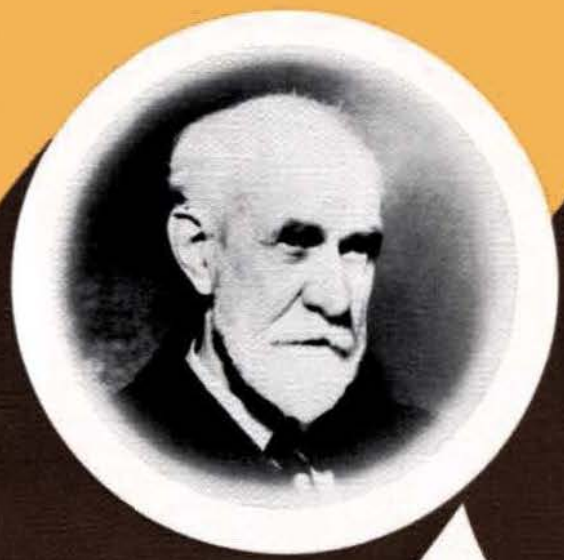
PRINT OUT 15

A FOUR-MONTHLY DIGEST OF NEWS FROM ITT CREED

DECEMBER 1971

Centenary of the birth of
Frederick G. Creed in 1871



ITT creed

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CONTENTS

The biography of Frederick G. Creed which constitutes the bulk of this edition of Print Out was written by Pamela Wilcox Bower.

Miss Bower has had extensive experience as a writer, director and producer for radio, television and films in England and America.

Her work for the BBC has included contributions to such series as Monitor, Tonight and Matters of Science. Her present activities include regular contributions to BBC Radio Brighton. She also produced and directed the film 'Brighton Story' starring Alec Clunes which was re-released this year under the sponsorship of ITT Creed.

Grateful acknowledgment is given to Mr G. R. M. Garratt MA, CEng, FIEE, FRAeS, a Keeper of the Science Museum, London, for allowing us to quote from his article "The Early History of Telegraphy" which appeared in volume 26 of Philips Technical Review.

This year our Company celebrates the centenary of the birth of our founder Frederick George Creed.

Creed, originally a telegraph operator, foresaw a great future for communications equipment.

Set against the perspective of the history of telegraphy, this biography is not only the story of the man but of the early days of the Company he established first in Glasgow and then in Croydon.

Today, closely allied to our parent organisation the International Telephone and Telegraph Corporation as our present nomenclature suggests, we are headquartered in Brighton with a workforce of some 3,000 people.

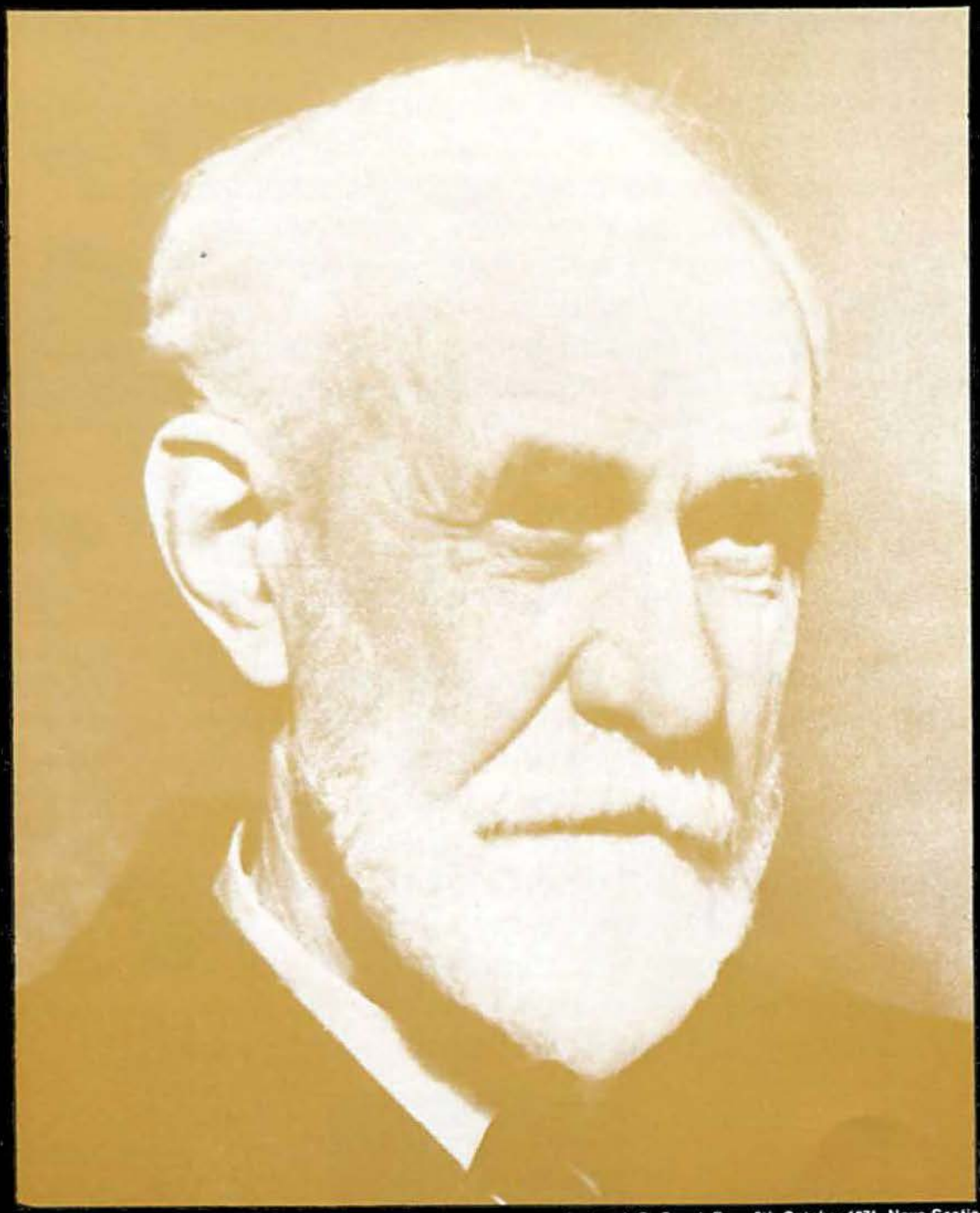
For us teleprinters have long been our staple product. Our customers include business houses of all kinds, oil and steel companies, airlines and railways, newspapers and press agencies, the Post Office and cable companies, car makers, the BBC, hotels, police forces and fire services, universities and research establishments, the Armed Forces and many others, both in this country and overseas. In brief, our teleprinters are helping to speed the affairs of trade and industry and are making all kinds of vital services more efficient through better communications.

Additionally, with the development of the teleprinter's natural but significant extension - the electronic dataprinter, the ITT Creed Envoy is forming an integral part of many electronic computer installations, both in the scientific and commercial fields at home and overseas.

From the time of the first experiments in a Glasgow shed over seven decades ago, the name Creed and our organisation has grown to achieve its reputation in the field of telecommunications that it enjoys today. We look forward with optimism to the challenge of the next seventy years.

Dr F. W. Stoneman
Managing Director ITT CREED

The breath of invention



Frederick G. Creed. Born 6th October 1871. Nova Scotia

This year, 1971, marks the centenary of the birth of Frederick G. Creed inventor of the Creed High Speed Automatic Printing Telegraphy System and the teleprinter that bore his name. With the former invention Creed revolutionised communications and brought more and faster news to newspapers.

Today he and his work remain largely unknown.

Consider any familiar medium in today's communication conscious world. From the headlines of the daily newspapers to the latest scores on BBC Grandstand—not to mention the multiple use of the teleprinter in carrying on the nation's daily business—all are due to the genius of one man, who, when he arrived in Britain in 1897, found newspapers claiming week old news as 'current intelligence.'

Who was this man—who, according to the reference books, might be 'the man who never was?' What was it that determined that a boy born of humble parentage and whose school days ended at fourteen should come to Britain to labour away in a small garden shed in Glasgow and to invent a highly complicated telegraphy system that was to revolutionise international communications?

Creed Childhood

Born in Mill Village, Nova Scotia on 6th October, 1871, Frederick George Creed was a boy who, like many famous men, 'crept unwillingly to school' and gave a poor account of themselves as scholars. There was not much for an ambitious lad to do when his nearest home town was the tiny fislung port of Canso on the eastern most point of the mainland of Nova Scotia. In the eighties of the last century the only thing that distinguished the place—then as now—was that the transatlantic cable lines terminated there.

There is one revealing anecdote about Creed's boyhood that has been handed down and repeated by enough people to make one believe in its authenticity.

As a small boy living in a village that had a weekly, and, rather erratic postal service, he was often asked by his mother to carry letters to her sister who lived in a village four miles away. The frequent journeys on foot, often undertaken in the depths of winter snow produced this protest from the eight-year-old, 'Surely there must be some easier, faster way.'

Self-taught Student

'Surely there must be some easier, faster way?'

Perhaps this summed up Creed's attitude to life and what he proposed to achieve, for at the age of only fourteen he left school to begin his remarkable career as a check boy for the Western Union Telegraph Company at Canso, Nova Scotia, where he proceeded to teach himself cable and land telegraphy.

He must have been a fast self-teacher—for three years later he was offered and accepted a job as a telegraph operator with the Central and South American Telegraph Cable Company in Peru, which in turn led to a transfer to that company's office in Iquique, Chile.

It was during the next few years—as a practical but often overworked Morse telegraph operator, finding the equipment far from perfect, that Creed repeated to his employers an adult version of his childhood protest to his mother about carrying mail through eight miles of Nova Scotian snow,

'There must be some easier, faster way.'

Creed, like fellow telegraph operators at the time, had reason to wish for an easier machine to work with than the Morse 'stick' perforator, (see figure 1), which required violent punching and caused what amounted to an occupational hazard of the job—a painful distortion of the right hand—which Creed carried with him until the end of his life.

To understand this physical hazard, a word on how the Morse 'stick' perforator Number Eight worked.

This was the era of hand operated Morse key circuits and Wheatstone telegraphy. The latter system was speedy for its day, being automatic in operation and based on the use of punched tape. But coding the message onto punched tape for transmission was a boring and laborious job.

The perforator was provided with three operating plungers, one for the dot, one for the dash and one for the space The operator, by hitting these plungers with small rubber tipped mallets, one in each hand, made the appropriate perforations in the tape.

So, not only did the operators have to punch out each element of the Morse Code combination separately, they had to supply the energy to move the tape as well!

No wonder the young Creed complained to his employers,

'There must be an easier and faster way.'

Indeed, this often repeated statement—you come across it many times in Creed's career—might well be taken as a personal signature to the motivation behind Creed's genius.

It is also a cry that has historical echoes in the long history of communications.

Fig. 1. 'Stick' perforator, introduced in 1867 for punching Morse message tapes. (Reproduced from 'Telegraphy' by J. W. Freebody, published by Sir Isaac Pitman & Sons Limited).

The Art of Communication

Someone once said that the history of the art of communication is the history of civilisation. A sweeping statement perhaps, yet in this age of mass communication media, how many of us recognise the echoes of our distant ancestry?

For instance, in World War II the signal of invasion was decreed by Churchill to be the ringing of church bells. Likewise to celebrate the victory of the R.A.F. in the air Battle of Britain—all the church bells in England were rung. American commentator Ed Murrow pronounced this a typical stroke of Churchillian showmanship. But Churchill would have been the first to admit that the idea sprung from mists of medieval English history, when people used to ring church bells to signal feast days or phases of the moon.

Roman roads were not only built in straight lines in order to get from A to B in the quickest manner—but to enable our Roman forbears to light beacons which would be visible from hill to hill.

Most people when driving over Telegraph Hill on Wimbledon Common assume that it is so named because of some connection with telegraphy. In fact, this landmark denotes the Admiralty end of a semaphore line built between London and Portsmouth early in the nineteenth century.

To place Creed the man, and the inventor, in the perspective of the great achievements which he was to attain, one must go back to the first half of the nineteenth century when momentous changes in the art of communication were being made—and nowhere more so than in France. In fact, it was a Frenchman, Claude Chappe who invented the first visual telegraph and semaphore.

Chappe's apparatus was an improvement on previous attempts at visual telegraphy (see figure 2).

At the top of a vertical pole, a long wooden beam was pivoted at its centre so that it could be rotated in a vertical plane. Slender arms, rotatable in the same plane, were fitted at each end of the beam and signalling was achieved by altering the position of the beam and the two arms.

