Description of operation
of Siemens & Halske
Fire Alarm system 1906

Alan

"Siemens" Morse Recorder Fire Alarm System.

EXPLANATORY MATTER

System.

This fire alarm system is of the closed circuit type, and consists of 14 Alarm Pillars, One Main Switchboard and Battery, and one Extension Circuit to the Firemen's Quarters.

The Alarm Pillars are normally connected in series with the battery.

Plate 2 herewith, shows the general arrangement of the system, and in conjunction with the following explanatory matter, will, it is hoped, enable the whole system to be thoroughly understood.

Alarm Pillars (General)

Each of the Alarm Pillars are fitted with a clockwork apparatus, operated by means of a weight, which causes a Type-wheel to rotate. A contact spring rubs against the periphery of Type-wheel - the Type-wheel and contact spring being connected with the circuit. As the Type-wheel revolves, the circuit is alternately broken and closed according as a tooth or space passes the spring. The Type-wheels of the Alarm Pillars are all cut with different code, so that each pillar transmits a characteristic signal to the receiving station where it is printed on the Morse Slip.

Alarm Pillar (Mechanism)

The mechanism of each alarm pillar is as follows:-

(See Plate 1) - Wheel "A" is geared with wheel "B" through lantern pinions and spur wheels in the velocity ratio of 1 to 12.

The cam "C" which is fixed to wheel "A" controls the locking device "L", and limits the turning movement of the clockwork for each alarm.

Drum "D" is free to revolve in an anti-clockwise direction on spindle of wheel "A" to facilitate the winding up of the weight "W".

The speed of the clockwork, when working, is controlled by means of a fly, whose spindle is geared to wheel "B" through a lantern pinion.

As will be seen from cam "C", the complete turning movement of wheel "A" for each alarm call is one half revolution, and of wheel "B" six revolutions.

Fixed rigidly on spindle of wheel "B", but insulated from same, is a sprocket or code-wheel "T", which makes and breaks the earth an line connections simultaneously a definite number of times for each fire-call, the code is received and registered six times in succession on the tape of the Morse-inker for each alarm.

The two small insulated pins "K^1" and "K^2" on the side of wheel "A" close and open the earth connection respectively before and after each fire call.

Method of operating Alarm Pillars.

There are two ways of operating an Alarm Pillar, viz:-

(a) By simply pulling the handle "H"

(b) By means of the Extension Alarm Push.

Both these methods bring about the same result, inasmuch as they both release the locking device "L" of the clockwork.

The latter of these two devices is not in use at the RSA.Factory, so that the working of the Alarm Pillar mechanism is as follows:-

Action of clockwork in Alarm Pillars.

When an alarm is given by pulling handle "H", beam "E" through the medium of spring "S^1", releases wheel "B" at "L", which revolves in an anti-clockwise direction under the influence of weight "W" acting through the gearing.

The clockwork continues to run until the wheel "A" has made half a revolution, when through the jockey roller "R" on beam "E" dropping into clearance of cam "C", the wheel "B" is locked at "L".

The earth connection at "M" is made and broken respectively at the commencement and finish of the call.

During the running of the clockwork the code-wheel "T" makes and breaks the line and earth connections a definite number of times, and these breaks in the circuit are recorded on the tape of the Morse-inker.

Fire Bell Step Relay

The Fire Bell Step Relay circuit is closed and broken through the beam of the Morse-inker, and by means of an escapement device is arranged to close the Fire Bell circuit after four successive breaks of the main circuit during an alarm.

There are three positions for the balance-weight of this relay, viz:- (1) Cut-out. (2) Normal. (3) Alarm.

When this weight is placed in position (1), the relay is inoperative.

When in position (2), it is ready to perform its alloted task, viz: to give the Fire Call Alarm after four successive beats of the beam of the Morse-inker.

Switching Bells

These bells are connected through the beams of the Morse Inkers with a local battery, in such a way as to ring when an alarm is given from any of the Alarm Pillars. They contain and actuate the switches marked B_1, B_2, B_3, B_4, and B_5.

These switches normally are as shown by full lines on Plate 2, but on an alarm being given they take up the positions shown by broken lines.

Earth Detector, Earth Key, Earth Relay, and Breakdown Switch.

The earth Detector shows at a glance whether the circuit is in good condition, and the Earth Relay closes the circuit of the Earth Bell when the leakage on the line becomes bad. The Station Official will then open the Earth Switch, which should remain open while the fault exists.

