N° 18,005 A.D. 1909

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COMPLETE SPECIFICATION.

Electric Control of Clocks.

We, Siemens Brothers and Company, Limited, of Caxton House, Westminster, S.W., in the County of London, Electrical Engineers, do hereby declare the nature of this invention (as communicated to us from abroad by Siemens and Halske Aktiengesellschaft, of 3, Askanischer Platz, Berlin, S.W., in the German Empire, Electrical Engineers) and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to devices for supervising electrically driven substation clocks (so called sympathetic clocks), in which the object is to enable it to be known at the central station, whether any and which of these substation clocks are not in synchronism with the main clock, and by which any interruption to the circuit of a clock and the clock circuit in which the interruption has occurred are directly recorded at the central station.

It has previously been proposed to arrange electric circuits for this purpose, wherein a master clock at the central station sends current impulses at regular intervals of time to actuate the substation clocks and in which the correct running of the clocks can be checked at the central station by causing each substation clock to effect a periodic and transitory change in the normal current in the supply leads, sufficient to actuate a galvanometer or relay at the central station.

In the arrangement hereinafter described the relay for this purpose is energised, whenever studs which are fitted to each clock, arrive at a certain position, differing in time for each clock in which they close a local circuit which causes an increase in the current flowing in the supply leads.

The object of the present invention is to provide a second relay and registering apparatus in the supply circuit, which only acts if the local circuits of two or more clocks are closed at the same time, which would occur for example, if the mechanical friction at the contacts caused an interruption in the working of any clock. The relay would cause a mark to be recorded by the registering apparatus at the central station which would show which clock had stopped on its contacts.

The method of working which is illustrated in the accompanying drawing is as follows:—

The main clock at the central station, indicated in the drawing by its pendulum P and the current reverser S, sends in the usual manner current impulses in alternating directions at minute intervals (or at other short intervals) through the leads l_1, l_2 to which the polarised substation clocks are connected. By these current impulses the minute wheel s of each clock is advanced one tooth so that the minute hand advances by one minute. The minute wheel s of each clock carries two contact studs c, d preferably diametrically opposite to each other, which studs when in a certain position close a circuit with springs f_1 and f_2 as shown closed in clock U_3 and open in U_1, U_2, U_4 in the drawing. The studs c and d on each clock are arranged, for example, one tooth behind those on the clock in front as shown in the drawing. As soon as any clock, for example, U_3 arrives at the circuit closing position, a series resistance w_1 on the branch circuit of the clock in question is short circuited by spring f_1, and a

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shunt resistance w_2 is connected across the clock magnet m by spring f_2. This causes an alteration in the flow of the current in battery B over leads l_1 l_2 and a minimum relay r_1 included in the leads receives a current impulse which causes it to act, and this is shewn in a suitable manner on a registering strip R by a registering machine S_1. The strip R is advanced in synchronism with the clocks U. The clocks are numbered consecutively and it is known at the central station what time each clock when running properly must actuate the register so that by comparing the times it can be seen which clock has made contact at f_1 f_2 and whether this contact was made at the right time. The relay r_1 is so adjusted that it is not actuated by the current, which is obtained when all the clock magnets m are connected in parallel, except at the time when the current in one of the branch circuits is increased by short-circuiting the magnet m and resistance w_1 through contacts f_1 f_2 and shunt winding w_2. When this short circuit occurs, the current will be strong enough to actuate the relay r_1 even should one or more of the other clock circuits be interrupted as by a broken wire. If the clock of the branch circuit in question (U_2 in the figure) is working properly and so closes the contacts f_1 f_2, the relay r_1 will act and register the time through S_1. If however the passage of current is interrupted in any one branch, for example, by a broken wire, or if the clock stops for some mechanical reason, then either when the contacts f_1 f_2 of that clock are connected there will be no current through the shunt circuit w_2 or the wheel s will fail to connect these contacts and consequently the current through relay r_1 will be insufficient to operate it and therefore the marking of the registering strip does not then occur. The registration may, if desired, be acoustic.

The short circuit of resistance w_1 effected by spring f_1 is intended so to increase the current flowing through the clock magnet m that a mechanical interruption of the working of the clock owing to the friction of contacts f_1 f_2 is prevented. If however a clock has come to a standstill on these contacts f_1 f_2, then on the next impulse from the main clock two clocks would be on their contacts f_1 f_2 so that two shunt windings w_2 would be connected up and the current flowing through the leads l_1 l_2 would be correspondingly increased. With this increased strength of current a maximum relay r_2 also included in the leads l_1 l_2 would be actuated and would cause a mark, differing from that caused by the device S_1 on the strip R through the device S_2. It can be clearly seen from the position of this mark which clock has stopped on its contacts f_1 f_2.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In the circuit which controls the running of substation clocks from a master clock at a central station, a relay and registering apparatus, which are actuated only when the local shunt circuits of two or more clocks are closed at the same time, substantially as described.