The apparatus even with its modest dimensions could easily be viewed from a distance of 8-12 miles by means of a telescope. 196 signals were possible, 98 signs for letters of the alphabet and numerals, etc, and 98 for service instructions.

Other European countries soon followed the French example in making use of visual telegraphy and in England, between the years of 1811 and 1816, the Chappe system soon replaced the Admiralty's Shuttered Telegraphs.

For many years, chains of these Chappe telegraphs with their mysterious and incessantly moving arms were a great sight for tourists. The last of these Chappe semaphore lines was not finally closed until 1847, a year after the Cooke and Wheatstone electric telegraph had been set up along the railway between London and Portsmouth

In the early nineteenth century, numerous experimental telegraphy systems evolved. These included Sir Francis Ronalds' ill-fated electrostatic telegraph, the electrochemical telegraph of Soemmerring and the electro-magnetic telegraph developed by Baron Schilling from the earlier experiments of Oersted and Ampère. Incidentally Schilling's system was the first to apply the important principle of the binary code.

From 1830 onwards different lines of development tended to emerge in several countries, notably Germany, England and America.

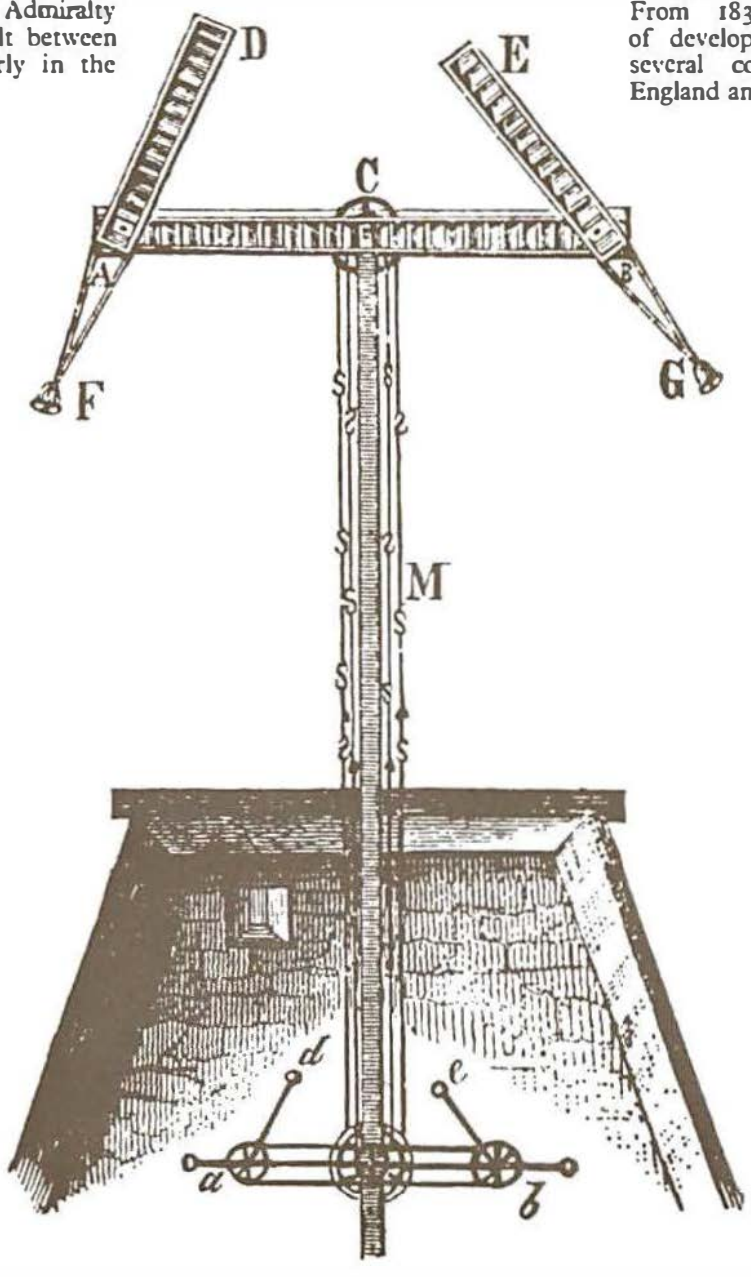
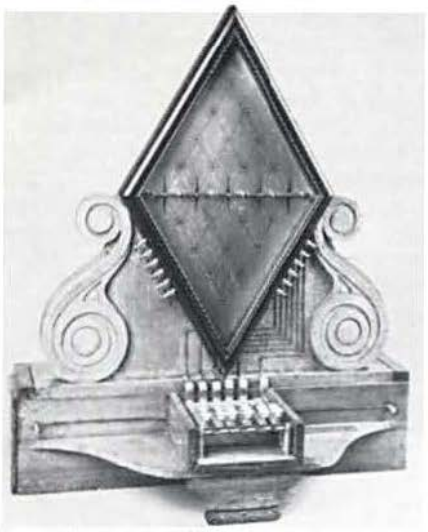


Fig. 2. Chappe's optical telegraph. A pole on top of a tower carries a pivoted beam (AB) with two rotatable arms (D, E). The position of the beam and the arms is controlled from inside the tower by means of the 'repetiteur' (a, b, d, e).

Cooke and Wheatstone

Development of the electric telegraph in England was accomplished almost entirely by the efforts of Francis Cooke and Charles Wheatstone. The first experimental telegraph devised by these two brilliant men in 1837 contained five vertical needles pivoting on horizontal axes and arranged across a diamond-shaped dial marked with the letters of the alphabet (see figure 3).



(Crown Copyright, Science Museum, London.)
Fig. 3. Cooke and Wheatstone's 5-needle telegraph. This is one of the original pair of instruments made in 1837 for demonstration and subsequently used from 1839 to 1843 on the Great Western Railway.

Each of the five needles carried on its axis a small magnet placed in the coil of wire behind the dial. The keys in front of the instrument were so connected that each needle could be deflected at will—to left or right, the corresponding needle in the distant receiver undergoing the same deflection. The signalling of any given letter was achieved by the deflection of the needles in opposite directions—the intersection of their direction indicating the required letter.

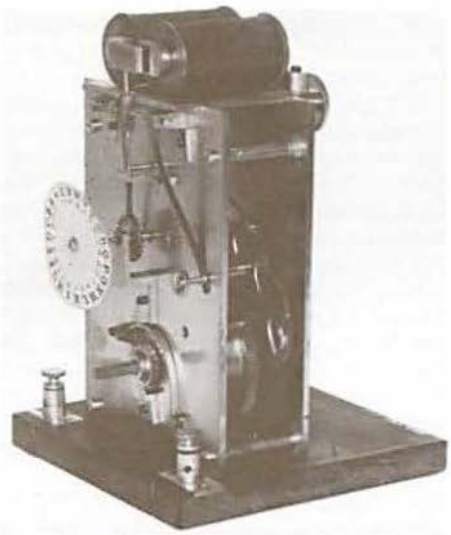
After the inventors had experienced great difficulty in persuading the railway companies that a telegraph was needed at all, it was installed on the Great Western Railway between Paddington and West Drayton in 1839.

With the experience of telegraph working it began to be realised that the simplicity of read-out was not really essential and that a higher rate of signalling could be achieved by experienced operators using a seemingly more complicated code and a system with only one or two indicators. Following this line of thought Cooke, in 1843, withdrew the 5 needle instruments on the Great Western Railway and replaced them by a design using only two needles. Each letter was signalled by a sequence of momentary deflections to left or right of one or both the needles.

The code, of course, necessitated some training of the operators but the system was soon shown to be far superior: in addition to reducing the capital outlay (by reason of the fewer wires and more simple instruments), it enabled a rate of working as high as 22 words per minute to be achieved.

A two-needle telegraph—adapted to conform with the surrounding architecture was installed in the Octagon Hall of the House of Commons by the Electric Telegraph Company in 1846, and was used for the sending and receiving of messages relating to Parliamentary business.

Wheatstone favoured the letter-indicating form of telegraph. In 1840 he devised what he called an 'A B C.' telegraph

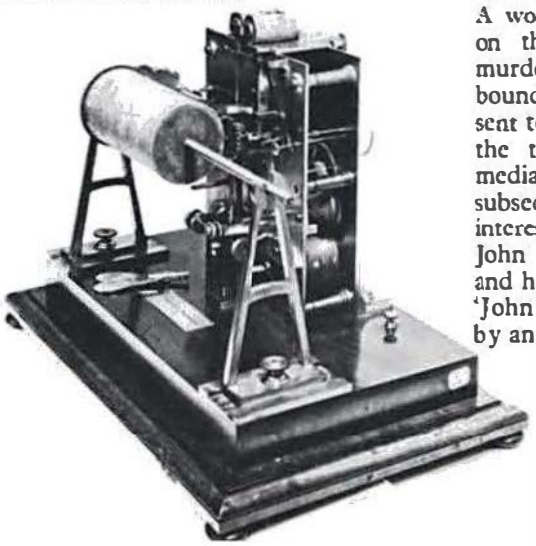


(Lent to Science Museum, London, by Kings' College, University of London.)
Fig. 4. Wheatstone's 'A.B.C.' telegraph, of 1840, based on his electromagnetic escapement. An electromagnet energized by pulses of current from the sender causes a step-by-step rotation of the clock-driven paper disc bearing letters and numerals.

(figure 4). It required a single wire line, along which pulses of current were sent to energise an electromagnet in the receiver. This electromagnet controlled a clockwork escapement whereby a paper disc bearing around its periphery the letters of the alphabet was made to rotate, step by step, behind a small window, a given letter being signalled by allowing the disc to pause for a moment while the required letter appeared in the window.

It had in common the disadvantage of what computer people would now call a long 'access time'. In the following year, 1841, Wheatstone transformed the instrument into a printing telegraph!

Fig. 5. Wheatstone's printing telegraph, 1841. It is a further development of the step-by-step telegraph shown in fig. 4.
(Photo: Science Museum, London.)



(figure 5). The 'letter disc' in this instrument was replaced by a type wheel, i.e. a circular arrangement of flexible reeds each carrying a type-face, and the window was replaced by a hammer behind this wheel. Having reached the correct position for a given letter, a separate signal was used to release the hammer to strike the type face against a sheet of paper placed on a drum, the latter making a sliding and rotatory movement as in our modern type-writers.

Although the apparatus was highly ingenious, there was no demand for a printing telegraph at this date.

In 1858 Wheatstone patented a completely new design of A B C. telegraph

(Photo: Science Museum, London.)
Fig. 6. Wheatstone's 'A.B.C.' telegraph, 1858. Like that shown in fig. 4, it also employed a step-by-step mechanism, but one of greatly improved design.

(figure 6). These instruments, though intricate, were beautifully constructed; very reliable and they remained popular for many years on private telegraph lines and on public circuits where the volume of traffic did not warrant the employment of highly trained operators. A few were still in use as recently as 1920!

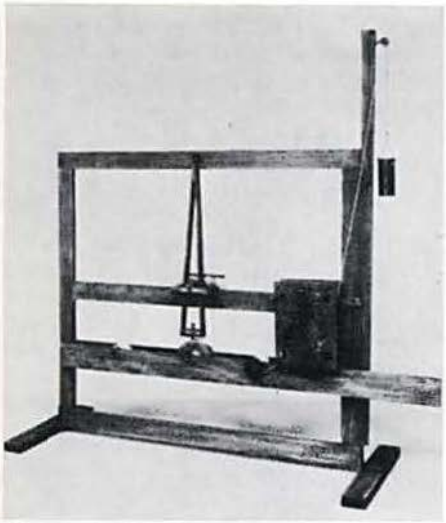
It is worth recording the high state of public interest and excitement over this new fangled invention, the Electric Telegraph. An interest that was suddenly brought into dramatic focus by the capture of a murderer which greatly contributed to public understanding of the service which the telegraph could render to the community.

A woman was murdered in her cottage on the outskirts of Slough and her murderer was seen to board a train bound for Paddington. A message was sent to Paddington station—where, when the train arrived, the man was immediately identified and arrested. His subsequent trial aroused tremendous interest, and when the accused man, John Tawell was eventually convicted and hanged, it was said that,

'John Tawell is the first man to be hanged by an electric telegraph.'