If the line should break down, the Milliameter will shew this by falling to zero. The Breakdown Switch should then be operated, thereby actuating switches R_1, R_2, R_3, and R_4, which together put the system into working order, with the centre of the battery permanently to earth, while the break in the line exists.

The system may therefore be used under these conditions until the opportunity arrives for examining the line and removing the fault.

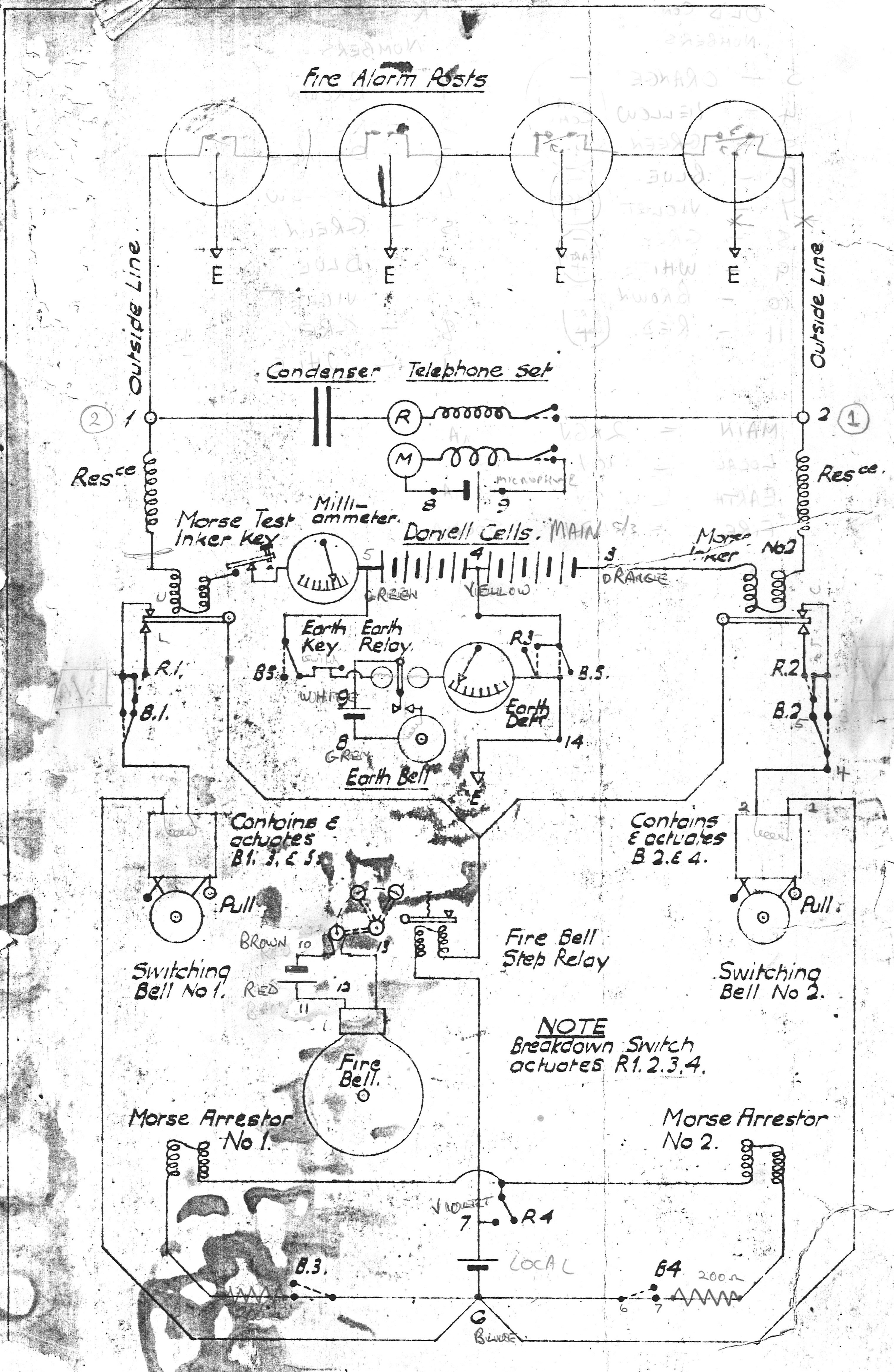
General

If an alarm is given at two Pillars at the same moment, the codes of the two pillars will be received simultaneously at the Switchboard, one on each recorder.

