Description *of the* Apparatus *and* Working *of the*

"Magneta" Clock System

WIRING FOR ELECTRIC CLOCKS

Pointers to insure a perfect system

SUPPLEMENT "A"

To General Catalogue

THE MAGNETA COMPANY
NEW YORK

SYSTEM IN GENERAL

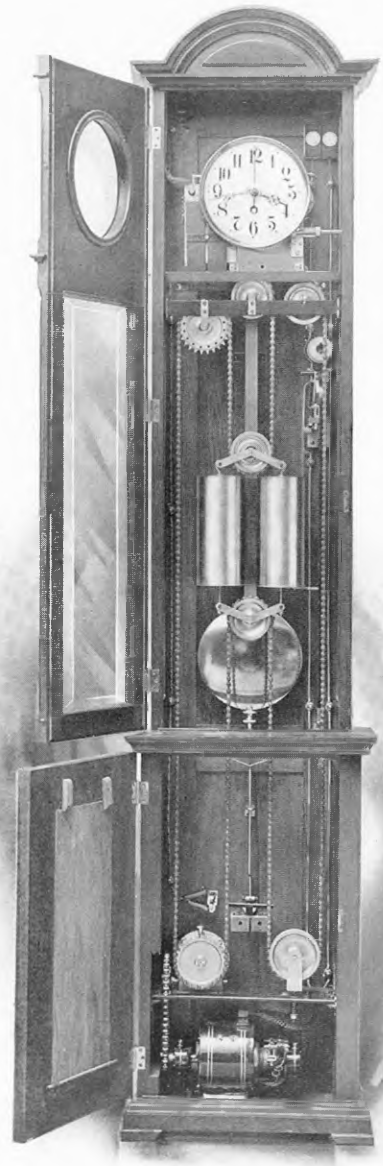
The entire system of Secondary-clocks requires neither winding, setting nor oiling.

The entire system of Secondary-clocks throughout the whole building is actuated by the Master-clock, which not only works the various dials, but keeps them synchronized at all times.

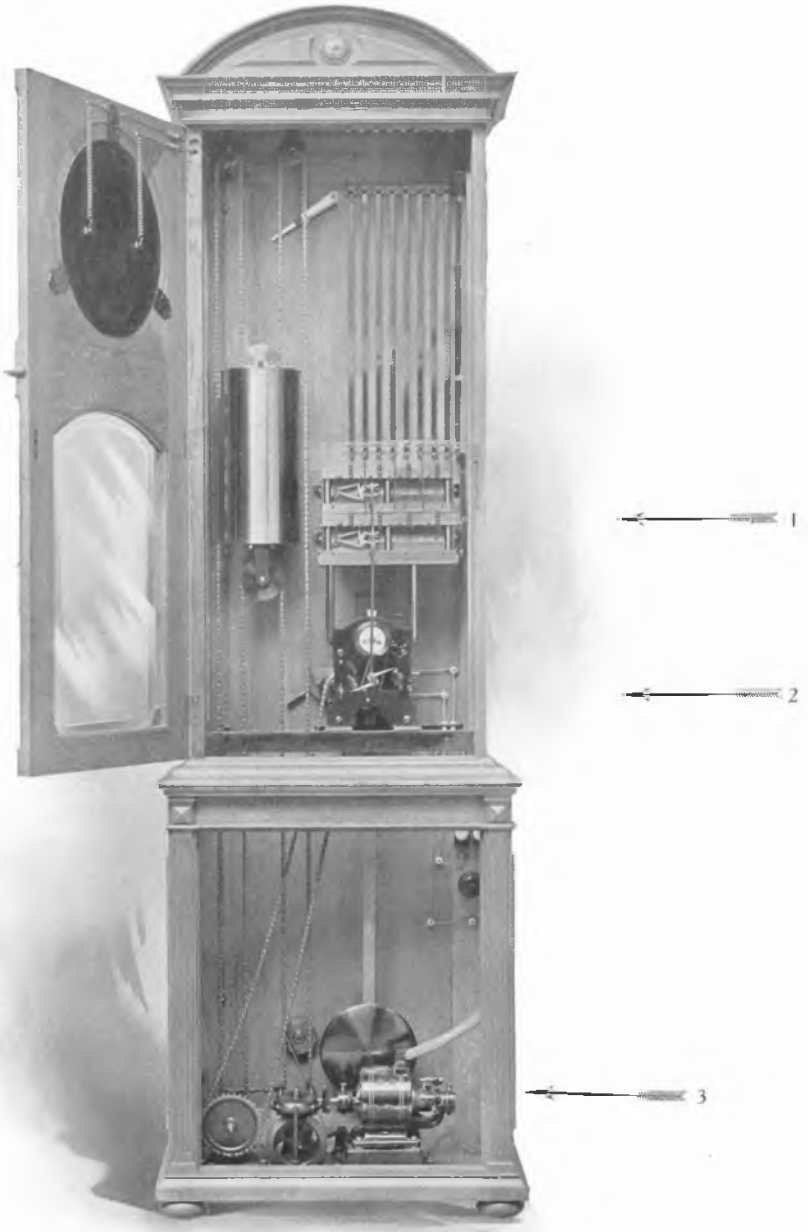
The winding of the Master-clock is either done by hand, or by an electric motor, which obtains the necessary current from the main of the electric plant in the building.