The Morse System

The development and introduction of the electric telegraph in America is usually ascribed to one man, Samuel Morse, but this is an over-simplification. Morse, an artist by training and profession, first conceived his idea of an electric telegraph while returning from a voyage to Europe in 1832 when he was nearly 50 years of age. His first crude instrument was constructed in 1835 (figure 7). For the frame he is said to have used part of an artist's easel. A wooden pendulum carrying an iron bar and a writing pen was suspended from the frame-work by means of a spring and was intended to be moved to and fro by an electromagnet energised by current pulses from a battery, the pen thereby recording a zig-zag line on a paper strip drawn continuously over a roller by a weight-driven mechanism. The instrument did not work well, Morse having been severely handicapped by his inadequate understanding of electromagnetism and his complete lack of mechanical skill.



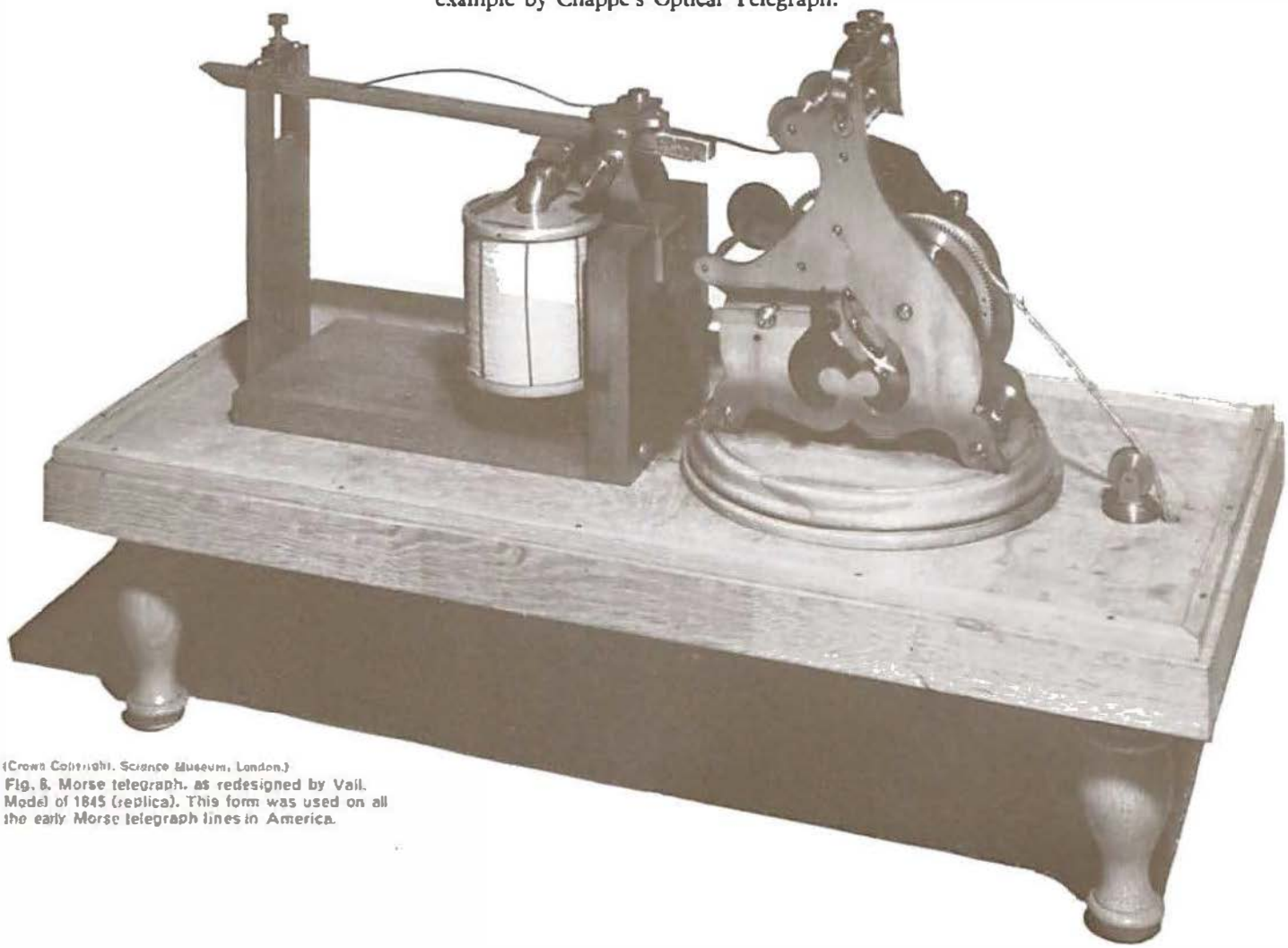
(Crown Copyright, Science Museum, London.)
Fig. 7. Morse's electromagnetic telegraph. First model of the receiver, 1835 (replica).

'Towards the end of 1835, Morse became acquainted with Leonard Gale, Professor of Chemistry at New York University, and Joseph Henry, who contributed to a clarification of his concepts of electricity. But it was his meeting with a young man, Alfred Vail, in 1837 that led to ultimate success. 'Vail, a well-educated man and competent mechanic, completely redesigned the telegraph (figure 8) and by the early part of 1838, it was capable of signalling through a line of about three miles. Vail's instrument recorded dots and dashes . . .

'. . . The system of coding was, of course, again an essential detail of such a system. Morse had started work on a code-book dictionary in which he conceived that messages would be conveyed by the transmission of groups of numerals—a very ancient idea and elaborated many times for example by Chappe's Optical Telegraph. '. . . Vail, however, in elaborating this code did better. He visited a local printer to ascertain the relative frequency with which each letter was used in the English language, and he detetmined the use of the shortest symbols for the most commonly used letters—a single dot for an E, a single dash for the T—and so on . . . Thus the Morse code was horn: an economical code, but one which should, in fact more correctly be termed the "Vail Code".'

Creed's early concepts

An interesting comparison between Morse and Creed, is that both men suffered from the same lack of mechanical skill. But Creed, unlike Morse never pretended to 'go it alone.' That is to say, that although all Creed's inventions—and there were many of them—were pure Creed, he always rallied around him top class support in any field in which he felt himself lacking. Perhaps it is the surest tribute to a genius, who was otherwise lacking in personal humility—that he managed to retain the loyalty of his 'scientific courtiers,' as one ex-employee described himself—until the end of his inventing life.



(Crown Copyright, Science Museum, London.)
Fig. 8. Morse telegraph, as redesigned by Vail. Model of 1845 (replica). This form was used on all the early Morse telegraph lines in America.

Creed arrives in Glasgow

It is an ironic fact that it was of the so-called Morse code, that Creed, the young Canadian telegraph operator, was saying in dismay to his superiors, 'There must be some easier, faster way.' The faster, easier way that Creed had in mind was still a series of hastily scrawled drawings and futile attempts to make his employers interested in a machine that looked like a typewriter, but which was in fact the embryo of the machine we know now as a teleprinter.

The time had come for young Creed to translate these scrawls and his dreams into reality, and in the spring of 1897 the frustrated Morse operator resigned, sailed for Great Britain, and took residence in Glasgow.

'Return to your Keys'

In later life Creed was to refer to Glasgow as 'Godmother Glasgow.' But if the true 'Godmother' was in fact the *Glasgow Herald*, then Creed's 'Godfather' was the late Lord Kelvin.

But it wasn't love at first sight on either side. At first the *Herald* would go no further than give Creed a job—his old job as a Morse operator.

As for Lord Kelvin—it was to him that Creed had come for advice and assistance to perfect his idea for a new Morse-based telegraphic keyboard perforator which would revolutionise the speed of telegraphic operating.

But all Creed got from Lord Kelvin was 'return to your job, there's no future in your idea.'

Young Creed protested that the newspaper Kelvin was reading was about an event in America that was over a week old and pointed out that there had been no speed-up in the transmitting of news since the death of Lincoln. The despatch containing news of his assassination had been transmitted by pigeon by another ambitious young man—Charles Reuter.

Kelvin remained unimpressed. Pointing out the difficulties facing the young inventor, he repeated his advice 'Return to your job.'

Creed returned—but spent most of his time knocking on the door of Assistant Editor Alexander Ewing, who in his turn repeated Kelvin's advice, but in slightly terser language.

'Return to your keys.'

Undaunted, young Creed drew his first week's wages, and made two detours on the way home which were to be the turning point in his dogged fight for recognition.

First, he stopped at an auction sale in Sauchiehall Street, Glasgow, and for the sum of fifteen shillings bought himself an old Barlock typewriter. For a further five shillings a week he rented himself a garden shed in a Glasgow suburb.

For the next year, despite his almost complete lack of mechanical training and the repeated advice of Ewing to 'Return to your keys,' Creed worked almost single-handed in developing his prototype.

That old Barlock typewriter was to become to Creed what 'rosebud' was to Orson Welles' 'Citizen Caine.' It was more than a mascot—it became his talisman which he never let out of his sight. Years later he used it as a working base for other experiments.

One of his employees, a foreman for twenty years at his factory in Croydon, said that every night when Creed was leaving he would wrap up this battered old object in brown paper. The first thing he would do on arriving in the morning, was to unwrap it and examine it to see if any harm had come to it overnight. Whenever he was absent for a day or two, Creed's last instructions to his foreman were always the same about what he called 'his BOX.'

'While I'm away don't let my BOX out of your sight.'

He always talked about his 'BOX' the employee added, as if he were spelling it in capitals. Many who remember working with him now remark ruefully that he also spelt the name CREED in those same capitals.

Such was the progress in that garden shed, that at the end of the year, Creed returned to Lord Kelvin who was so impressed that this time he offered him the technical facilities with which to complete his work.

According to the Glasgow Street Directory of 1904 the first address at which Creed was to set up a factory was at 156 St Vincent Street, Glasgow. By an ironic twist of fate which would please Creed's evangelistic teetotaller's spirit that same building today houses the 'TEMPERANCE Building Society!'

'F. G. Creed in 1912'

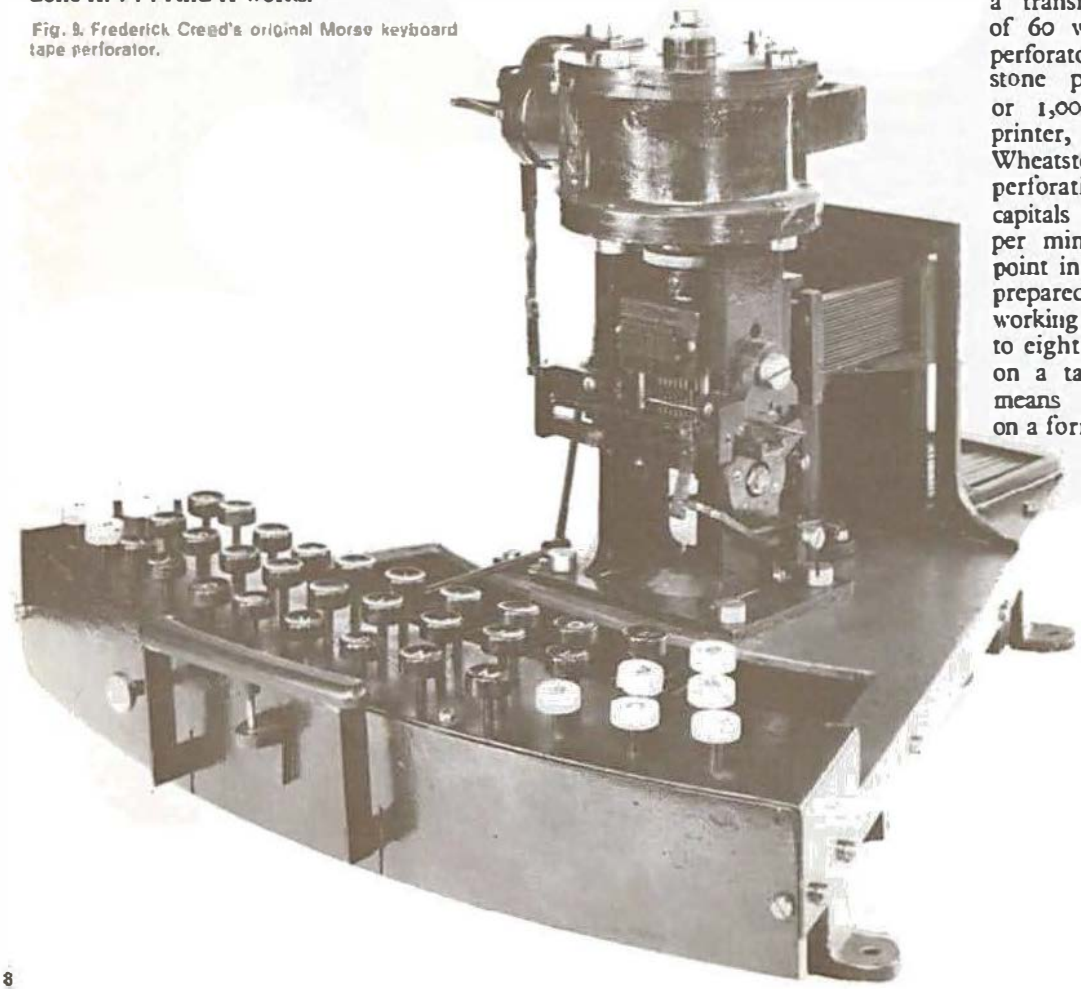
In fact, Creed's 'factory' consisted of only one rented room at the top of the building. According to one of his first employees Creed managed to make life nearly unbearable for his neighbours, and, in particular, for the man who had rented the room directly below him. Losing no time in installing a noisy compressor, Creed caused this downstairs neighbour to be extremely irritated by the resultant cacophony.