2. An electric control for clocks operating substantially as herein described and illustrated.

Dated this 4th day of August, 1909.

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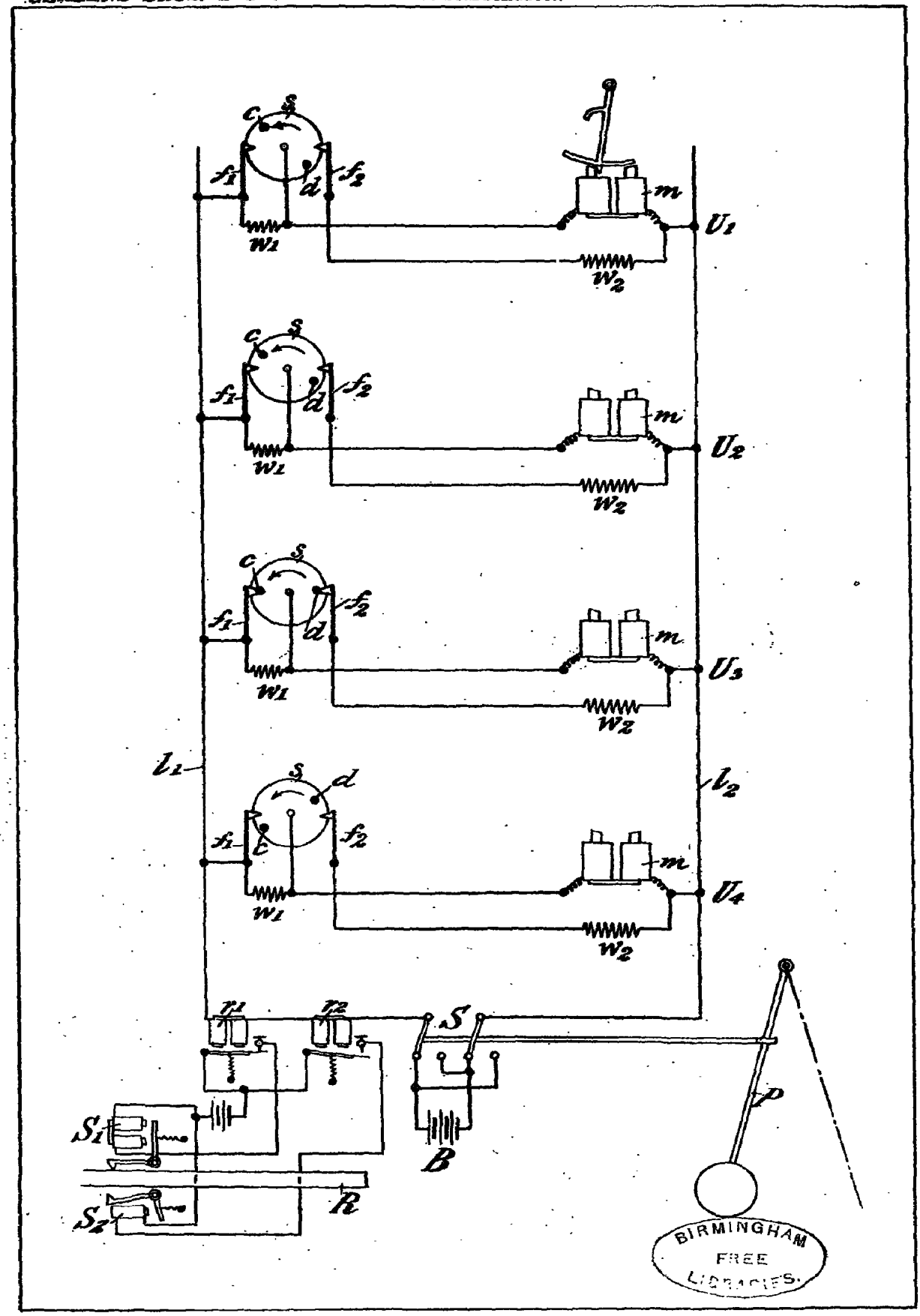

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