MASTER-CLOCK

The Master-clock is of the *standing type*, and is wound, either *by hand*, or by an *automatic self-winding arrangement*.



Apparatus as arranged in Master-clocks—Types c—e



Apparatus as arranged in Master-clocks—Types f—i

The following types are self-winding:

Type c	Driving	35	units.
Type d	Driving	50	units.
Type e	Driving	75	units.
Type f	Driving	100	units.
Type g	Driving	200	units.
Type h	Driving	300	units.
Type i	Driving	500	units.
Type j	Driving	1000	units.
Type A	Driving	20	units

is equipped with an eight-day movement.

(One unit equal to a Secondary Clock of 12″ diameter of dial)

PENDULUM

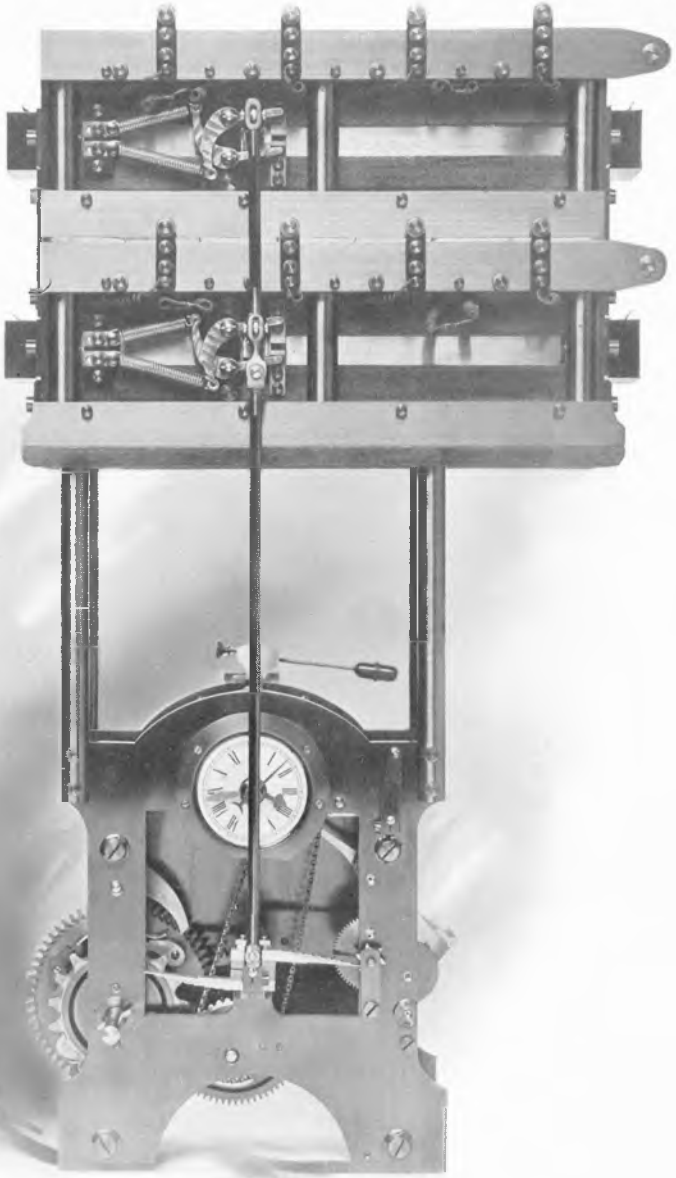
The Master-clock is equipped with either a patented Paris Invar Steel Pendulum, or a Riefler Compensation Pendulum, both of which give far better results than the best mercurial pendulum.