But Creed's genius for persuasion made an honourable compromise possible. When the neighbour arrived in his office to make 'phone calls or conduct urgent business he was asked to knock on the ceiling with a broom. This was a signal for Creed to switch off his air compressor. Then, his business completed, the man would be required to thump on the ceiling again, and was obliged to retreat before the noise recommenced.

An indication of the dogged determination which propelled Creed to the fulfilment of his aims can be found in the Glasgow Street Directory of 1905 in which Creed, working in one room with little equipment and impeded by irate neighbours, nevertheless advertised his first business address at St Vincent Street as 'CREED—MAKERS OF TELEGRAPHIC EQUIPMENT.'

A premature description? Not really. For exactly one year later Creed was to burst into Alexander Ewing's office at the *Herald* carrying a machine that looked like a typewriter with a small mangle mounted on it and set off by an alarm clock (see figure 9). Placing this strange contraption on Ewing's desk, Creed cried triumphantly, 'I've done it! . . . And it works!'

Fig. 9. Frederick Creed's original Morse keyboard tape perforator.



Creed's Eureka

What was it that Creed's first hectic year of pure invention had brought forth? The best answer comes from the *Glasgow Herald* itself.

'Through the first decade of the century there was little change in the methods of telegraphy—the tape being prepared by stick punches, fed to the line at high speed, and the resulting Wheatstone tapes were written up by hand at the Glasgow end.'

In announcing the lease of a high speed wire the *Herald* added:

'The low bar punching tape for Wheatstone working will be much lightened by the use of the Creed perforator, a remarkable machine which does three times the work of an ordinary stick puncher. The perforators are being constructed by Mr James White, well-known electrician, for the inventor, Mr F. G. Creed.'

The first machine developed in the Glasgow garden shed was the Morse Keyboard Tape Perforator operated by compressed air. Its superiority over the 'stick perforator' attracted the attention of the Post Office, who in 1902 placed an order for twelve machines.

By now Creed had turned his thoughts to the development of equipment that would improve message handling on the receiving side.

In the Wheatstone system, as then generally employed, the incoming signals were recorded on a moving strip of paper by a pen and ink device. This merely recorded the signals as a series of dots and dashes and again a skilled operator was required to decode the message.

With the aid of a small team of mechanics, Creed produced two further machines

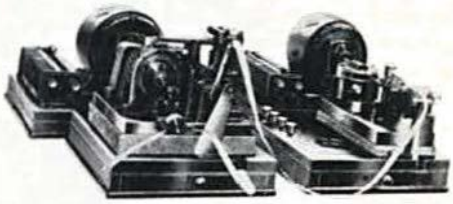


Fig. 10. Morse Reperforator and Morse Tape Printer

(see figure 10). These were a receiving perforator (reperforator), which recorded the incoming signals in a perforated tape identical with that used at the other end of the line for transmission; and a printer which accepted the received message tape and decoded it into plain language printed characters on ordinary paper tape.

Thus was born the 'Creed High Speed Automatic Printing Telegraphy System.' The acceptance and introduction of the Creed machines by the *Glasgow Herald* marked the first stage in the now almost universal system of Creed High Speed Telegraphy. In giving Creed the freedom of the *Herald* wire for his most important experiments the *Glasgow Herald* notched up a well deserved 'first' in the field of telegraphic journalism.

Here is a description of the equipment in 1914, when it went on war service:

'The Creed telegraphic equipment comprises a keyboard perforator used for preparing Wheatstone perforated tape; a transmitter with a working speed of 60 words per minute; a receiving perforator capable of reproducing Wheatstone perforated Slip at 200 words or 1,000 letters per minute; and a printer, which, under the control of Wheatstone tape obtained from the perforating receiver, prints in large capitals at a maximum of 775 letters per minute. This printer is a unique point in the system by which a message prepared at double the speed of hand-working is transmitted, say at five to eight times hand speed, and printed on a tape, which is neatly pasted by means of a semi-automatic process, on a form ready for delivery.'

Continued on page 13

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DECEMBER 1971

ITT Creed announce two new senior appointments.

Effective from 1 November 1971, Mr. F. S. Reade, formerly marketing director, now assumes new responsibilities and will assist the Managing Director on special projects aimed at expanding the activities of the Company.

On the same date Mr. S. Hesketh, from the Microwave and Line Division of Standard Telephones and Cables at Basildon, joined the Company as Sales Director.

Mr. Hesketh was born in Southport, Lancashire, in 1914. He graduated from Liverpool University in 1937 (Telecommunications Engineering).

Mr. Hesketh joined GEC Telecommunications where he was engaged in their engineering and commercial operations. (During this period he spent 6½ years in the Royal Corps. of Signals). He relinquished his post with GEC to join Standard Telephones and Cables Transmission Division as its Marketing Manager in 1967.

Mr. Hesketh has been responsible for the total marketing policy and implementation of this policy within the STC Basildon Division. Married with a married daughter (and grand-daughter) Mr. Hesketh takes a keen interest in athletics and motor racing.

supplement

ITT Creed is marketing data and communications systems including Model 444 Teleprinters and Envoy Dataprinters. The systems can incorporate a new Terminal Exchange Unit (T.E.U. 20) [in the UK only] supplied by Advanced Telecommunications Equipment Ltd. of Woking, Surrey. This unit will operate with 444 Teleprinters or Envoy Dataprinters.

The T.E.U. 20 can accept 5 (C.C.I.T.T. No. 2) or alternatively 8 (C.C.I.T.T. No. 5 or ASCII based) unit coded signals at speeds of 50, 75 or 110 bauds.

The unit can be equipped for a maximum of 20 lines and accommodate up to 10 simultaneous two-way connections between subscribers. Additionally up to 10 trunk lines can be added to the unit.

Random selective broadcast can be made available as an optional extra.

A master over-ride facility is provided for urgent broadcast messages as standard.

All input/output circuits are designed to conform to standard B.P.O. private wire specifications and requirements for connection to privately rented lines.

The signalling configuration is 2 wire (send and receive legs) with common earth return, using 80-0-80 volt signals with negative for MARK. Line currents are 12-20 mAs according to line resistance. Line monitoring and testing points are provided enabling Teleprinter and/or oscilloscope monitoring.

Visual line fault indication is provided.

The exchange includes line protection and anti-interference filters.

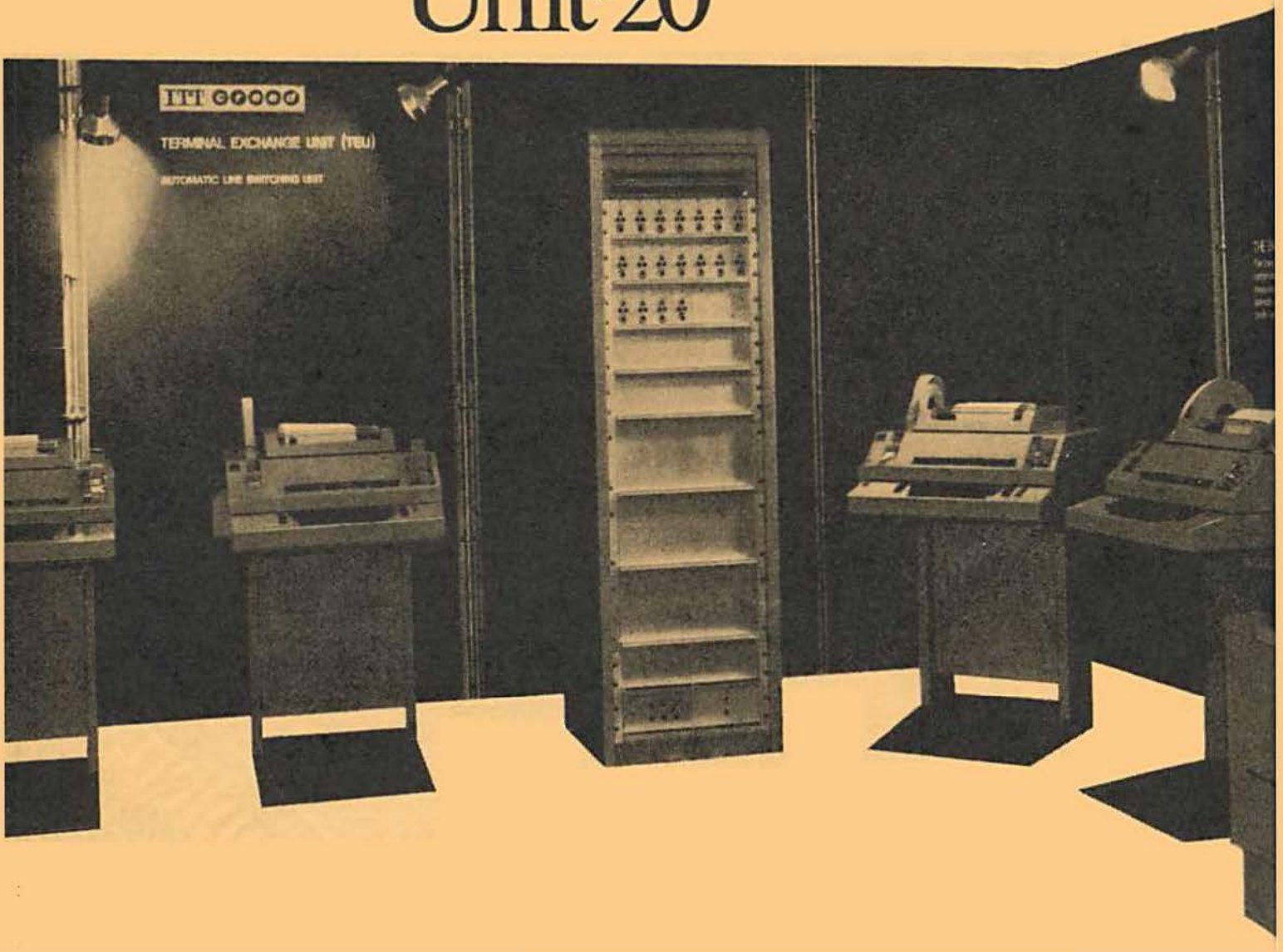
Standby power supply unit can be supplied as an optional extra on request.