Example:- If Pillars 1 and 2 are in operation together, Pillar 1 will register its code on Morse Inker 1, and Pillar 2 on Morse Inker 2. Each Pillar will work off opposite halves of the battery, with the earth as common return.

Similarly, if the line should break, and the breakdown Switch has been actuated, a call from an alarm pillar on the left side of the break (see Plate 2) will register its code on Morse Inker No. 1, and a call from an Alarm Pillar on the right of the break on Morse Inker No. 2.

Example:- If Alarm Pillar 1 is operated, the current will pass from the battery, through the earth to the Alarm Pillar and return to the battery through the line and Morse Inker No. 1, as the code-wheel of the Pillar ...ses



Fire Alarm Posts
E
E
E
E
Outside Line
Outside Line
Condenser
Telephone set
R
M
8
9
1
2
Resce
Resce.
Morse Test Inker Key
Milli-ammeter.
Daniell Cells.
MAIN
5
4
3
ORANGE
GREEN
YELLOW
Morse Inker No2
R.1.
B.1.
R.2
B.2
Earth Key
Earth Relay.
R3
B5.
B.5.
WHITE
Earth Deft.
14
Earth Bell
E
Contains & actuates B1. 3. & 5.
Contains & actuates B 2. & 4.
Pull
Pull.
Switching Bell No 1.
Switching Bell No 2.
BROWN
10
13
RED
12
11
Fire Bell Step Relay
NOTE
Breakdown Switch actuates R1.2.3.4.
Fire Bell.
Morse Arrestor No 1.
Morse Arrestor No 2.
VIOLET
7
R4
LOCAL
B.3.
B4
200Ω
C
BLUE

OLD CON. NUMBERS.

3	ORANGE	− MAIN COMN. +
4	YELLOW	
5	GREEN	
6	BLUE.	− LOCAL +
7	VIOLET	
8	GREY	− EARTH +
9	WHITE.	
10	BROWN	− FIRE BELL +
11	RED.	

R.S. PLUG NUMBERS.

1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE.
7	VIOLET
8	GREY
9	WHITE.

MAIN	= 2×6V	100mA.
LOCAL	= 10V	1A.
EARTH	= 5V.	100 mA.
FIRE.	= 12V.	500m A.

WALTHAM ABBEY CLOSURE

RGPF FIRE ALARM

Details of Signals sent from each Fire Alarm pillar

UPPER WORKS (North Site)

– –	NG Hill
– – –	Daisy Island
. –	Edmonsey Stoves
. . –	Edmonsey Engines
. . . –	Long Walk
. . . . –	Group E
. . . . .	Group A
–	Refinery Gate

LOWER WORKS (South Site)

– . . .	Lower Island
– . .	Swing Bridge
– .	Proof Range
. – –	Gun Cotton Laboratory
. – . –	Nitric Acid Factory
. – . . –	Cordite Office, Quinton Hill
. – .	Black Ditch (west)
. . – –	Acetone Recovery

"Siemens" Morse Recorder Fire Alarm System

EXPLANATORY MATTER

System
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[1] Not available

definite number of times for each fire-call, the code is received and registered six times in succession on the tape of the Morse-inker or each alarm.

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Similarly, if the line should break, and the breakdown Switch has been actuated, a call from an alarm pillar on the left side of the (see Plate 2) will register its code on the Morse Inker No. 1, and a call from an Alarm Pillar on the right side of the break on Morse Inker No. 2.