ESCAPEMENT

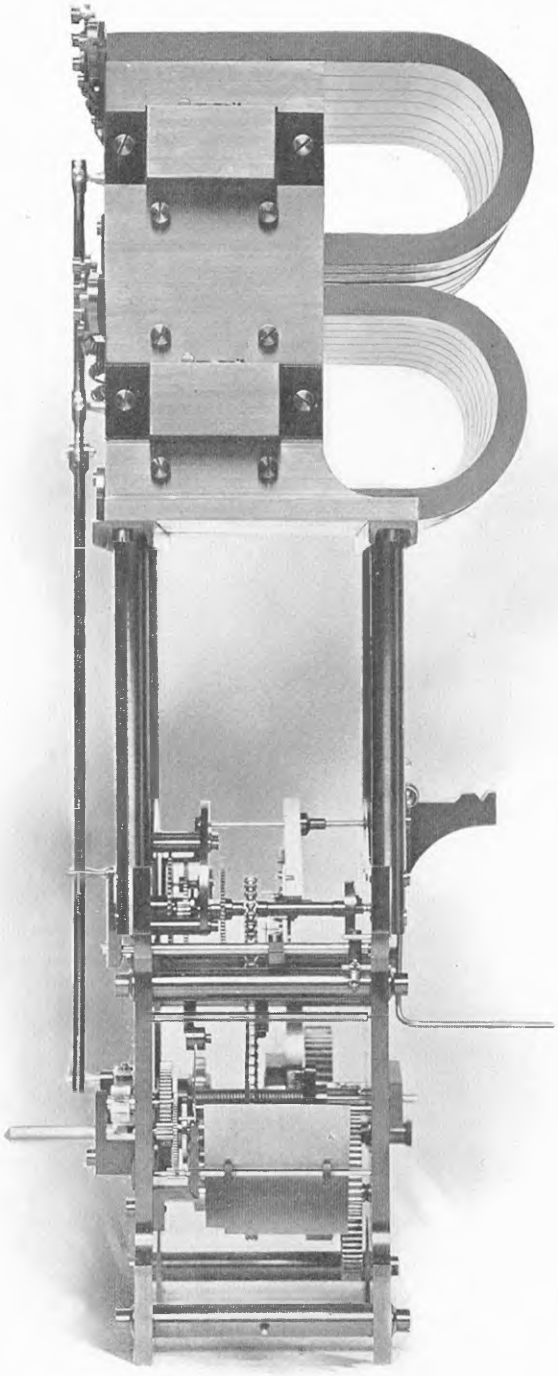
The "Remontoire" type escapement is fitted to all the Magneta Master-clocks.

It is the most accurate escapement made; it is the type applied to all astronomical regulators, and is used on the larger tower-clocks, where accurate time-keeping is desired.

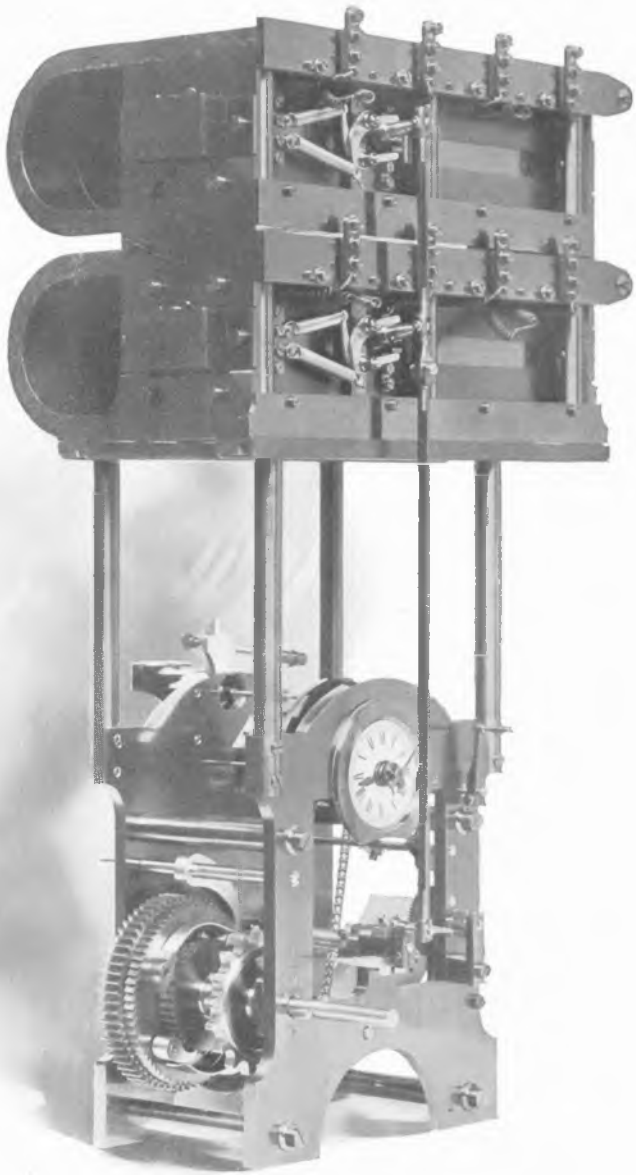
It is the only escapement that effectively overcomes the inertia of the moving parts.



Front View



Side View



Diagonal View

MATERIAL AND WORKMANSHIP

All parts of the mechanism are of the very best hardened brass, Krupp steel, highly polished, and magnalium. The teeth of all gears are accurately machine cut. Workmanship and finish of the *highest degree attainable in the clock manufacture.*

CONSTRUCTION

The Master-clock may be said to consist of three principal parts (see illustration on page No. 4, Master-clock type "g" being here illustrated):

1 The clock movement proper including pendulum.

2 The current producing magneto apparatus.

3 The motor arrangement at the bottom of the case for the winding of the weight.

The clock movement proper, as well as the magneto generating apparatus, are both operated by weight; the generating apparatus being released by the clock movement every minute.