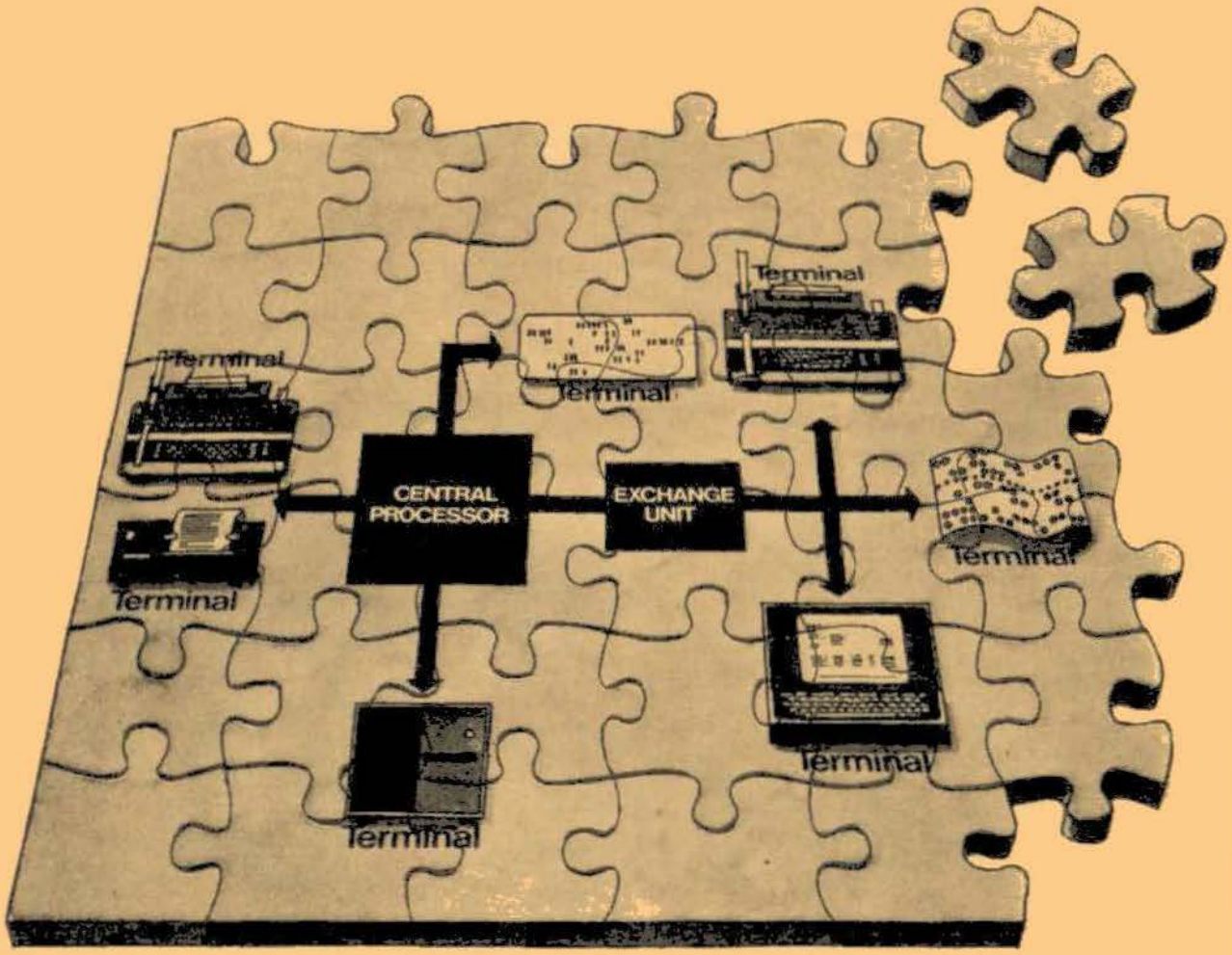
All component modules are housed in an Imhof 19" enclosed rack 6' high.

The external finish is Imhof standard.

Further information on request from the Sales Manager, ITT Creed, Prudential House, North Street, Brighton BN1 1SU.

Terminal Exchange Unit-20





Leave the puzzle to us.

Those first steps towards a data or communication system are guaranteed to confuse. A real puzzlement.

That's where ITT Creed come in.

Think of us and you think of some of the best data terminals and teleprinters in the world. It's been that way since Frederick Creed's pioneer work began way back in 1897.

But we involve ourselves in advice, design and installation of the complete systems, too – getting away from simply manufacturing peripherals.

So that now we're in a position to handle anything and everything connected with data preparation, data collection, data transmission, communication and intercommunication.

Anything, in fact, that requires the preparation and transfer of printed information between local or remote locations.

Our Envoy and 444 printers you'll know already. What our marketing staff will do is show you how best to integrate these, and other peripherals, into a system within your business.

To speed up information transfer and eliminate some of those administrative problems that are causing bother.

No problem is too big or too small for our attention. We work from a basic two machine set-up, upwards. And all of our equipment is covered by a nationwide installation and servicing staff to ensure speedy, reliable attention at all times. Whether you rent or whether you buy.

Once you've decided on a complete data or communication system–you get in touch, tell us your troubles and we'll take it from there.

Already we've installed many complete systems to specification. For international companies. For foreign telegraph services. For airports – and so on.

We'll fit the pieces of the puzzle into place – keeping you in the picture through every stage of the operation.

Clip your company letterhead to this coupon for more information about our complete data communication systems.

Name .....

Position .....

Tel. No. .....

PR Dept. ITT Creed, Hollingbury, Brighton BN1 8AL.

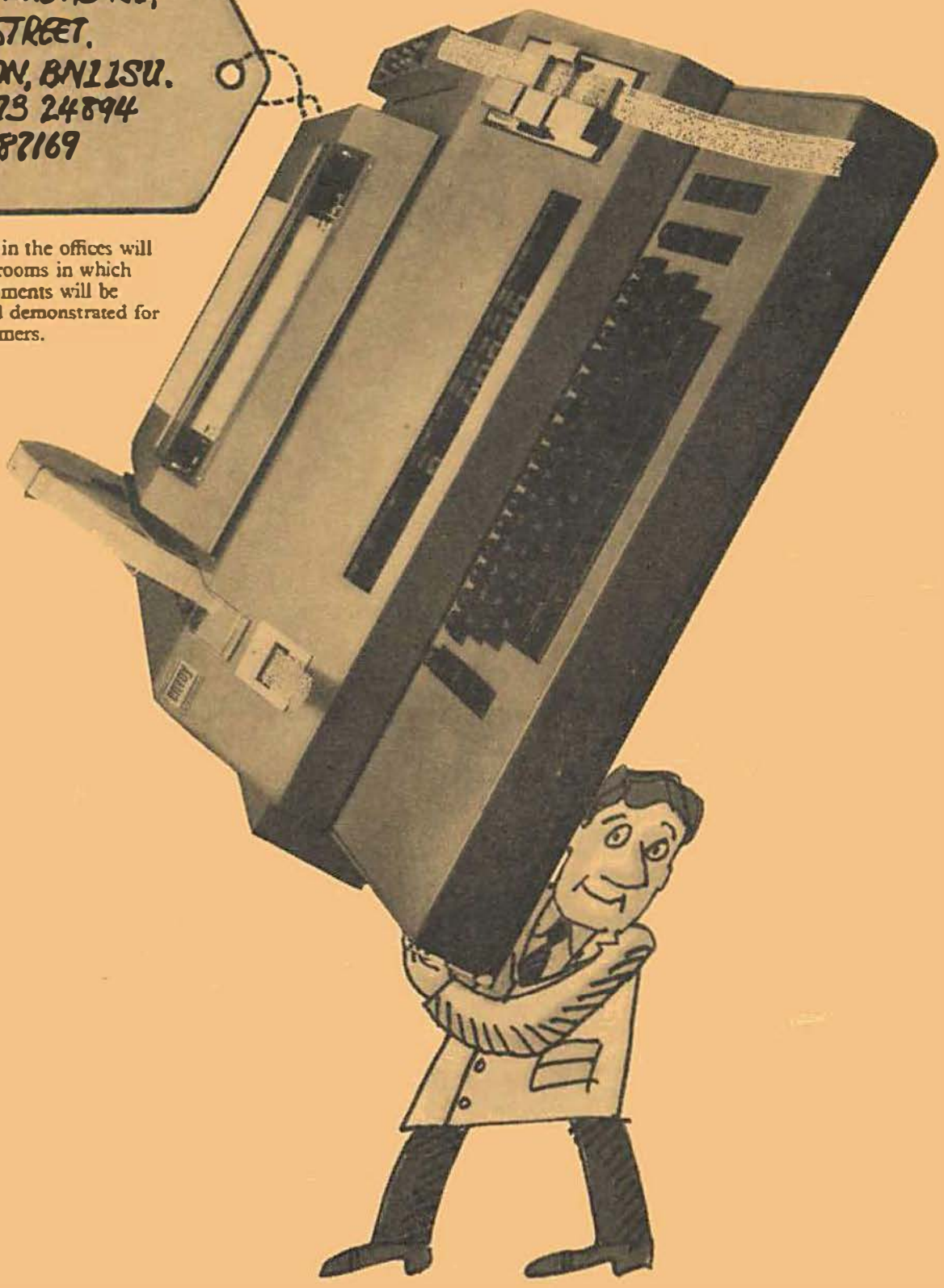
ITT creed

New Sales Offices and Showrooms

ITT Creed Machine Sales Department have moved into newpremises in central Brighton The new location is

PRUDENTIAL HOUSE,
NORTH STREET,
BRIGHTON, BN1 1SU.
TEL: 0273 24894
TELEX: 87169

Incorporated in the offices will be new showrooms in which current equipments will be displayed and demonstrated for visiting customers.



Continued from page 8

The first Creed invention, with minor improvements, dictated by experience, was still in use twenty years later, and in 1931 was in universal use by the press and the Post Office.

To understand Creed's second battle—the battle for the acceptance of his invention—it is worth looking ahead a few years—to the beginning of this struggle, as one man remembers it during the early twenties in Canada.

A Creed Pioneer

Richard Royan, one time salesman of Creed Teleprinters brings this struggle vividly to life in an article 'MEMORIES OF THE TELEPRINTER PIONEERS.'

Royan recalls that on his selling trek in North America, Morse telegraphy was still practised extensively, both in the US and Canada. It was not until 1928 that Creed's company finally obtained an order for 100 machines—mainly Model 2P printers—from the Canadian press.

This was an exciting victory, but as Royan goes on to tell us winning the order was easy compared with the effort involved in actually getting the machines installed.

'It was a pioneering operation,' writes Royan, 'occupying a period of over two years, and which took me into every town in Canada big enough to support a local newspaper and accommodate a Model 2P Printer.... Many Morse operators who lost their jobs with the introduction of the Creed machines took a very uneo-operative view of the situation,' recalls Royan. 'One such operator went so far one dark night as to enter the office in which he had formerly pounded a Morse key, and smashed the Model 2P with a hammer!'

The Move to Croydon

In 1909, alas as today, unemployment was Glasgow's biggest industry, and Creed had his eye on greener fields. His greatest frustration at that time was the slowness of the Post Office in accepting the use of his machines. Not content with the fact that the Post Office had been his first customer, albeit for only twelve machines, he bombarded each succeeding Postmaster General with letters imploring them to try his machines.

Finally, he decided the mountain must go to Mohammed and he wryly told an acquaintance at the time that his main decision for moving his factory to Croydon was that, 'I will be nearer to the Postmaster General.'

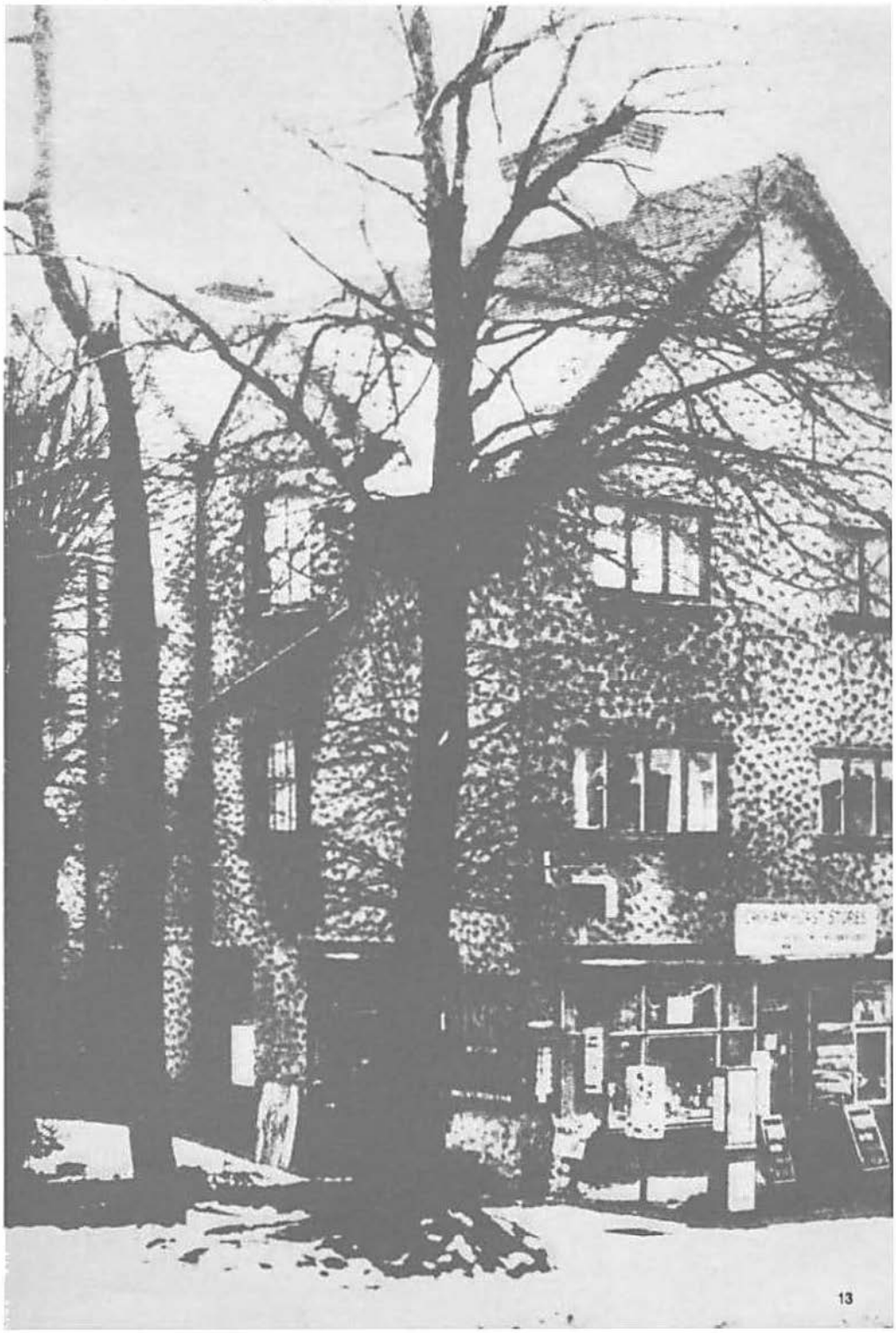
Nine employees gave up their homes and jobs to travel to London with this eccentric Canadian, who had an unquenchable faith that if all else failed the Almighty would help him to sell his machines.