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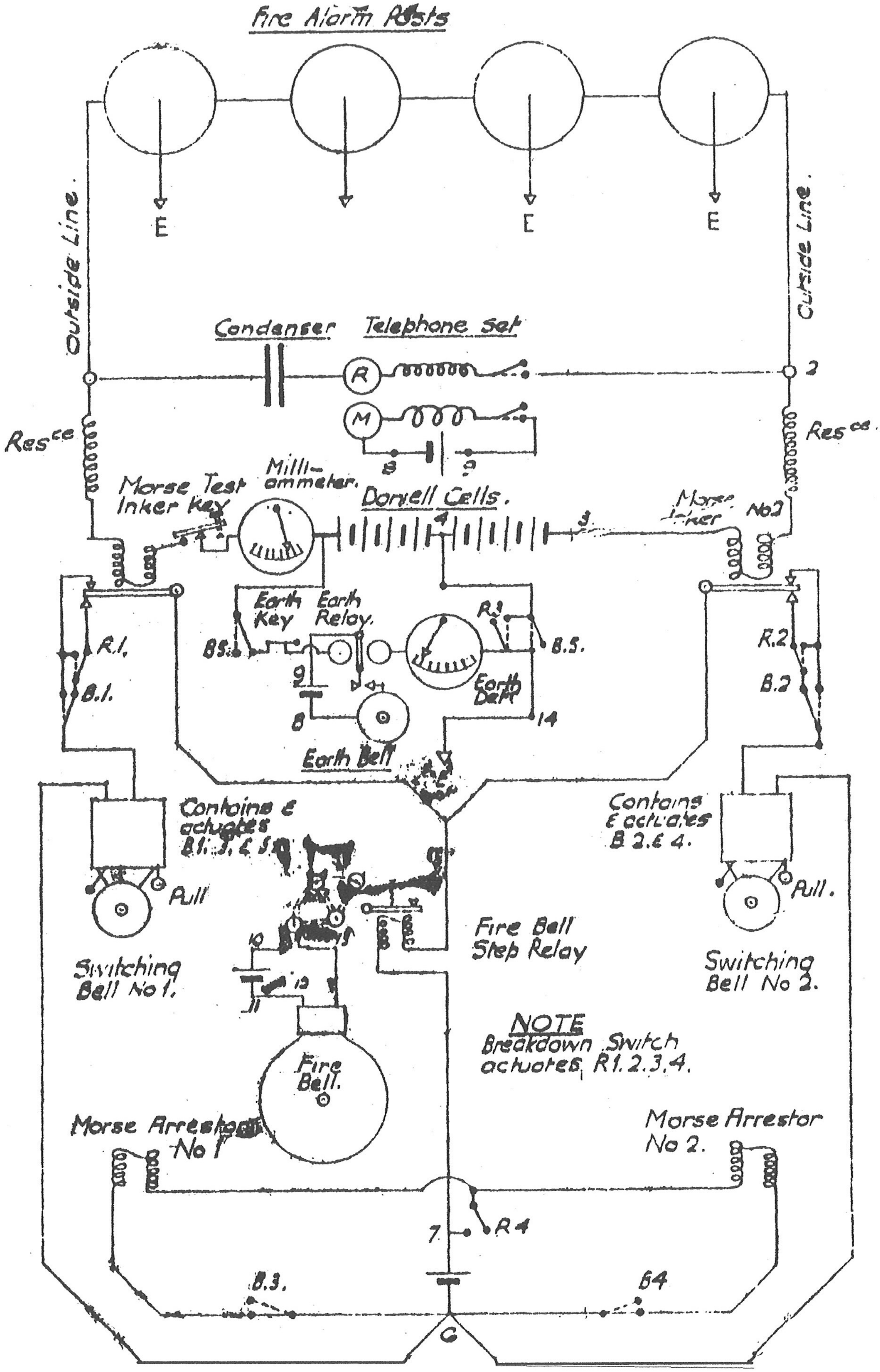
Fire Alarm Posts
E
E
E
Outside Line.
Outside Line.
Condenser
Telephone set
R
M
2
Resce
Resce.
Milli-ammeter.
Morse Test Inker Key
Donell Cells.
4
3
Morse Inker No2
Earth Key
Earth Relay.
R.3
B.S.
B.S.
R.1.
B.1.
R.2
B.2
9
8
Earth Defr
14
Earth Bell
Contains & actuates B1. 3. & 5
Contains & actuates B 2. & 4.
Pull
Pull.
Fire Bell Step Relay
10
13
11
Switching Bell No 1.
Switching Bell No 2.
NOTE
Breakdown Switch actuates R1. 2. 3. 4.
Fire Bell.
Morse Arrestor No 1
Morse Arrestor No 2.
7
R 4
B.3.
B4
C

WALTHAM ABBEY CLOSURE

RGPF FIRE ALARM

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UPPER WORKS (North Site)

- -	NG Hill
- - -	Daisy Island
. -	Edmondsey Stoves
. . -	Edmondsey Engines
. . . -	Long Walk
. . . . -	Group E
. . . . .	Group A
-	Refinery Gate

LOWER WORKS (South Site)

- . . .	Lower Island
- . .	Swing Bridge
- .	Proof Range
. - -	Gun Cotton Laboratory
. - . -	Nitric Acid Factory
. - . . -	Cordite Office, Quinton Hill
. - .	Black Ditch (West)
. . - -	Acetone Recovery

cross section of a parallelogram of 7:1 ratio, which proved capable of testing the hardness of diamond itself. Of all the foregoing only the plastic indentation methods, Brinell, Rockwell and Vickers, are still widely used.