The weight is wound once every day by an electric motor located at the bottom of the case; the motor deriving its power from the light line of the building. The clock, however, can be wound by hand, should it happen that the light line is interrupted, or out of order.

The accompanying illustrations (Pages No. 6, 7, 8) show the clock movement proper, as well as the current-producing magneto apparatus, but a much clearer idea of the principle of the operation of the Master-clock will be obtained by referring to the sketch on Page 10, Fig. 1, an elevation and Fig. 2 a plan.

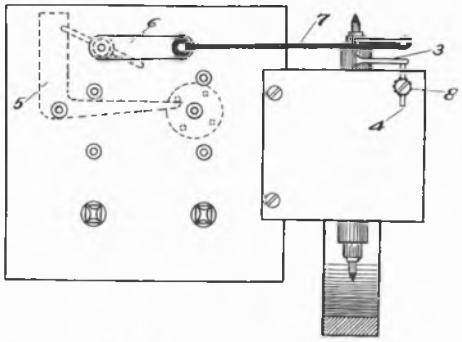


FIG-1

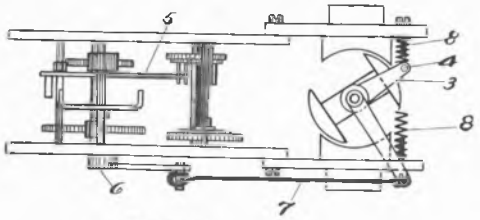


FIG-2

No. 5 denotes a releasing lever which is operated every minute, in a known manner, by the going train of an ordinary clock, and thus causes the crank No. 6, which is driven by weight through a train of wheels, to rotate each time through a half-revolution. The crank is connected, by means of the link No. 7, to the arm of an armature, so that each time the crank No. 6 is operated, the armature is suddenly moved to and fro. On the armature shaft there is mounted an arm, No. 3, which, at each oscillation of the armature, acts against the oscillatory movement by means of a pin No. 4, which compresses one or the other of the two springs No. 8, thus the inertia of the armature is stored and is utilized when the lever No. 5 is again released to start the oscillation of the armature. By this means, the energy of the weights, which acts on the crank No. 6, and serves for moving the armature, can be reduced to a minimum, and very light armatures can be used.

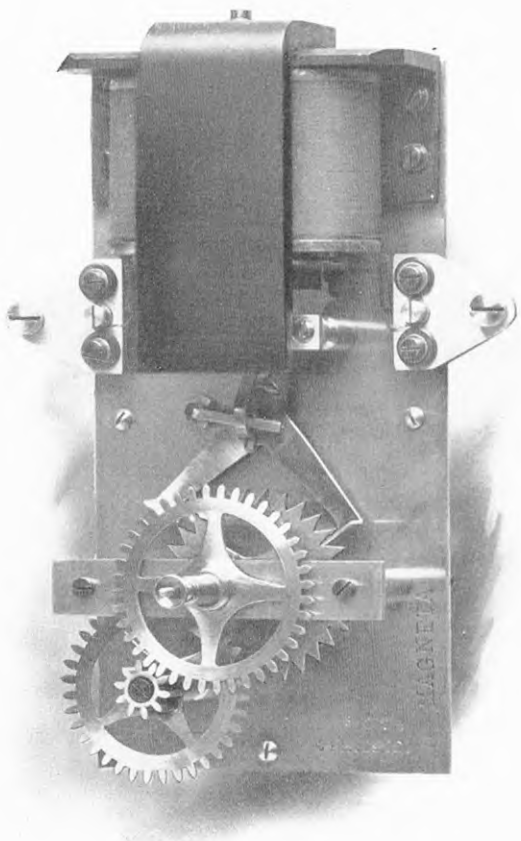
SECONDARY CLOCKS

DESCRIPTION

The Secondary-clocks all have standard "Magneta" electrical movements, white enameled dials, balanced hands, stout glass fronts, and either wooden, metal or bronze cases, of any *dial diameter desired* (dials see General Catalogue.) Glass covers over the dials of the Secondary-clocks are very essential, as these prevent the dust from getting into the movements; they also prevent interference with the hands while the clocks are being cleaned, etc. All of the clocks made by this Company, even to the largest for use in railroad depots, etc., have glass covers.

OPERATION OF SECONDARY-CLOCKS

The operation of the Secondary-clock mechanism is very simple; the current generated by the Master-clock is alternating; alternating every minute on account of the armature in the Master-clock making a semi-rotation the first minute in one direction and the following minute in the opposite direction. The importance of this method of operation cannot be over-estimated; it prevents the cores in the coils from becoming magnetic, as the reversing current, naturally, reverses the polarity. This cannot be said of battery-clocks, which, in time, are bound to become permanently magnetic;—one of their fundamental faults.