Croydon was all Creed feared it would be, and worse! When he and his nine faithful followers arrived there on a cold Saturday morning in November 1909 it was recalled by one of his men that,

'On Sunday we had arranged to meet and go for a walk around the town. What we saw stunned us—people working—people gardening—people going into pubs. It sounds ridiculous now, but fifty or sixty years ago, to a Scot like myself who had some religion it was bad enough. To Creed—it was like going on a day trip to Sodom.'

The group finally recovered sufficiently to assemble at the house in Selsdon Road which had been converted partially into a workshop (see figure 11). The machinery sent down in crates from Scotland had yet to be unpacked, but before doing so Creed set his own seal of satisfaction on the completion of their move by reading a prayer and a parable.

Fig. 11. The house in Selsdon Road that stood on the site of Mr. Creed's first 'factory' in Croydon.



There can hardly be a more miserable creature than a Scot newly away from his homeland on Hogmanay, and Creed for all his prayer-reading (which included one to the Almighty beseeching that the new Postmaster General might be made to see the light) was apparently not insensitive to the home sickness of his little band of followers. He spent most of that first Christmas Day visiting them at their lodgings to see if they were comfortable, although, as one ex-employee put it,

'The main reason for Creed's concern was that any of us should have been contaminated by the Sodom and Gomorrah atmosphere that was to be our new home.'

The Perils of Drink

An employee who later became a Director recalls:

'Creed was a big man in every way. He thought big. His temper was a frightening thing to behold, but he was also incapable of pettiness in any form.'

Another ex-employee, who at the age of 14 knocked on the door of his house in Selsdon Road, Croydon, to ask for a job, felt that it was God himself who had answered the door.

'A giant of a man wearing a black Stetson hat. I was terrified of all six foot four of him and when he asked me to sign the pledge I did so at once, although I had no idea what I was signing . . . judging by his manner it might have been my death warrant!'

'Not to sign the pledge would have been the equivalent of that death warrant in Creed's eyes. All his life he was a strict and devout Christian, a non-drinker, non-smoker, and a natural-born crusader who practised his beliefs not only on his own family, but on all who worked for him. No-one entered Creed's employment, not even a fourteen-year-old boy, without first signing the pledge:

'I solely solemnly undertake that I will not consume alcohol in any form nor frequent taverns while I am employed by the company.'

'I have seen him jump off a bus to drag one of his employees, who signed the pledge, away from the tavern door by force . . . but he was also a brilliant man and he had enough charm when he wanted to use it to make you believe that.'

In one respect Croydon and the ultimate success of his company was going to present Creed with a unique problem. The booming orders eventually meant enlarging the staff to include the heathen Southerners, who happily signed the pledge as a requisite to their employment, and equally happily went off to the Drovers Hotel every evening, justifying themselves by saying that the pledge was only binding during working hours. Two or three men were sacked for such behaviour, but gradually Creed was forced to turn a blind eye. When told that the majority of his staff were prohibition breakers he controlled his normally violent temper.

'If it is true,' he said 'then all my men are liars—and I refuse to believe that for a moment.'

All his life Creed continued to take his prohibition work very seriously, and even went so far as to join forces at public meetings with Lady Astor. Besides his hatred of drink, Creed was a born crusader who often involved himself in moral and patriotic causes such as the 'Keep Britain Great Movement.'

When the legendary 'Pussyfoot Johnson,' America's Great White Chief of Prohibition, came to England he was, of course, invited to visit the Creed factory. As he toured the works, Creed extolled the virtues of his workers,

'And what does your father do for a living?' asked Pussyfoot of one young worker.

'He runs an off-licence, sir,' came the reply.

Creed's religious beliefs extended to his whole family. On Sundays, when other children spent at least part of the time playing, the Creed children went back and forth to the local Evangelistic Mission for services and lessons, but the situation in retrospect is not without its irony.

The Mission that Creed supported was started and run by the Watney daughters. They were as adamant as Creed about the evils of drink—yet, how they supported a Mission which owed its existence to the very thing they were condemning, remains a mystery.

Creed was married twice. We hear little about his first wife other than that she shared his crusading beliefs. But his second wife who still lives in Croydon said of him, 'to be near him was to believe in him utterly'.

A Kind Giant

All his life, Creed seems to have managed to surround himself with people who believed in him utterly. But whether he believed in anyone but himself and his God is open to question.

One personal bereavement, which apparently affected him deeply, was the death of his first business partner.

Early in 1908 Creed had formed a partnership known as Creed and Bille, joining his name to that of a close associate, Harald Bille, a well-known Danish telegraph engineer. The partnership became a limited company, Creed Bille & Co Ltd, in 1912.

Harald Bille became Managing Director of the company, but met his death in a railway accident in 1916. Following his death, the company name was changed to Creed & Company Limited.

An original employee recalls:

'In all the time I knew him, nothing upset Creed so much as the news of this tragedy. Bille and he had an understanding which went far beyond a business partnership. I don't think he ever got over it.'

George Street, Croydon circa 1912.

Even in the context of over half a century ago, Creed as a family man seemed to present a rather stern father figure. But his kindness and understanding to his professional colleagues was without question. He was never loath to give credit where credit was due, nor did he aspire to be the tyrannical taskmaster. One employee remembers the first experiment Creed ever entrusted him with as a young man. It went wrong, badly wrong, and held up production for several weeks. All Creed said to him was,
'Never mind, it happens to us all at some time.'

Years later, when Creed, using himself as a guinea pig, was experimenting with a new invention, which he called 'a new irremovable hair dye' something went wrong, badly wrong. Creed travelled halfway across London to present himself at the home of the same employee—complete with a beard that was every colour of the rainbow.
'You see,' he said with a grin, 'it happens to us all at some time.'

The First Big Breakthrough

In 1912, the *Daily Mail* was the first national daily newspaper to adopt the Creed system. Creed is reported to have rushed out of the house in the morning to buy the first 'Creed Edition.' In such a state of exaltation he forgot, for the first time in his life, to say his prayers. No doubt the Almighty forgave him, when his triumph was consolidated by a letter from the mighty Northcliffe himself—dated 24th April, 1913 (see figure 12).
Other newspapers shortly followed this lead and export business began to develop, with orders from telegraph administrations and companies in Denmark, India, Australia, South Africa and Sweden.

Fig. 12. Letter received from the *Daily Mail, 1913.*

[LORD NORTHCLIFFE, CHAIRMAN OF ASSOCIATED NEWSPAPERS LIMITED, PROPRIETORS OF THE DAILY MAIL]

THE DAILY MAIL, LONDON.

Telegrams Daily Mail London
Telephone 5000 Holborn

Carmelite House, E.C.

24th April 1913.

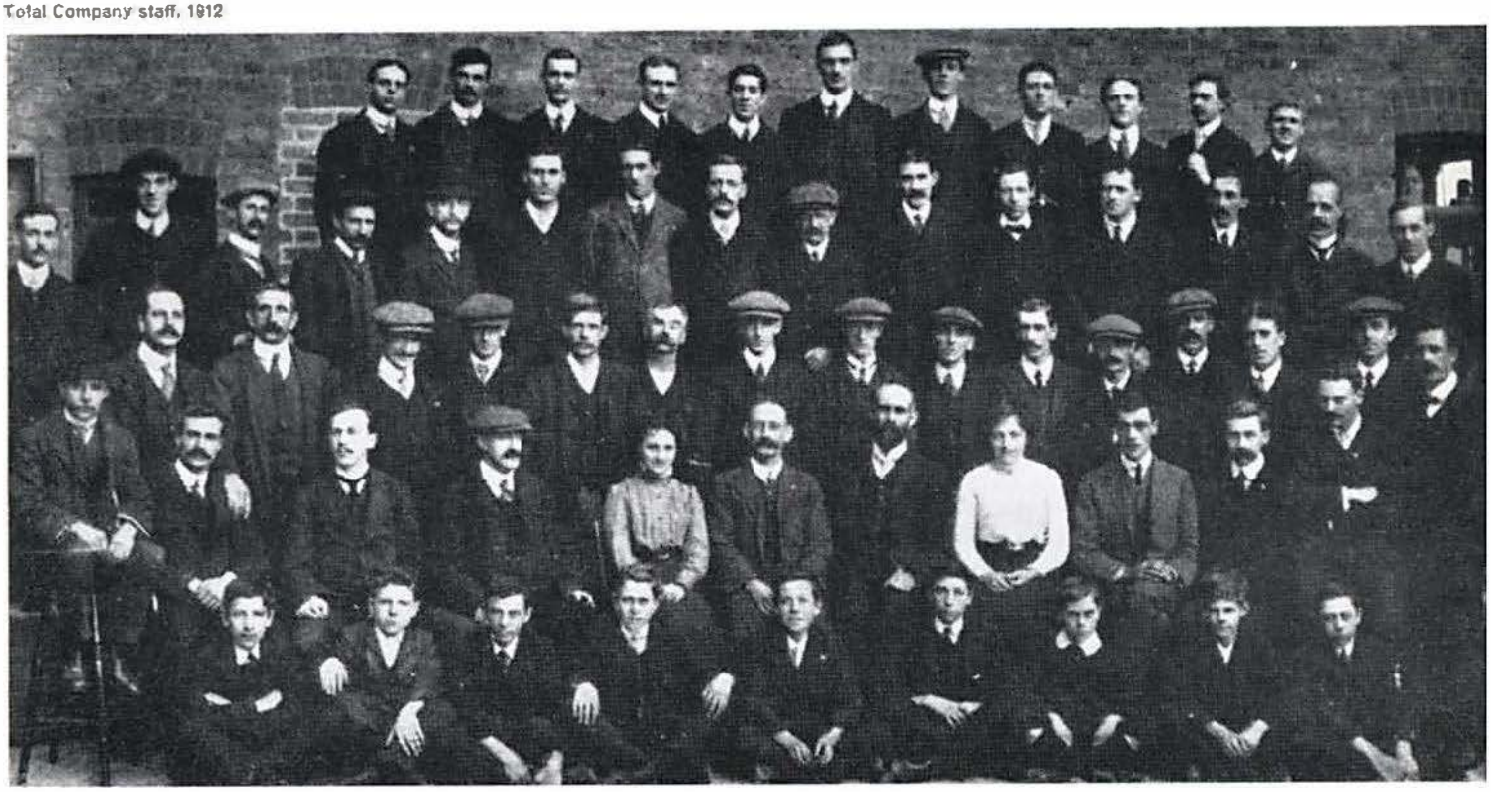
The entire contents of the Daily Mail are telegraphed every night from London to Manchester and Paris for simultaneous publication, a labour which involves the highest speed and great accuracy. For many years it was necessary to have the whole of this matter transmitted to Manchester by the Wheatstone instrument and written by hand by a large staff of telegraph clerks.

