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COMPLETE SPECIFICATION.

Improvements in Synchronised Electric Clocks.

We, SIEMENS BROTHERS & Co. LIMITED, of 12, Queen Anne's Gate, Westminster, S.W., Electrical Engineers, and EDWARD FRIEDRICH HERMANN HEINRICH LAUCKERT, of 63, Maryon Road, Old Charlton, Kent, Electrical Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Our invention relates to the construction and arrangement of synchronised electric clocks in such a manner as to avoid sparking on changes of contact, and to ensure accuracy in the movements imparted as we shall describe referring to the accompanying drawings.

Fig. 1 is a diagram of the electrical connections at the master clock, Fig. 2 is an elevation and Fig. 3 is a plan of part of the contacts and contact springs at the master clock.

Fig. 4 is a side view and Fig. 5 is a rear view of the operating gear at one of the secondary synchronised clocks.

The diagram Fig. 1 shews the electrical connections not in the relative positions that they really occupy but as if they were spread out so as to avoid the confusion which would result if the one half of the diagram were drawn behind the other half.

a is a spindle of the master clock which makes one revolution per minute. It has fixed on it two arms each carrying a roller but the one roller *b* is in front of the other roller *c*. Each of these rollers as it revolves acts on a projection depressing a spring, the roller *b* on spring *e*, the roller *c* on spring *d*, these two springs being side by side as shewn in Fig. 3. A battery of which *f* and *g* are the poles, a resistance *h* and electro-magnet coils *i* of the secondary clocks (of which three are indicated) are connected to contracts as shewn, both springs *d* and *e* being connected to one pole *f* of the battery. When the roller *b* depresses the spring *e* the connection of spring *e* with the pole *f* is broken and connection is made with pole *g* so that a current passes from *g* through the magnet coils *i* in the one direction and back to the pole *f*. When the roller *c* depresses the spring *d*, the connection of spring *d* with pole *f* is broken and connection is made with pole *g* so that now a current passes through the magnet coils *i* back to *f* but in the opposite direction. Thus every half minute a current is transmitted to the magnet coils of the secondary clocks, but these currents alternate in direction so that one of the poles of these electro-magnets is strengthened and the other is weakened alternately every half minute.

As shewn in Fig. 2 one of the springs, *d*, normally makes two contacts, the one *j* connecting it to the resistance, the other *k* to the battery pole *f*. When *d* is depressed the contact *k* is broken but *j* remains in contact until *d* makes contact with *l* and depresses it. On the backward movement, the contact *j* is established before the contact *l* is broken, so that no sparking occurs at the break of contact *l*. The contacts made by the spring *e* are similarly arranged.

As shewn in Figs. 4 and 5 in each secondary clock there is a permanent

[*Price* 8*d*.]

magnet *m* which by vicinity to an iron spindle carrying an armature *n* gives it always the same polarity. On the same spindle are fixed two arms *p q* linked to two levers side by side on which are pivoted pawls *r s* which are engaged with the teeth of a ratchet wheel *t* fixed on a spindle of the secondary clock. Under the armature *n* is an electromagnet *u* having its pole pieces notched to admit the arms of the armature *n*. When a current is transmitted from the master clock it strengthens one pole of the electromagnet *u* and weakens or even reverses the other so that one of the arms of *n* is attracted down thus depressing one of the pawls *r s* and turning the ratchet wheel *t* one tooth. The next current sent strengthens the pole that was formerly weakened or reversed, and weakens the pole that was formerly strengthened so that the other arm of *n* is attracted down and the other of the two pawls *r s* is depressed, turning the ratchet wheel another tooth and so on every half-minute. The spindle of the ratchet wheel *t* being suitably geared to the hands of the secondary clock, this clock is obviously worked in synchronism with the master clock.

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 combination with a clock the electrical connections for synchronising secondary electric clocks substantially as described with reference to Figs. 1, 2 and 3.

2. Electrical synchronising apparatus for secondary clocks, arranged and operating substantially as described with reference to Figs. 4 and 5.

Dated this 27th day of May 1899.