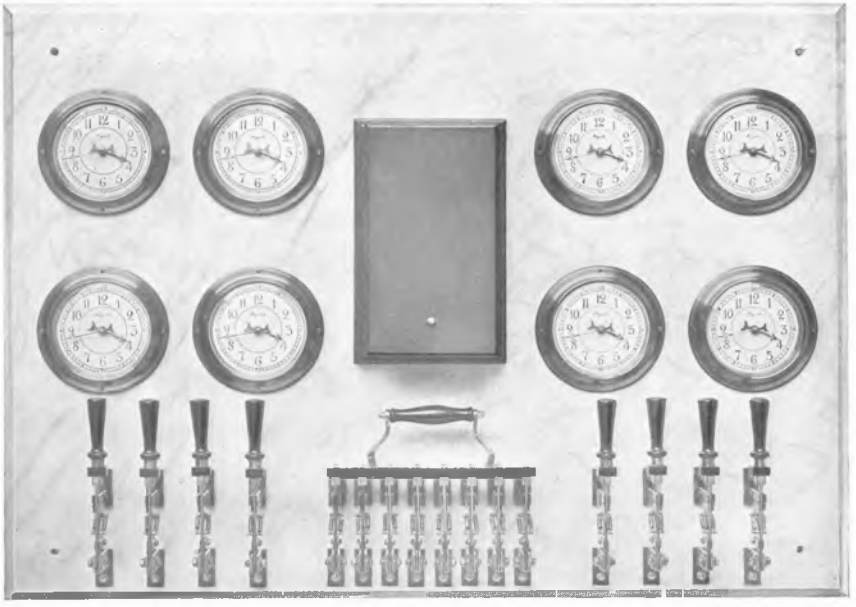
"Magneta" Secondary-clock Movement

CONTROL-BOARD AND TIME STAMP APPARATUS

The control-arrangement is only used in larger systems; the stoppage of a control-clock immediately indicating trouble on the circuit to which it is connected, and thus the breakage, or interruption, of any circuit line will be instantly indicated.

Electric time-stamps are often used in connection with time-clocks.

Our magneto time-stamp releasing apparatus is used for the purpose of keeping electric time-stamps in synchronism with the Master- and Secondary-clocks. The form of apparatus used by this Company is the only one that can be satisfactorily employed in connection with time-stamps; an ordinary relay being quite useless, as it is not constant.



Control Board

With Control Clocks and Timestamp-releasing Apparatus

Installed in U. S. Custom House, N. Y.

ADVANTAGES OF THE SYSTEM

Batteries and contact points of any form entirely superseded; therefore ***nothing to renew!***

ABSOLUTE SAVING *of the annual expenditure needed for the maintenance and repair of battery-clocks.*

No supervision, no maintenance *or attention of any kind is required; the entire system being self-acting.*

Highest time-keeping qualities, secured by the extreme simplicity of construction.

Secondary-clocks require no oiling.

Absolute impossibility *of the Secondary-clocks not to show uniform time, as the cores* ***cannot become magnetic;*** *the operative current being alternating.*

Large systems *and clocks located at* ***long distance from the Master-clock,*** *which in all other systems were absolute failures;—are a* ***perfect success*** *by employing* ***"Magneta"*** *clocks, as is proven by the number of large* ***"Magneta"*** *systems now in operation, some of them having more than five hundred Secondary-clocks connected to one Master-clock.*

DRAWING OF SPECIFICATIONS

A careful study of these lines, as well as of our General Catalogue, will enable the drawing up of specifications without omitting any vital points.

COMPETITIVE BIDS

In all such estimates and contracts which are open to ***public, competitive bids,*** *and where clock systems of all makes must be admitted (****specifications covering "Magneta" and battery systems****) it is always advisable to specify and insist upon a* ***tower-clock movement*** *(Remontoire type; weight driven and self-winding) for the Master-clock of the battery-systems, as is done by the U. S. Government, and many prominent architects.*

This will absolutely preclude the possibility of placing a Master-clock of an inferior and unsubstantial make, and one whose time-keeping qualities are greatly influenced by the varying resistance of the contact points which it must overcome.

Further, in connection with the battery systems, the specifications should call for two motor generator sets, and it is advisable to have these sets placed in dust-proof cases. Further, a voltmeter should be provided to show the line voltage, also, a voltmeter of proper range to show the voltage of the secondary circuits of the motor generator sets, as these always vary, and an ammeter of proper range should also be included.