In 1912 it was decided that the improvements in the Creed telegraph printing machine rendered it suitable for the heavy work of the Manchester wire. Under the severest tests it roproduces automatically in printed words the entire contents of the newspapor, and the slow process of handwriting is abolished.

We have gained in speed and in accuracy. The "copy" is clearer and easier for sub-editors and compositors. We have a machine that never tires and does not make mistakes of its own.

Northcliffe

Total Company staff, 1912



By the end of the First World War—the wire and telegraph rooms were being dubbed the international name they bear today—the Creed Rooms.

But he was not doing so well at the Post Office.

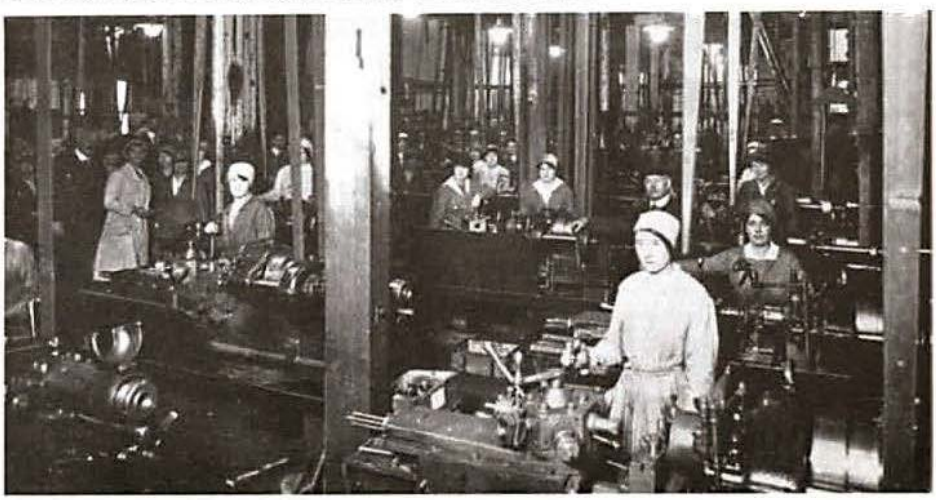
When not working at his factory, at Telegraph Works, it is said that he spent most of his time, close enough to the Postmaster General to bombard him with sales talk and who could blame him? Here was a man at the height of his inventive genius—wasting his days away sitting in draughty corridors waiting for a chance to prove his new machines.

'He put up with immense humiliation during that period,' one of his pioneer colleagues recalls, 'but he bore it with dignity and patience and without a flicker of doubt that one day he would win.'

To be fair to the Post Office, they must have shared the same qualms as their Canadian counterparts regarding large numbers of staff being put out of work. It was not until Creed had worked on a further development of his machines in which the keyboards, perforators and transmitters had been combined into one instrument—that the Post Office decided finally to adopt them.

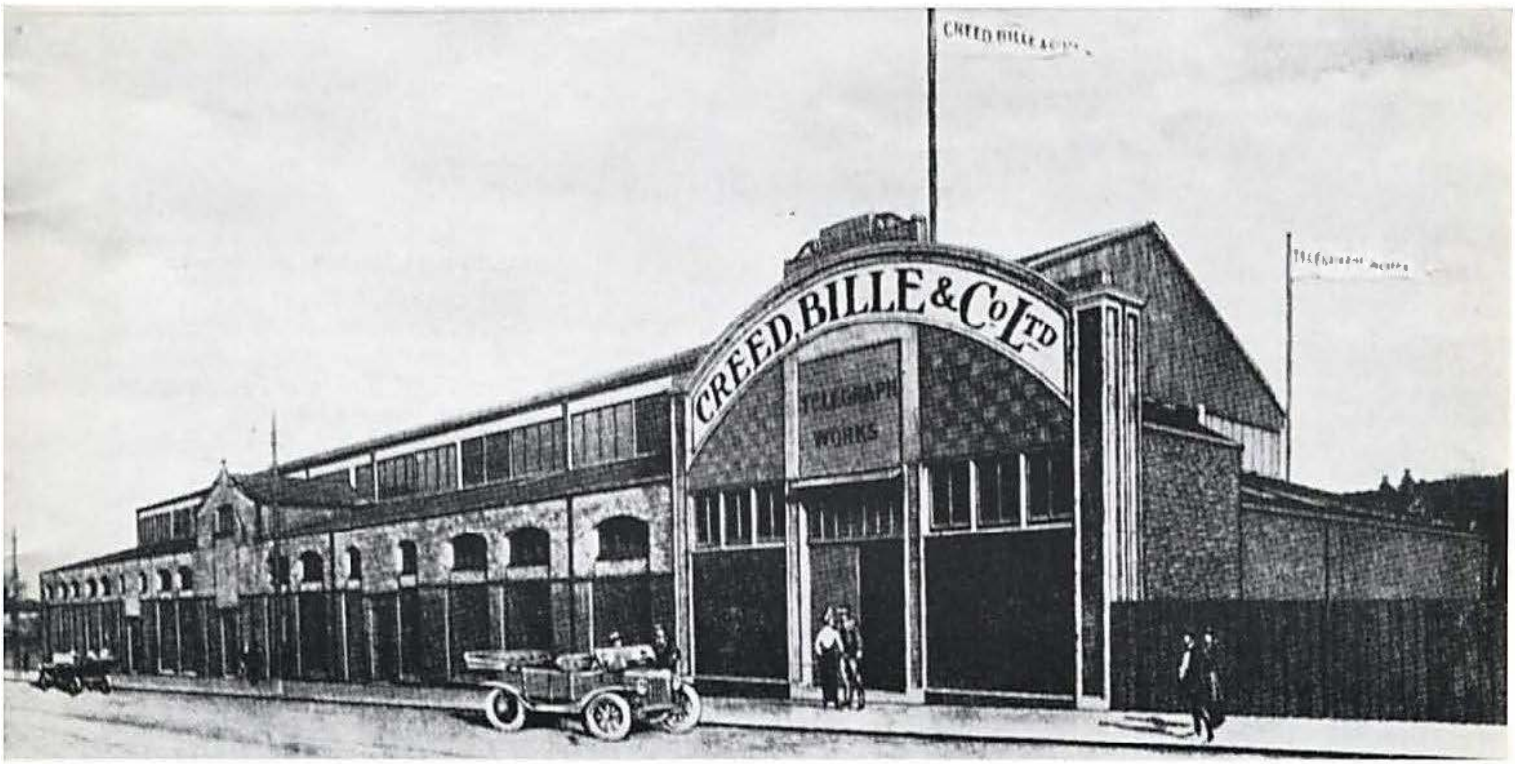
Creed's comment on this final capitulation was typical,

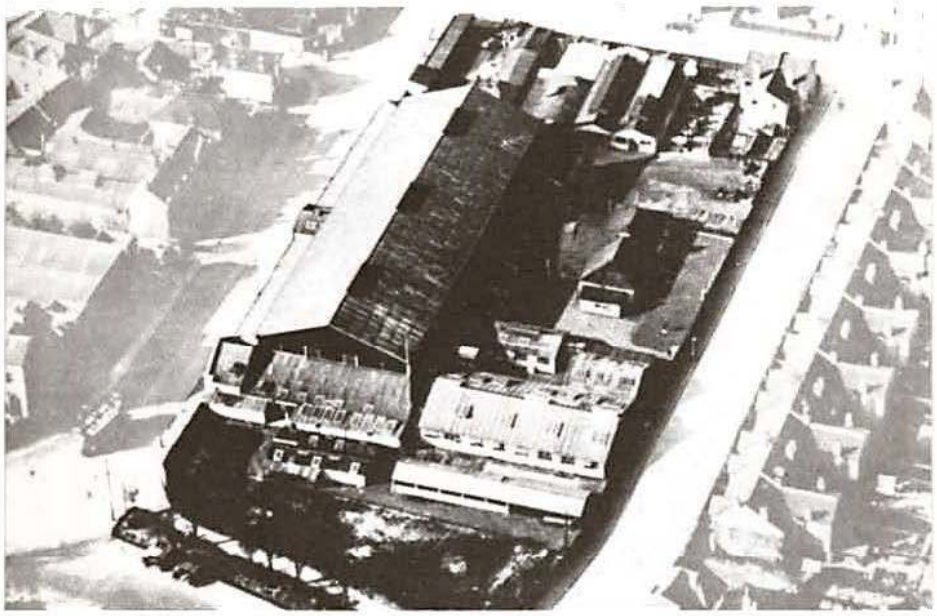
1918. Packing and Assembly Area, Telegraph Works, East Croydon.



1918. Machine Shop, Telegraph Works.

Telegraph Works, East Croydon. *circa* 1915.





An aerial view of Telegraph Works.

Test Room at Telegraph Works, 1926.

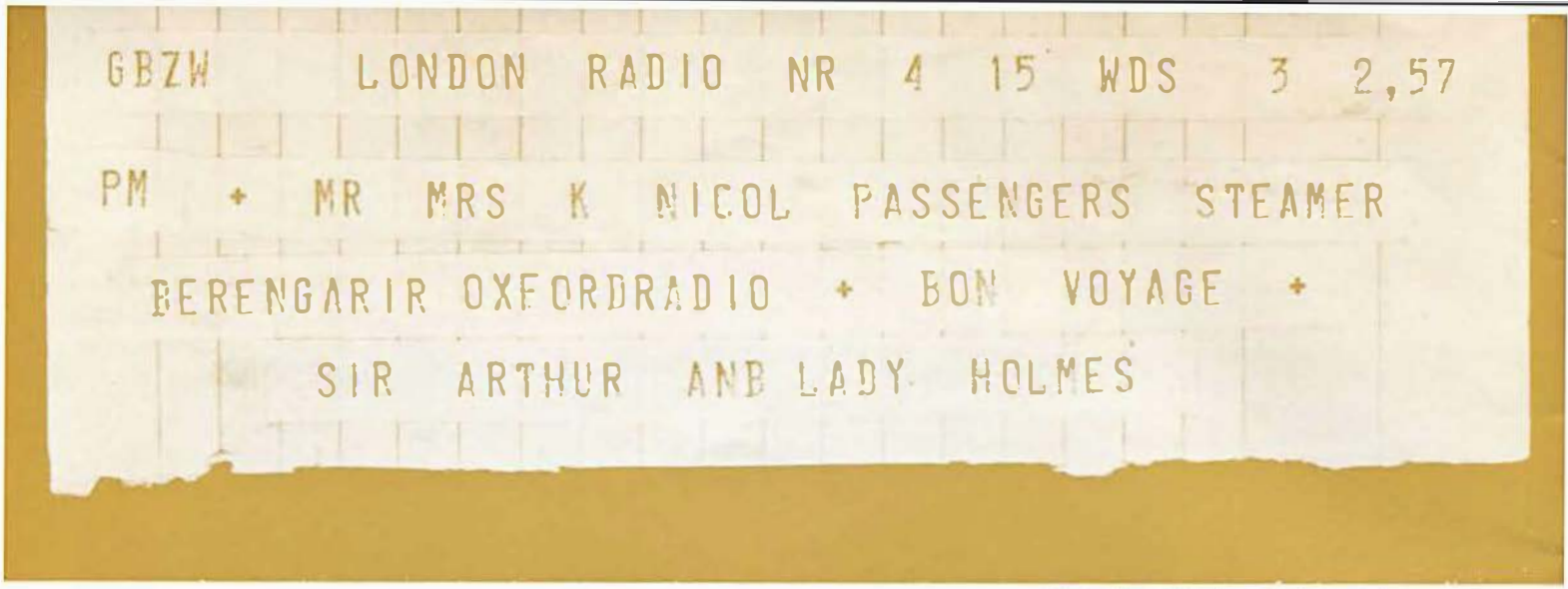
'I may have wasted a lot of time standing around at the Post Office—but not all of it . . . To an inventor there is no such thing as wasted time. One is inventing when one is just looking out of the window.'

The War Years

During the First World War the Company was called upon to supply two sets of equipment to the Central Telegraph Office in London. These machines were used on circuits to Southampton and Grimsby, and successfully handled a large volume of message traffic in connection with the landing in France of the British Expeditionary Force.

Other equipment produced during the 1914-18 War included tube amplifiers (then the last word in radio technique), spark transmitters for aircraft, air compasses, small high-tension generators, bomb release gear and high explosive shell and bomb fuses.

