but workmanlike, practicable and acceptable to the staff who have to use them.

Note: This article was prepared by Brig. K. S. Holmes, Director of Mechanisation and Buildings, for the Daily Mail supplement of January 30th, 1988.

GENERAL POST OFFICE
CENtral 1170.

FEBRUARY, 1958.

# The British Letter Facing Machine

## History

The letter facing machine which started operating at Southampton Head Post Office in December 1957 is a logical development from earlier laboratory models but is the first to be brought to the stage of a field trial in the United Kingdom. First experiments with equipment using photo-electric cells as the means of detecting the position of stamps on letters were started in 1937, but the outbreak of war in 1939 brought further research to a halt for the duration. Work restarted in 1945, but concentration on other projects having a higher priority delayed completion of an actual machine, although the basic features for a satisfactory design had been established.

## The need for special stamps

Initially a detailed study to select the best method of recognising stamps had been undertaken. The obvious choice seemed to be the use of photo-electric cells which would not only pick out the stamp against the background colour of its envelope, but could also differentiate between various colours, thereby enabling the lower paid printed paper matter to be segregated for separate treatment. Unfortunately this method proved to be inadequate for practical purposes.

Research was then concentrated on the possibility of endowing the stamps with some special characteristic which could be detected unerringly by the scanning unit incorporated in the machine. Many lines of approach were tried - among them, the incorporation of strips of metallic foil; treating the stamp paper with zinc or aluminium paper; impregnating it with a solution of salt (for electrolytic detection) or ferric oxide (for magnetic detection) - but all had to be ruled out on one ground or another. Then, in 1956, the first experiments with "graphite inks" which could be printed in lines on the stamp paper during the manufacturing process started, and were sufficiently encouraging for intensive studies to be made of this technique. In collaboration with Messrs. Harrison and Sons Ltd., the firm responsible for the printing of current issues of postage stamps up to 1s. 6d. and Acheson Colloids Ltd., the makers of "dag" graphite compounds, the substance used for the present trials was evolved.

During the laboratory experiments the substance was called "naphthadag", as naphtha was the principal liquid used to hold the graphite in suspension for printing; more recent research has, however, yielded other liquids with better printing qualities. Stamps of the 2d. value are printed with one graphite line, on the back of the paper under the gum, and those of other denominations (up to 3d.), are printed with two. The lines are black and 1/32" wide; they act as electrical conductors so that when letters carrying these stamps pass through a high-voltage scanner the current passes through the stamp, completes an electrical circuit via the lines, and causes a recognition signal to be given. A single 2d. stamp gives one signal; any other stamp or combination of stamps gives at least two, which is sufficient for the machine to distinguish between the lower-paid matter and the rest.

## How the machine works

The present machine is designed to handle "short" letters (i.e. those up to about 5" x 7" in size) at a rate of over 300 a minute. It measures 20 ft. long, 6 ft. tall and 5 ft. wide, and consists of three main sections:

1. The feed section takes the stacks of unfaced mail and converts them, by means of a roller system into a stream of separated letters feeding into

2. The scanning section. This is made up of (a) a single endless belt forming the main conveyor system of the machine, (b) two sets of scanning heads searching an area along both sides of the bottom edge of the letters and (c) apparatus for turning the letters through 180°. Letters pass through the first set of scanners on edge, and if no signal is given to show that a stamp has been found on the bottom edge they are diverted from the stream and turned through 180°, so that by the time they rejoin the

main stream and enter the second set of scanners all letters have the stamps on the bottom of the envelope. The second scanners detect whether the stamp is on the leading (left-hand side) or trailing (right-hand side) of the envelope and whether the letters are paid at the lower rate or not.

3. The stacking and cancelling section date-stamps the letters and puts them in one of four stacks according to the type of signal received from the second set of scanners. If no stamp has been found, the letters enter a fifth stack (uncancelled) and are dealt with specially.

