

A SIMPLE ELECTRIC DROP RECORDER

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Simple drop recorders usually employ the drop weight for direct record or the transmission of air pressure like in the Marey tambour or in the float recorders. In some electric drop recorders the drop weight closes a circuit (Condon). The difficulties found in actual work of these apparatus are plentiful and the tracings are not easily recorded.

The device described here works by the drop principle closing the circuit like in the Winton drop recorder (1). It is connected directly to the 110 volt, A. C. mains and the circuit is a simple one. Construction and operation characteristics make this device much more useful than the common ones used in biological laboratories.

Working principle — The circuit presented here (fig. 1) is for records on smoked paper using an electromagnetic signal (time maker).

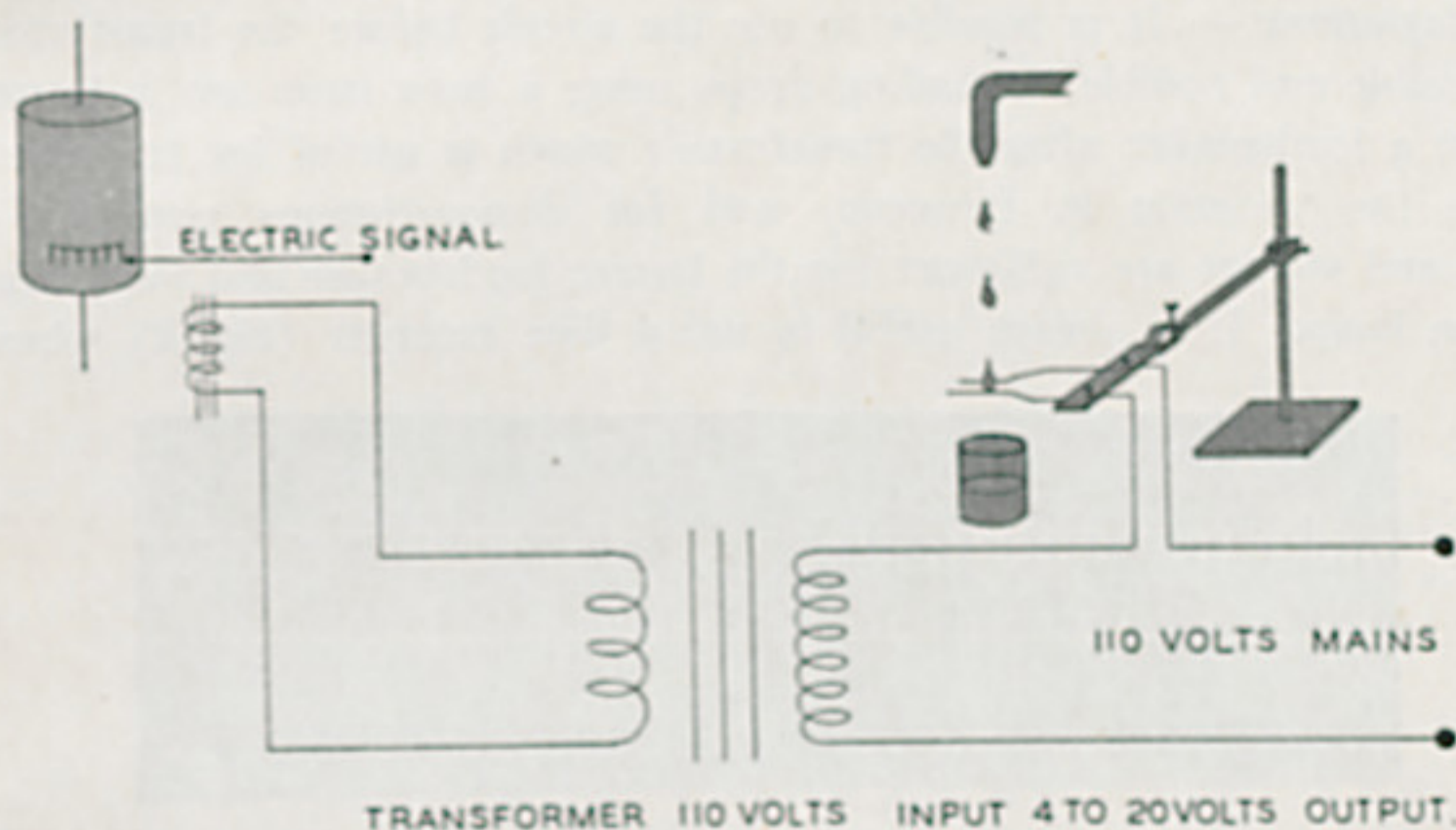


Fig. 1 — Electric drop recorder scheme.

