

R. H. ROGERS.  
RECORDING DEVICE.  
APPLICATION FILED AUG. 14, 1916.

1,306,631.

Patented June 10, 1919.

Fig. 1.

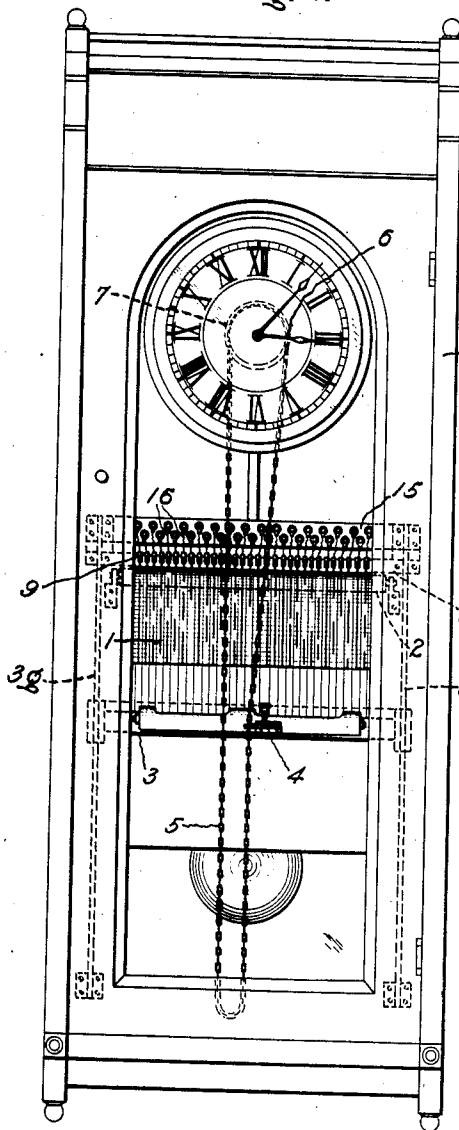


Fig. 2.

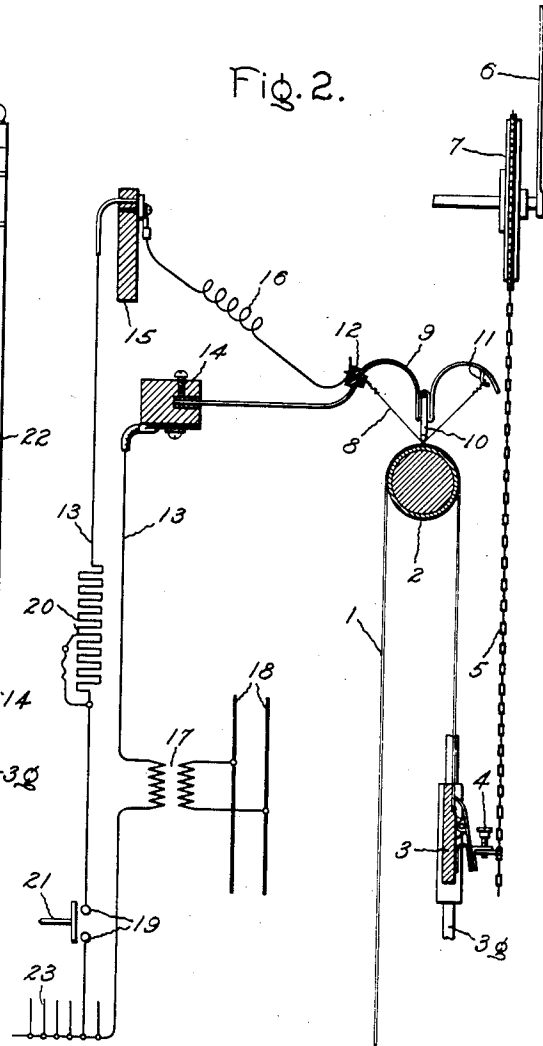
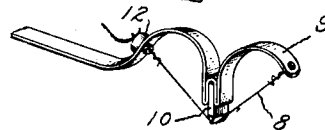


Fig. 3.



Inventor:  
Robert H. Rogers,  
by *Wm. B. Davis*  
His Attorney.

# UNITED STATES PATENT OFFICE.

ROBERT H. ROGERS, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## RECORDING DEVICE.

1,306,631.

Specification of Letters Patent. Patented June 10, 1919.

Application filed August 14, 1916. Serial No. 114,827.

*To all whom it may concern:*

Be it known that I, ROBERT H. ROGERS, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Recording Devices, of which the following is a specification.

The present invention comprises a device for making a record upon a chart of the operation of industrial machines or other moving devices which may be located at points remote from the recording device.