By 1915 the 'factory' which was part of the house in which the Creeds lived in Selsdon Road, Croydon, was no longer big enough to allow for future expansion. So in 1915 Creed purchased an old skating rink and a collection of wooden huts in Cherry Orchard Road, East Croydon. This provided some 21,000 sq. ft. of floor space enabling the fledgling company to spread it's wings.


GBZW LONDON RADIO NR 4 15 WDS 3 2,57

PM + MR MRS K NICOL PASSENGERS STEAMER

BERENGARIR OXFORDRADIO + BON VOYAGE +

SIR ARTHUR ANB LADY HOLMES

Fig. 13. Part of the 'Berengaria' Telegram.

The Press Association Order

Shortly after the war an important order received in this period for telegraph equipment came from the Press Association in London.

Faced with the growing problem of ensuring that news reached all subscriber papers simultaneously—a key feature of news agency operations—the PA decided to investigate the possibility of a 24-hour private telegraph system linking their Fleet Street offices with newspapers taking their service

A demonstration was given at Croydon in 1920 and Creed equipment was subsequently installed for use on a circuit between London and Bristol.

It was a great success and Exeter, Plymouth, Newport, Cardiff, Bath and Swindon were added shortly after, followed by centres at Manchester, Leeds and Glasgow, each of which in turn served a group of newspapers in the area.

In all, several hundred units of Morse equipment came into use on the PA system, which eventually served practically every morning daily in the country.

Telegraphy by Wireless

Before the war, in 1913, the first experiments in high speed automatic telegraphy by wireless had been made. Messages were successfully transmitted by an aerial on the roof of the Selsdon Road premises to Creed's home about three miles away.

Years later, on 21st February, 1923, Creed and a Senior Engineer, Mr H. F. Woodman, were travelling to America aboard the liner R.M.S. *Berengaria*. On the second night out from Southampton, Creed had obtained permission from the Captain for Woodman to set up their equipment for the first time in a radio cabin on a ship at sea. The operation was carried out in strict secrecy. None of the passengers were aware of the experiments. Creed was always reluctant to publicise his wares until they were proved.

At about midnight Creed and Woodman were in the cramped little radio cabin. At exactly five minutes to midnight they began receiving signals from the Post Office station near Rugby.

This was the first demonstration of punched tape recording and printing from shore to ship.

As Woodman put it—the senders, if they are still alive, could not possibly object to a reproduction of that telegram which he has kept to this day (see figure 13).

The First British Teleprinter

In the early 1920s the teleprinter came into the picture with the arrival from the USA of the Morkrum Teletype machine.

This operated on the now familiar 5-unit start-stop signalling code and was a 'direct printer.' This means it recorded messages directly from the incoming line signals, instead of from tape via a reperforator as in the Creed system.

This machine represented competition with a capital 'C' and the Company lost no time in meeting the challenge.

The result was the introduction of the first British teleprinter—a separate keyboard transmitter and a receiving page printer, both operating on the 5-unit start-stop teleprinter code.

In 1924 an order was received from the Central News Agency in London for a number of these machines to provide a news distribution service to various Fleet Street newspapers. It was not long before the Exchange Telegraph Company, the British United Press and others had printers working in Fleet Street.

The first printer, the Model 1P, was soon superseded by the improved Model 2P, a number of which are still in operation to this day (see figure 15).

Fig. 14. 'Model 3 Tape Teleprinter'.

This marked the start of Creed's business in the teleprinter field, and practically all subsequent development work employed a 5-unit code.

Meanwhile, Donald Murray, a New Zealand farmer turned journalist, had invented the Murray Multiplex System—another 5-unit code system—which had become popular in India, Australia, New Zealand, Brazil and Russia.

Murray made a valuable contribution to telegraphy by rationalising the allocation of the combinations of the 5-unit code to the characters of the alphabet on frequency-of-occurrence basis. His arrangement of the code, in which the most frequently used letters of the alphabet are represented by the smallest number of holes in the tape, has since become standard practice.

Murray's Multiplex System and other telegraph patents were acquired by Creed in 1925 and these machines were produced at Croydon for many years. They were 'Rolls-Royce' jobs and some of them are in service to this day.

In 1926 came the introduction of the Creed Model 6S Automatic Tape Transmitter.

By 1927 the Post Office had decided to adopt a uniform telegraph system based on voice frequency signalling, giving 18 telegraph channels on a circuit that would only carry one channel on the system formerly used.

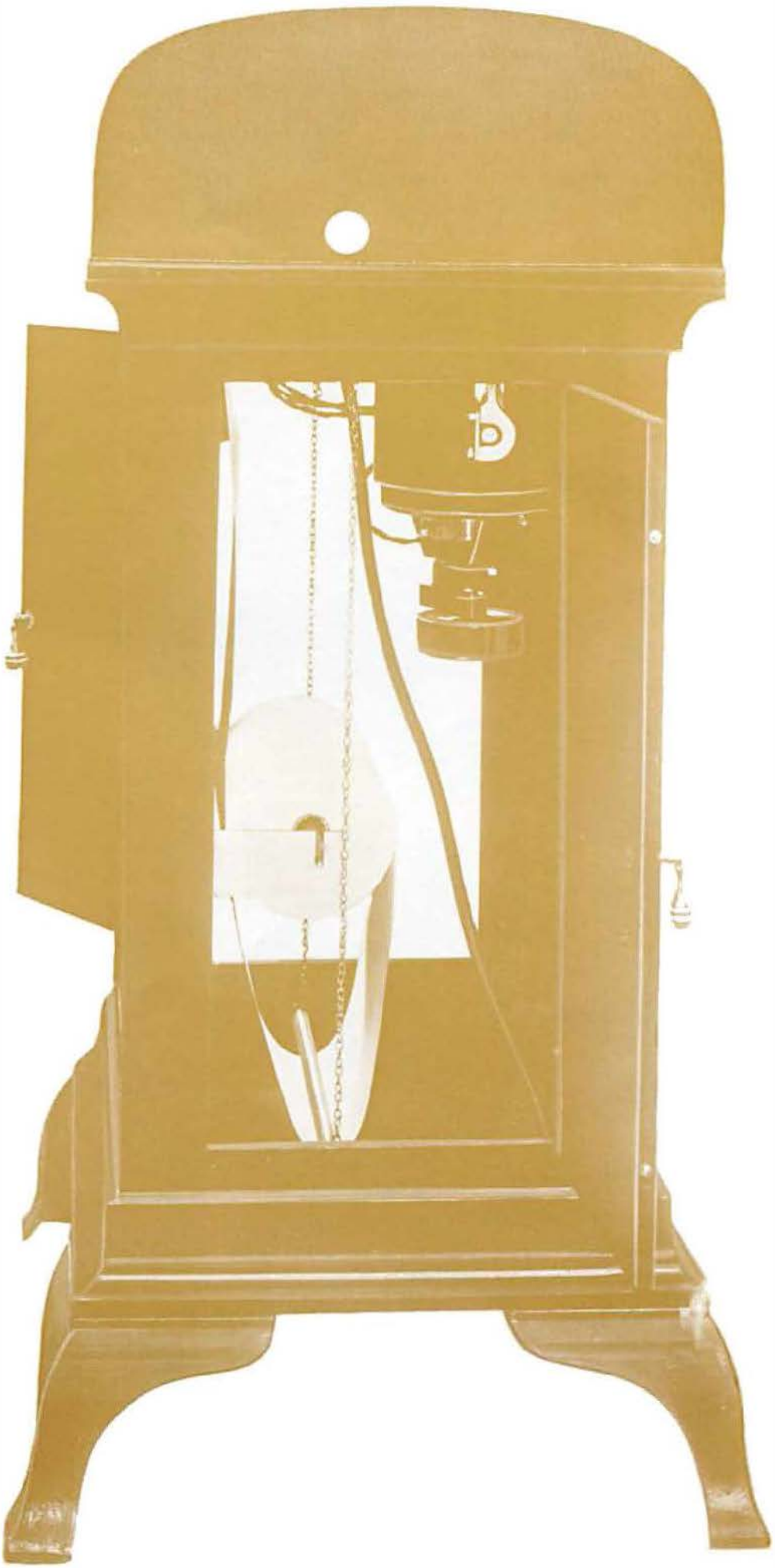


Fig. 15. 'Pedestal mounted version of the model 2P Teleprinter'.

The separate keyboard transmitter and receiver page printer units which comprised the Creed teleprinter at that time were not suitable for the new service which was intended to handle public telegram traffic. For such work it was also necessary for messages to be printed on a tape from which all unwanted signals could readily be removed before it was gummed down on to the familiar form for delivery to the public.

This led to the development of the Model 3 Tape Teleprinter, which was the first Creed machine produced as a combined start-stop transmitter-receiver. The Model 3 Teleprinter (see figure 14) incorporated a number of features that were novel at the time and was the first Creed machine to go into volume production, many thousands being sold in the years 1927-42.

In 1928 Creed & Company became part of the International Telephone and Telegraph Corporation.

This event, coinciding as it did with Creed's growing activities in the teleprinter field, marked an important step in the development of the Company.

Foreign markets, which until then had been relatively uncultivated, were opened up on a world-wide basis and co-operation with other ITT System Companies became possible. A new era of expansion began.

A meeting of ITT executives with Frederick Creed outside the Croydon Headquarters, *circa* 1928.

Creed bows out

On 8th March, 1930—like a thunderclap—came the news of Frederick George Creed's resignation from the Board at the age of only 59.

Mr F. W. Helmer's explanation sounds incredible. But it is true, or rather it must have seemed true to Creed himself at the time, although as the subsequent events of this extraordinary man's life were to prove—there were other reasons.

However, the Board was faced with the bizarre situation that their Chairman and their leading genius was resigning because he could not countenance the decision to permit his employees to play on the sports field on the Sabbath!

'My employees, and that includes the highest to the lowest either keep the Sabbath or they lose me.'

They lost Creed.

What an extraordinary exit! To bow out of a brilliant career at the height of his creative powers and at the summit of success. Such a flamboyant gesture could have only come from a man who felt that he must 'unto himself be true.'

He may have left the Board but he never renounced invention.

In 1931, he was already pioneering at least half a dozen inventions in his 'den' at Selsdon Road. In fact he told a newspaper reporter shortly before his death, in December 1957, that he himself didn't think he would live long enough to perfect some of them.

There are three inventions that we know about.

There was the irremovable hair dye, of course, which never progressed further than disfiguring the beard of its creator. The others however show a certain foresight beyond his own time which might outweigh the fact that they never came to fruition.

His senior engineer, Mr Woodman, now retired, recalled one of these—Creed's ideas for an alternative fuel to petrol as a propellant for motor cars. Strikingly similar experiments in California have been publicised recently. But he had other and bigger projects on his workbench—undoubtedly the same old Barlock typewriter—the 'BOX' which he had carefully wrapped and taken away the day he resigned on the question of the Sabbath.

The biggest project of his life he called 'my private Taj Mahal.' Officially, he gave it the name of 'Seadrome' and early in 1939 he actually gave a demonstration of it to the Air Force, the Navy and the Ministry of Defence.

He could hardly have chosen a more inopportune year. With the very real prospect of an imminent invasion by Hitler, those responsible for our defence would surely have turned it down on the grounds that the 'Seadrome' would make an ideal floating island for an invasion.

But in 1971, when the question had been raging for ten years of where to build the nation's new airport, many people might have thought that Creed's floating airport offered a civilised solution.

The 'Seadrome' was based on a system of stabilising cylinders, used in ship-building, which would make vessels virtually unsinkable (he had that problem in mind too—plus a plan for an aeroplane-ship that bore a very close resemblance to the Hovercraft).

His ambitious plans included mid-ocean landing strips embodying the 'Seadrome' system with the idea of promoting daily air services to Australia and the United States.

Ironically, the 'Seadrome' was never tested, not because a farsighted Defence Ministry could foresee a possible artificial invasion 'island,' but because Creed's basic idea of shortening 'hops' by airliners was outstripped by development in the aircraft industry for longer range flying planes.

Therefore so far as the history books are concerned—when they record his activities—it must be stated that the inventive life of Frederick George Creed so far as posterity is concerned—ended in 1930. But what an end! In fact what a splendid beginning to the Creed revolution which has affected all our lives and all our thinking when it comes to explaining the vast and complex world of communications we now live in.

A Model 3 Tape Teleprinter, the first Creed machine produced as a combined start-stop transmitter receiver, in 1927, shadows a Model 444 Teleprinter, the current model in the ITT Creed range.

Creed & Company Limited
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