A circuit having one of the wires connected to two nickel chrome wires originates from the mains. This circuit is normally open. The falling of a drop between the nickel chrome wires closes the circuit. Biologic solutions

contain electrolytes in amounts sufficient for the flow of current through them. The current originating from circuit closing will pass through a small transformer decreasing its voltage to the level of common recording apparatus. The current used is 110 volt A. C., 50 or 60 cycles and the variation in $1/50$ to $1/60$ sec. will always be in time with falling drops otherwise the flow would be a continuous one. Each falling drop provokes many circuit closings and the pen registers many tracings which are all superposed owing to the small kymograph velocity.

Construction — The nickel chrome wire used is of n.^o 24 or 21 B & S gauge. They are enclosed in an insulating plate and connected to the small binding post to which the interrupted wire coming from the mains is also connected. The nickel chrome wire is advantageous because of low price and resistance to oxidation. The space between the two wires is easily adjusted to the drop diameter.

The transformer is from the common buzzer model with 110 volt input and 4 to 20 volt output. When the electrolyte concentration is weak the transformer can be adjusted to a higher voltage or another transformer with greater output be employed.

In this laboratory there have never been the need of using transformers giving more than 4 to 12 volt output, but when the electromagnetic pen is of the high consuming current type there will be the need of a transformer with a larger capacity.

Adaptations — It is possible to use the circuit before the transformer to make visible and audible the falling drops using a neon lamp and a buzzer or to adapt a loudspeaker after the transformer which is useful for controlling at distance the variation in frequency and for demonstrations purposes. The current and voltage are sufficient for the buzzer loudspeaker and ionization for the neon lamp. It is always useful to use a time recorder (fig. 2) when the

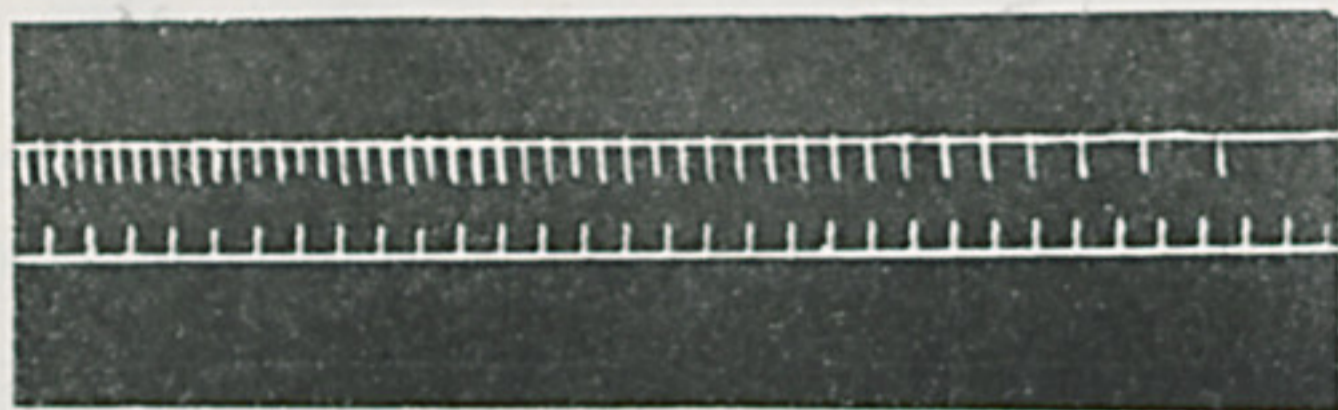


Fig. 2 — Upper tracing, drop record; lower tracing time 6 sec. intervals.

chief purpose is to register the flow variations. When it is desired to determine the total number of drops in prolonged observations it is possible to connect an electromagnetic counter (2). It is also possible to use an electric buzzer by adapting a pen in the vibrating plate (3) and with this simplification there is no need to use a transformer or electromagnetic pen. In this way both the recording and the audible signal are obtained.

RESUMO

É descrita uma montagem simples para a contagem eléctrica de gotas, com o emprego de corrente alternada, usando pequeno transformador e pena inscritora electro-magnética comum. São descritas igualmente possíveis variantes do método, para tornar visível ou audível a passagem das gotas. Instala-se para isto, no circuito, uma lâmpada neon, o que facilita a observação e demonstrações ou uma campainha, cigarra ou alto falante, obtendo um sinal sonoro.

REFERENCES

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2. *Leite, J. V. P.* — Personal communication.
3. *Rocha e Silva, M.* — Personal communication.