Future developments

Although the initial laboratory trials have given promising results, much work remains to be done. In particular, research will continue to try to devise a method of treating stamps which does not involve a visible marking. The graphite lines used for the present experiment have been adopted in order to give the machine the earliest possible trials under live traffic conditions, and it does not necessarily follow that stamps will be permanently treated in this way.

Other work will be directed towards devising an automatic transfer system between the segregating machine - which is also currently undergoing trial at Southampton - and the facing machine, and at a later stage between the facing machine and the sorting machine, with the ultimate aim of achieving a system whereby letters need not be touched by hand at any point of their journey through the sorting office.

GENERAL POST OFFICE
CENtral 1170

19th December, 1957.

## Sorting Office Automatons - Machines for preparing mail

Every evening avalanches of mixed-up mail of all shapes and sizes descend on postal sorting offices throughout the country as the main collections are brought in and tipped out of sacks onto a series of long tables at the start of the journey through the postal system. Within an hour or two, all this mail must be leaving the office again on route for its destination, having been reduced to order, classified into various categories that are dealt with separately, post-marked, sorted, tied up in bundles in the case of letters, and finally put into hundreds of bags, a separate one for each destination.

The most tedious part of this work is the preliminary break-down of mail into various categories. Bulky matter such as newspapers and packets have to be picked out from letters, which in turn are divided into "longs" and "shorts". These have to be further sub-divided so that the "deferred" classes - such things as printed papers, bills etc. carrying only a twopenny stamp - can be held back for sorting after the fully paid, more urgent letters have been dealt with. Before they can be postmarked and sorted, all letters have to be arranged in piles so that the addresses face the same way and the stamps are all in top right hand corner of the envelope - the process every postman knows as "facing".

At large offices, this separating and facing needs scores of people at the peak hours - each dealing with about 2,000 letters and packets an hour. Small wonder that the efforts of post office experts have for a long time been directed at perfecting machines to do all this work automatically. Within the last few months the fruits of many years of patient research have been harvested, and equipment to perform automatically all processes necessary before letters can be sorted have started field trials at the Post Office's main experimental office - Southampton.

Here is how they work:

On arrival at the sorting office the mixed mail is tipped into a hopper and fed by conveyor into the segregator - a large, inclined, rotating drum, the sides of which are made up of a series of hinged flaps which open and close as the drum revolves. As they pass through the drum, letters slip out through the flaps onto another conveyor running below. Bulky matter cannot pass through the flaps, and emerges at the lower end of the drum ready for hand stamping. The segregator can deal with more than a thousand items a minute.

The letters are carried from under the drum and up through tower shaped separator units containing a series of rollers separated by eight inch gaps. "Short" letters are able to slip out through the gaps in the rollers and down onto a collecting device at the bottom, but "long" letters bridge the gaps and are carried to the top of the towers. The separated streams of "shorts" and "longs" are carried by more conveyors to an automatic stacker ready for facing.

The facing machine does its job by searching for the stamps on the letters as they pass through it at a rate of over 300 a minute, rearranging the envelopes as necessary and stacking them in orderly piles. The machine first searches the bottom of the letter back and front and if it does not find a stamp it turns the letter upside down and searches again. Date-stamping units are included, so that the letters emerge post-marked and completely prepared for sorting. The machine automatically picks out envelopes paid at the 2d printed paper rate, and sends these to a separate stack.

The method of stamp detection used in the present trials is based on the printing of an electrical conductor on the back of stamps under the gum (the black lines of graphite now familiar to everyone living in and around

the Southampton area). When letters move through the machine a high voltage electrical current leaps through the stamps and, making a circuit via the graphite, causes a "recognition" signal to be given to the machine.

By printing only one line of graphite on 2d. stamps, and two lines on the others, different signals are sent to the machine's "memory", so allowing envelopes bearing the former to be picked out from the others.

The Post Office hopes that ultimately machines like this will be a familiar sight in many large offices.

Note: This article was prepared for the "Daily Mail" supplement of January 30th, 1958.