The Master-clock applied in the ***"Magneta"*** *system is a high-grade astronomical regulator of the standing type; and in every respect as substantially made as a tower-clock.*

If you want the Master-clock to be a perfect time-keeper, specify the "Remontoire" type, that is, have the escapement actuated by the "Remontoire" mechanism, otherwise your Master-clock will be fitted with a "Graham dead-beat escapement." The latter is the most commonly used of the escapements, but can in no way compare with the "Remontoire."

CONDUITING AND WIRING

IN GENERAL

A first-class wire system is a fundamental necessity for the perfect operation of an electric clock system. For this reason, and in view of the fact that our Master-clock generates its own current for the operation of the Secondary-clocks, and does not depend upon batteries for its source of power, the same strict rules and regulations governing the installation of electric light and power wires should be enforced in connection with the installation of the wiring for the time-clock wire system. Under no condition should this wiring be classed as bell, call or similar wiring.

CONDUITS

It is always advisable to have an independent conduit system for the clock wires.

Conduits, of sufficient size to accommodate the wires should be installed in the usual approved manner; all conduiting to be "Loricated." All joints to be well red-leaded, and all pipe ends to be properly reamed and bushed.

WIRING

Thirty units are usually connected to one series (*maximum* amount 50 *units*).

1-12″	dial clock	equals	1 unit.
1-16″	dial clock	equals	3 units.
1-20″	dial clock	equals	3 units.
1-24″	dial clock	equals	8 units.
1-28″	dial clock	equals	8 units.
1-32″	dial clock	equals	8 units.
1-36″	dial clock	equals	8 units.
1-40″	dial clock	equals	20 units.
1-48″	dial clock	equals	20 units.
1-60″	dial clock	equals	30 units.
1-70″	dial clock	equals	40 units.
1-80″	dial clock	equals	40 units.
1-84″	dial clock	equals	40 units.
1-96″	dial clock	equals	50 units.

From the foregoing list the exact amount of series into which a system should be sub-divided can be very easily determined upon, depending, of course, upon the number and size of the clocks.

The return wire is common to all series.

For the series No. 18—heavy rubber covered wire is used, and for the common return No. 16—heavy rubber covered wire is used.

All connections to be *well soldered and taped.*

TEST

The insulation resistance against the ground is to be at least 500,000 ohms.

JUNCTION BOXES

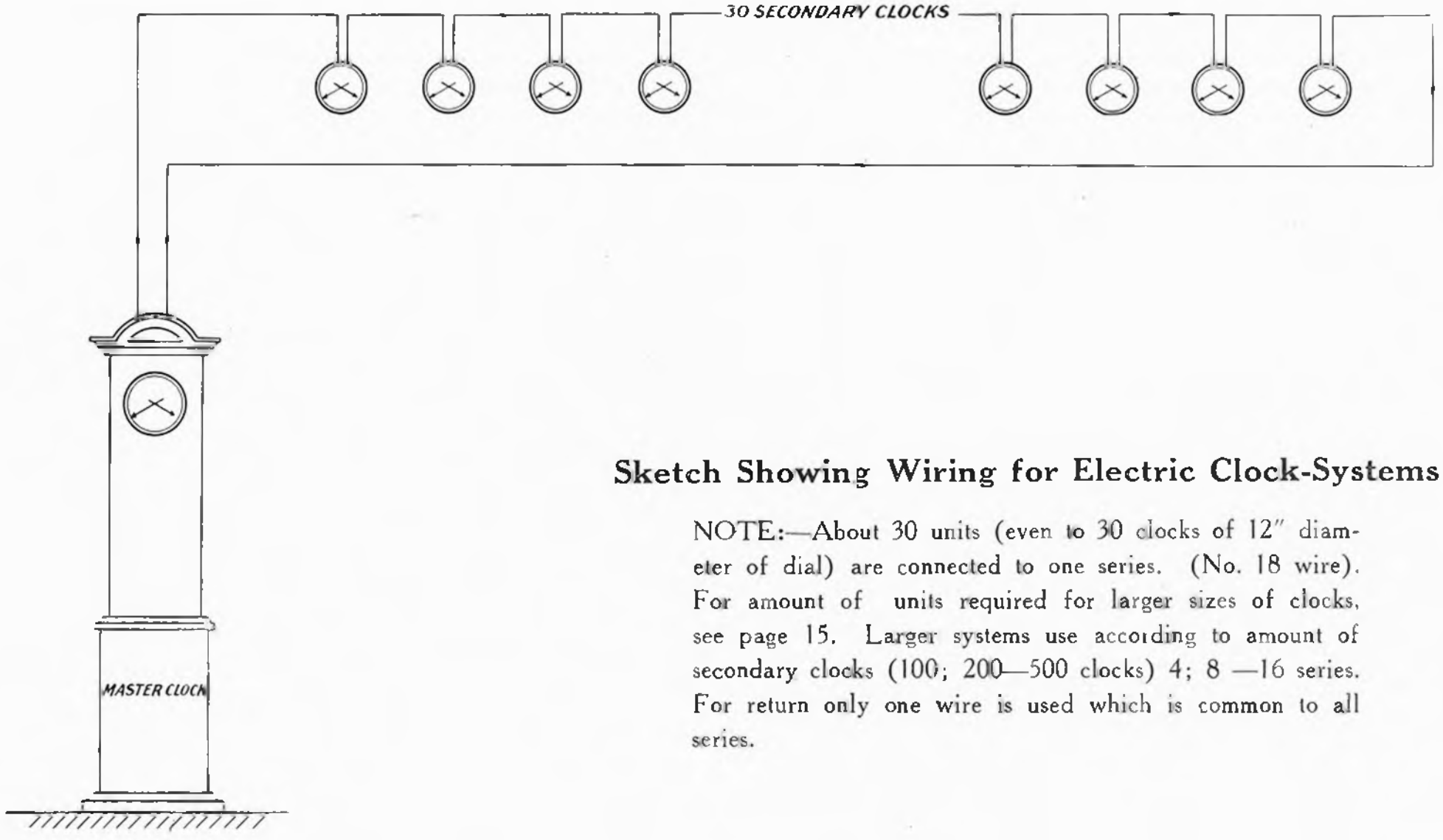
Wires, six or more in number, when terminating in junction boxes, are to be mounted on slate interconnecting blocks, each connecting strip plainly marked.