Meanwhile, in the same period, some tests for dynamic hardness were proposed, some based on dropping a small indenter from a known height, Martel in 1895 measuring the volume of indentation while Shore, with his sceleroscope of 1906, measured the height of rebound of the indenter. This device was portable (weighing about 20lbf, c10 kg) that could thus be used on a large machine or structure in situ. In 1923, Herbert used the damping of a swinging pendulum to measure surface hardness and wear. At some time, perhaps around the turn of the century, Kirkaldy used a flagstone wear and abrasion tester consisting of a rectangular box containing a number of hard steel balls. The sides of the box were four flagstones and the whole was rotated by an electric motor for a period such as 24hrs after which the weight loss of each flagstone due to abrasion was measured.

Around 1900, Hertz proposed a theory for elastic indentation, such as a lightly loaded ball onto a surface (or thumb into arm), and Jeffries and Archer pointed out that permanent indentations in metals were governed by the laws of plastic slip at the atomic structure level (which structure also controls magnetic properties, hence the aforementioned relationship). As the theory of plastic flow of metals by the movement of dislocations through the crystal lattice became better understood, it was realised that the permanent indentation tests such as Brinell, Rockwell and Vickers, were essentially measures of the resistance to plastic flow. That, being equal and opposite for tension and compression and in most ductile metals, allowed such tests to be used as much for giving a cheap and simple method of estimating the tensile strength of a sample as for determining a hardness measure, per se.

If you do not remember the Shore Sceleroscope then welcome to Kirkaldy Testing Museum to see one 'in the flesh'. A Kirkaldy-owned Brinell machine c1920 and a donated Vickers machine c1960 and the in-house wear tester for pavement slabs are also on display. This is not the place to expand on the relationships between all these types of hardness (a book by SR Williams[1], lists about 2,000 papers up to 1941!) but if you have, or know of, any of the other machines mentioned above 'going spare', please telegraph Kirkaldy Testing Museum at once! *Ted Turner*

Kirkaldy Testing Museum, 99 Southwark Street, London SE1 0JF. Open first Sunday each month, 10.30am-4pm

FIRE ALARM SYSTEM – ROYAL GUNPOWDER MILLS

Further to recent correspondence on fire fighting in London (GLIAS Newsletter 214 p6, 215 p6), not surprisingly the Royal Gunpowder Mills at Waltham Abbey had an extensive addressable fire alarm system connected to a central fire station. An addressable system is one which indicates which part of the site has a fire rather than just sending out a general alarm. In addition firefighting and first aid equipment was stored around the site and every manufacturing section had its own firefighting squad drawn from the production workers.

With the advent of electricity in the 19th century those concerned with fire safety soon realised its potential for alarm systems. One of the leaders in electrical development was the German firm of Siemens and Halske, with its independent British offshoot Siemens at Woolwich. At the end of the 19th century this firm installed a state of the art system at the Mills.

Fire alarm pillars were distributed at key points in what was dense woodland surrounding the scattered production buildings. Current flow in the circuit was continuous. On operation of the alarm by pulling a brass handle the switch actuated a clockwork mechanism which turned a disc. Slots were cut into the edge of the disc at varying intervals. As it turned a copper brush contact interrupted the current flow. This transmitted a Morse code signal to the control room in the fire station. The Morse dots and dashes were recorded on ticker tape. Each alarm had its own unique sequence of dots and dashes, enabling immediate location of the fire. In addition the signal actuated indicator lights. The system utilised clockwork which needed servicing, winding and might break down as could the electrical supply. A continuous current system meant that any interruption of the current through a fault arising could be immediately identified and rectified. In addition as a back up measure there was a weight attached to a chain which when released by pulling the alarm handle turned the disc.

Like the Morse code it used the concept and equipment were durable and the system was operable into the 1950s. Alarm pillars, mechanisms and the control board, which were made to a very high standard, have survived and have been restored. The alarm pillars, about 6ft high, have elaborate decoration in the casting ; painted bright red picked out in silver topped by fireball filials they present an impressive sight. Visitors to the Mills will be able to see the pillars, mechanism and board and other firefighting equipment.