GENERAL POST OFFICE
CENtral 1170.

FEBRUARY, 1958.

## The New Sorting Machines

The rate at which letters can be sorted by hand is limited, not only by the time it takes the sorter to pick up each one in turn, read the address and put it in the right pigeon-hole, but also by the number of boxes ("selections" as the Post Office calls them) he can reach comfortably from a standing position. The same is true of parcel sorting, with the added disadvantages that weight and bulk bring. With weights up to 15 lb., and lengths to 42 inches to contend with, it is little wonder that sorting parcels is a slow and laborious business.

Machines are being installed in post offices to speed up both these processes, and to minimise the physical effort involved in doing these jobs for long periods.

In advanced countries all over the world, postal authorities are experimenting with equipment to replace the age old methods of sorting letters. It can fairly be said that the machine invented and developed by the British Post Office in its laboratories at Dollis Hill, the prototype of which has been in regular service for over two years, is of more advanced design than any other letter sorter in use anywhere.

In an age of initials and nicknames, this machine has been christened ELSIE (Electronic Letter Sorting and Indicator Equipment). ELSIE will not only allow a postman to sort letters twice as fast as by hand but will also send them to three times as many selections, thereby cutting down very considerably the number of letters that have to be sorted a second time.

ELSIE consists basically of 144 stacking boxes, each labelled with the name of a different destination, to which letters are directed by the postman sitting at a keyboard at one end of the machine. Controlling the movement of the letters, and working on information received from the keyboard, is a "brain" made up of batteries of mechanical and electronic memory devices.

The letters for sorting, which have previously been faced and postmarked, are fed in to the machine in batches. An ingenious pick-up system presents them to the postman one by one in a viewing window. He reads the address, presses the correct combination of two keys (one with each hand) on the keyboard to correspond to the particular stacking box the letter is destined for, and the letter then starts on its journey through the power driven roller track of the machine.

Refinements on the keyboard are extra keys for cancelling out any wrong keying, and for sending to a special box letters which for one reason or another - insufficient address, illegible handwriting, and so on - will need to be dealt with specially.

Every time a key is pressed, information is sent to the brain, and stored in sequence in the memory system. This information is interpreted and automatically synchronised with the journey through the machine of the letter to which it refers. In this way, the "points" are correctly set for each letter in turn to arrive at its proper box, no matter how many are travelling through the machine at any time.

Unlike most other types of automatic sorter, the British machine has not got a set "rhythm" to which the operator must work - he is completely free to make his own pace.

This revoluntionary machine is surprisingly flexible in use, and can be installed in any number of units to meet the individual needs of particular offices. An order for twenty production models has been placed with the Thrissell Engineering Company of Bristol, and deliveries will start shortly. They will be put into different offices all over the country to help the Post Office get further experience of mechanical sorting under a variety of conditions, but the new sorting office at Norwich will be given enough machines to allow all sorting of "short" letters to be done mechanically.

The "Sovex" parcel sorting machine also uses a keyboard and a memory system for directing the parcels to their correct destination. The diagram shows an artist's impression of how a complete project might look. This is made up of a number of separate sorting units - each with two operators' positions - all being fed by a conveyor band (1), from which the parcels are ploughed off down a slope (2) to the operator (3) who reads the address and presses a key on his keyboard, after which the parcel drops through a trapdoor into one of the buckets on a moving endless chain (4), to be emptied automatically on the correct conveyor belt of the series running underneath (5) - chosen by pressing the key - which carries the parcel away to the next stage in its treatment. Each of these units will deal with up to 1,800 parcels an hour.

Machines of this type will do much to take the effort out of sorting office work. The sorting office of the future will be a brighter and a cleaner place to work in - as well as a more efficient mail processing factory - as a result of the Post Office's policy of keeping up with the march of scientific progress.

Note: This article was prepared for the Daily Mail supplement of January 30th, 1958.

GENERAL POST OFFICE
CENtral 1170.

FEBRUARY, 1958.