It is the object of my invention to provide a simple, reliable device for making a sharp, indelible record and which may be used for recording the operation of a large number of devices upon a single chart. With this object in view, I have provided a recorder containing an electrically heated stylus, or pen comprising preferably a fine wire, which when traversed by an electrical current will scorch a record on paper, or other thermally sensitive material.

In the accompanying drawing, Figure 1 is a front elevation of a clock-operated recorder equipped with a group of styli for recording the operating conditions of a plurality of machines or operations; Fig. 2 is a diagram illustrating the relation of the operating parts and the electrical circuits and Fig. 3 is a detail view of one form of thermal stylus.

Referring to Fig. 2, the strip of paper, upon which a record is to be made, is drawn over a roller 2 at a predetermined rate, in this case by attachment to a weight 3 connected by means of an adjustable clamp 4 to an endless chain 5 which in turn is connected to the clock mechanism. The weight 3 is shown in Fig. 1 as traveling in guides 3\* indicated by vertical dotted lines, and it may assist the main weights (not shown) in driving the clock mechanism. The record strip 1 is geared to the hour hand 6 of the clock and will advance a distance per hour depending on the size of the sprocket wheel 7 over which the chain 5 travels, for example, one inch feed per hour is ordinarily satisfactory.

I prefer to use ordinary manila paper made of spruce wood, although other ther-

mally-sensitive materials may be employed. The roller 2 consists of wood or other poor conductor of heat to prevent undue loss of heat from the stylus.

Bearing on the surface of the paper is a thermal stylus comprising a fine wire 8, carried by a double bow 9 of phosphor bronze or other suitable resilient material, and passing over the sharp edge of a bridge 10 of glass, porcelain, or other suitable insulating material. As more clearly shown in Fig. 3, the bow is W-shaped and when the holder is compressed the central rib holds the bridge 10 in place even without the assistance of the heater wire. The heater wire 8 consists preferably of calorite, an alloy of about 65% nickel, 12% chromium, 15% iron and 8% manganese, although platinum, tungsten and other suitable refractory metals may also be used. The wire may have a diameter of about ten mils so as to heat and cool rapidly. It is electrically connected at one end to the bow 9, for example, by simply tying to a hook 11 and its other extremity passes through an insulating washer 12. Connected to the bow 9 is one terminal of an electrical circuit 13 conveniently at the metal support 14 carrying the stylus. The opposite terminal of the circuit 13 is connected to a bracket 15 from which a conductor 16 leads to the terminal of the heater 8 passing through the insulator 12. As in the described form of stylus the heater wire is bent upon itself on an acute angle over the sharp edge of the bridge, but a small section of the V-shaped heater wire comes into contact with the paper, and permits a sharp clean break in the record over a short time interval. Breaks one-sixtieth of an inch in length are easily readable.

The circuit 13 contains a source of electrical energy of suitable voltage for example, a transformer 17, the primary winding of which is connected to a source of alternating current as represented by the conductors 18. The circuit 13 also contains contacts 19 and an adjustable resistance 20. The contactor 21 may be connected to a moving part of a machine, to a thermostat, to a float in tanks or process vats to a valve, or any other part, the condition or operation of which is to be recorded.

In Fig. 1 are shown a plurality of thermal styli bearing on a ruled record blank supported within a clock 22 of the well-known weight and pendulum type. Several circuits to the respective styli are indicated at 23, Fig. 2. The small size of the stylus enables a large number to be accommodated within the housing of an ordinary clock. As the record advances, and the contactors of the various industrial devices close allowing current to pass through the heaters, vertical lines are scorched upon the record sheet, the length of which varies with the length of time that the contactors remain closed.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A recording device adapted for use with a strip of a thermally sensitive material, comprising the combination of a wire stylus, a holder therefor having a sharp edge engaging with said wire to present substantially a point contact with the strip on which a record is to be made, means for heating said stylus independently of said strip, and means for producing relative motion between said strip and said stylus.

2. A stylus for making a record on thermally sensitive material, such as paper, comprising a wire of refractory material and a holder for maintaining said wire taut while bent in the shape of a V.

3. A stylus for making a record upon a thermally sensitive material, such as paper, comprising a wire of refractory material, a resilient holder for maintaining said wire taut and current connections therefor.

4. A stylus for making a record upon a thermally sensitive material comprising a resilient holder, a heater wire held in a taut condition by said holder and a bridge of insulating material for maintaining one section of said wire bent at an angle.

5. A stylus for making a record upon a thermally sensitive material such as paper, comprising a W-shaped holder a bridge of insulating material held by the central rib of said holder, and a heater wire passing over said bridge at an angle and fastened to the outer ribs of said holder.

In witness whereof, I have hereunto set my hand this 11th day of August 1916.

ROBERT H. ROGERS.