The Mills latterly also had an extensive sprinkler system. Colonel William Congreve, Comptroller of the Royal Laboratory at Woolwich, and of the Mills, evidently had an eye also to the commercial market. As early as 1812

[1] Hardness and Hardness Measurements; S.R. Williams, Am. Soc. Met. Cleveland, 1942

he took out a patent for a sprinkler system 'Securing Buildings, Ships etc. from Fire' incorporating a sealed reservoir holding water with air pumped in and compressed.

Siemens Woolwich had close links with the German firm and a street alarm pillar virtually identical to the Waltham Abbey model survives in a street near to the site of what was the massive Spandau explosives works in Berlin, latterly used during the Soviet occupation as a tank factory. *Les Tucker*

EARLY CONCRETE HOUSES IN THE GRAVESEND AREA

Thameside in the 19th century saw the rise of the modern cement industry and proprietors of cement factories were keen to demonstrate the advantages of the progressive new material by building concrete houses, often for themselves to live in. To show what could be done with the new material a number of pioneering concrete houses were built around the middle of the century in the Swanscombe – Gravesend area.

In London Road, Swanscombe, at the entrance to Swanscombe Cement Works a concrete house was built by John Bazley White Junior, probably in the 1840s. From 1926 to 1964 it was used as the offices of Swanscombe Urban District Council. Demolition took place soon after the council moved out.

In what is now Council Avenue, Northfleet, a concrete house was built in 1841 by Thomas Sturge, a local cement manufacturer. It remained a private house up to the First World War but in 1920 was purchased by Northfleet Urban District Council, becoming Northfleet Town Hall. Following local government reorganisation in 1974 it became the Technical Department of Gravesham Borough Council.

In Pelham Road, Gravesend, a concrete house called Mayfield was built in 1875 by I C Johnson, to his own designs. Johnson, who claimed to be the first developer of Portland Cement, owned local cement factories. He lived in Mayfield until his death in 1911 at the age of 101. Later it was used for educational purposes and in the 1980s was part of the Gravesend Branch of the North West Kent Technical College.

The inventor of Portland Cement, William Aspdin, planned to build a grand concrete house – Portland Hall. The Architects were John Morris & Son of Poplar. In the Leith Park Road – Windmill Hill area of Gravesend a considerable area was enclosed for this purpose but unfortunately Aspdin ran into financial difficulties and the house never got much beyond its foundations.

The remains became known as Aspdin's Folly and a good deal of these have since gone but part was incorporated into a private house. Twenty years ago the wall surrounding the property was still in existence. It featured pilasters with elaborate capitals. Probably built 1855-1860 the wall, pilasters and capitals were constructed of brick with a thick coating of aggregate and cement. Ref A C Davis, A Hundred Years of Portland Cement 1824-1924, Concrete Publications Ltd 1924, pages 69 & 71.

Thanks are due to Gravesend Central Library, Windmill Street, for information. *Bob Carr*

SCIENCE MUSEUM LIBRARY

Members may have heard about proposals to close the Science Museum Library and split it among three locations. This arose because Imperial College, where the library is located, proposed to raise the service charge for the accommodation by 400%.

The GLIAS committee learned that the trustees of the museum were unable to meet this increase in costs and therefore proposed to transfer the bulk of the printed collection to the Imperial College Library; other material, particularly archives, to the British Library; and to retain a small collection in the main Science Museum. This proposal was strongly resisted by Prospect, the trade union representing the staff, many of whose jobs would have disappeared.

I wrote to the trustees on behalf of GLIAS, emphasising the importance of the historic material which is relevant to Britain's and London's industrial history; and the retention of free access in the evenings and at weekends. The committee was particularly concerned about the future of the large collection of Victorian literature on science and industry; and of the archives which had been deposited with the library. The trustees said that, if the proposals went ahead, agreements would be put in place '*to guarantee public access similar to that available now, and most material currently on open access* [was] *likely to remain so*'.

The position was discussed further by the trustees before Easter. They '*felt unable to take what would be an irreversible decision without reviewing funding first*' and '*decided for the time being to continue the Science Museum Library's presence in the Imperial College building, South Kensington, while an independent study is undertaken of NMSI's funding... Further consultations with interested parties will take place in the near future. So we have a reprieve for the time being. The Review has taken the view that the Trustees were not entirely happy with the Tripartite option, which was the best of the dispersal type options for the library, so we are*