ABEL & IMRAY,
Agents for the Applicants.

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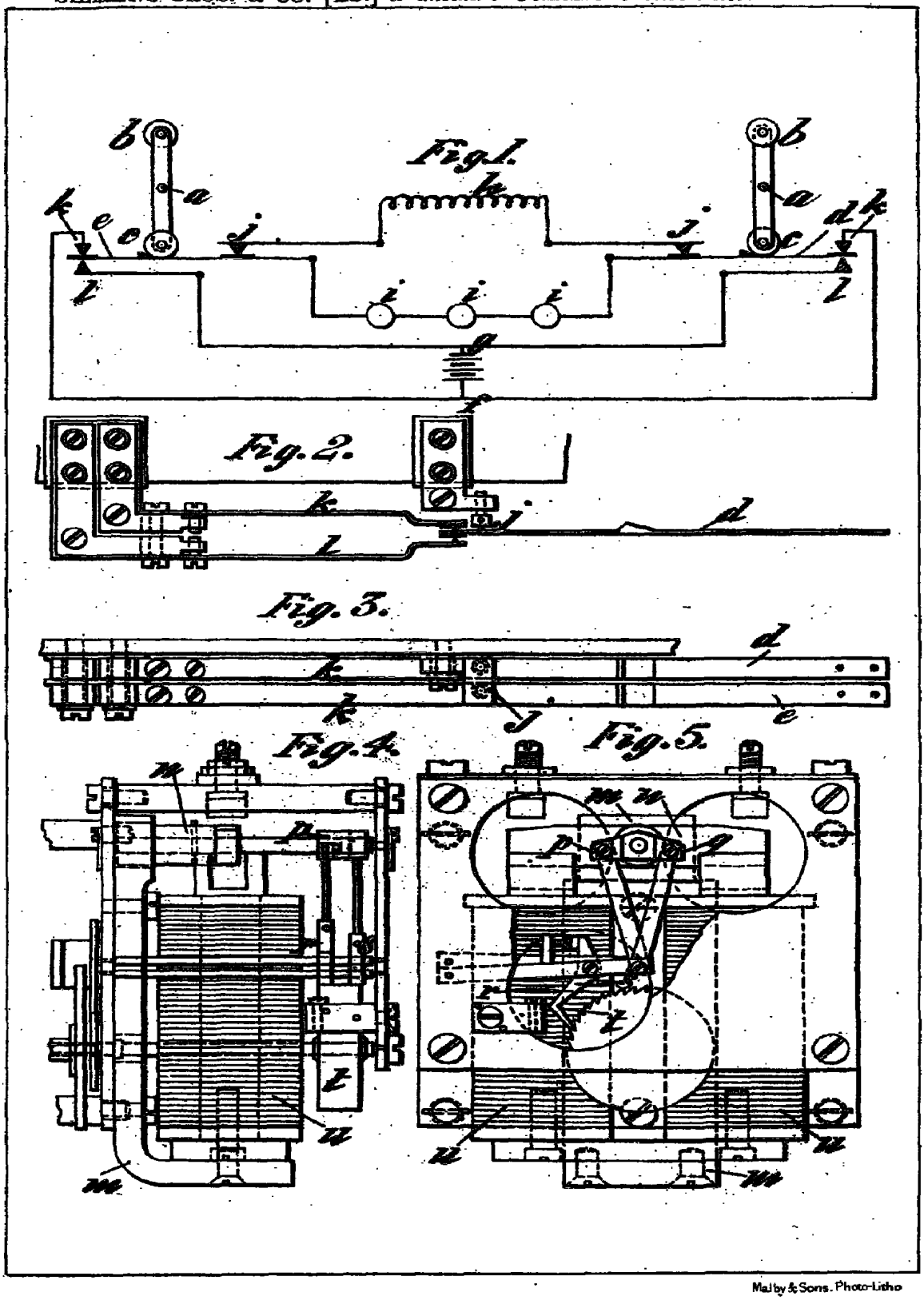

[This Drawing is a reproduction of the Original on a reduced scale.]

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