MASTER-CLOCK CONNECTION

If a self-winding Master-Clock is adopted, a suitable connection is to be made to the same from the light line. It is advisable to have this connection made directly to the main panel-board, so that the same will not be interfered with, or cut out.

CONTRACTOR

It is strongly recommended to have, at least, the wiring for the clocks done by the clock contractor, who by reason of the fact that he has had vast experience in this line, and has in his employ skilled electricians who only do clock wiring and thus have become, so to say experts in this line, he is in a position to install a faultless wire system, and thus assumes the responsibility for the perfect operation of the entire system; and cannot shift any responsibility upon others.



Sketch Showing Wiring for Electric Clock-Systems

NOTE:—About 30 units (even to 30 clocks of 12″ diameter of dial) are connected to one series. (No. 18 wire). For amount of units required for larger sizes of clocks, see page 15. Larger systems use according to amount of secondary clocks (100; 200—500 clocks) 4; 8 —16 series. For return only one wire is used which is common to all series.

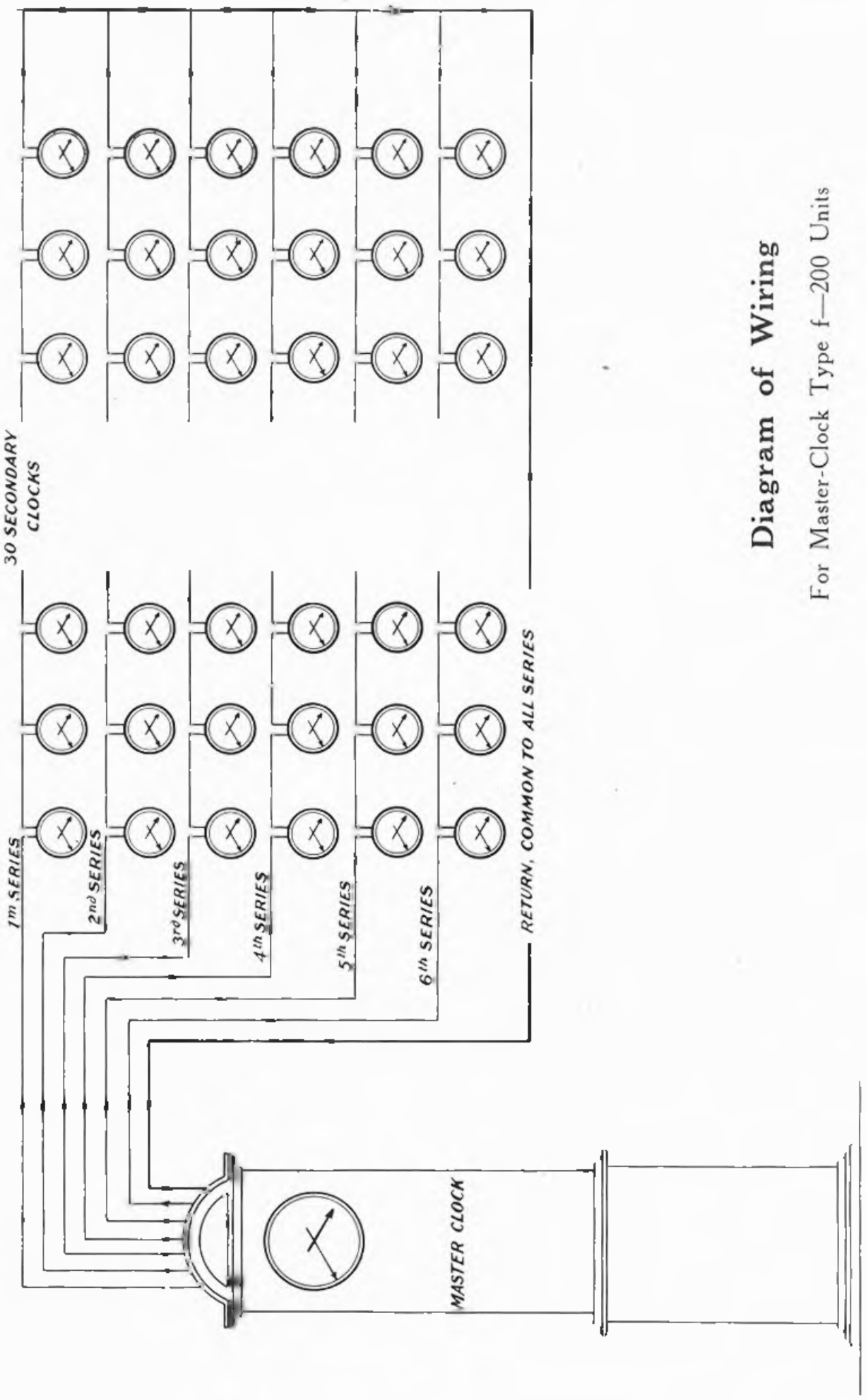
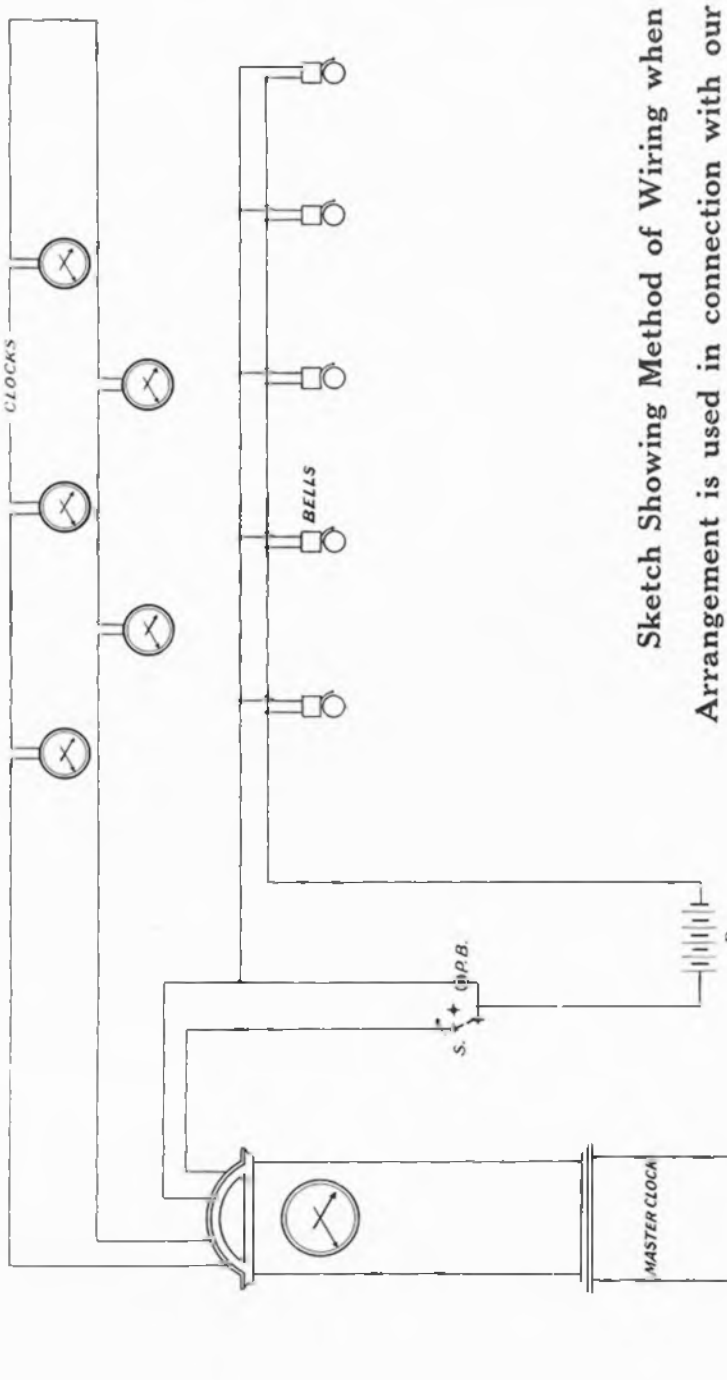


Diagram of Wiring

For Master-Clock Type f—200 Units



Sketch Showing Method of Wiring when Program Arrangement is used in connection with our Clock-system