Oct. 1, 1929. C. C. SCOTT 1,729,630

MACHINE FOR REDUCING RECORDS TO GRAPHS

Filed May 28, 1928 2 Sheets-Sheet 1

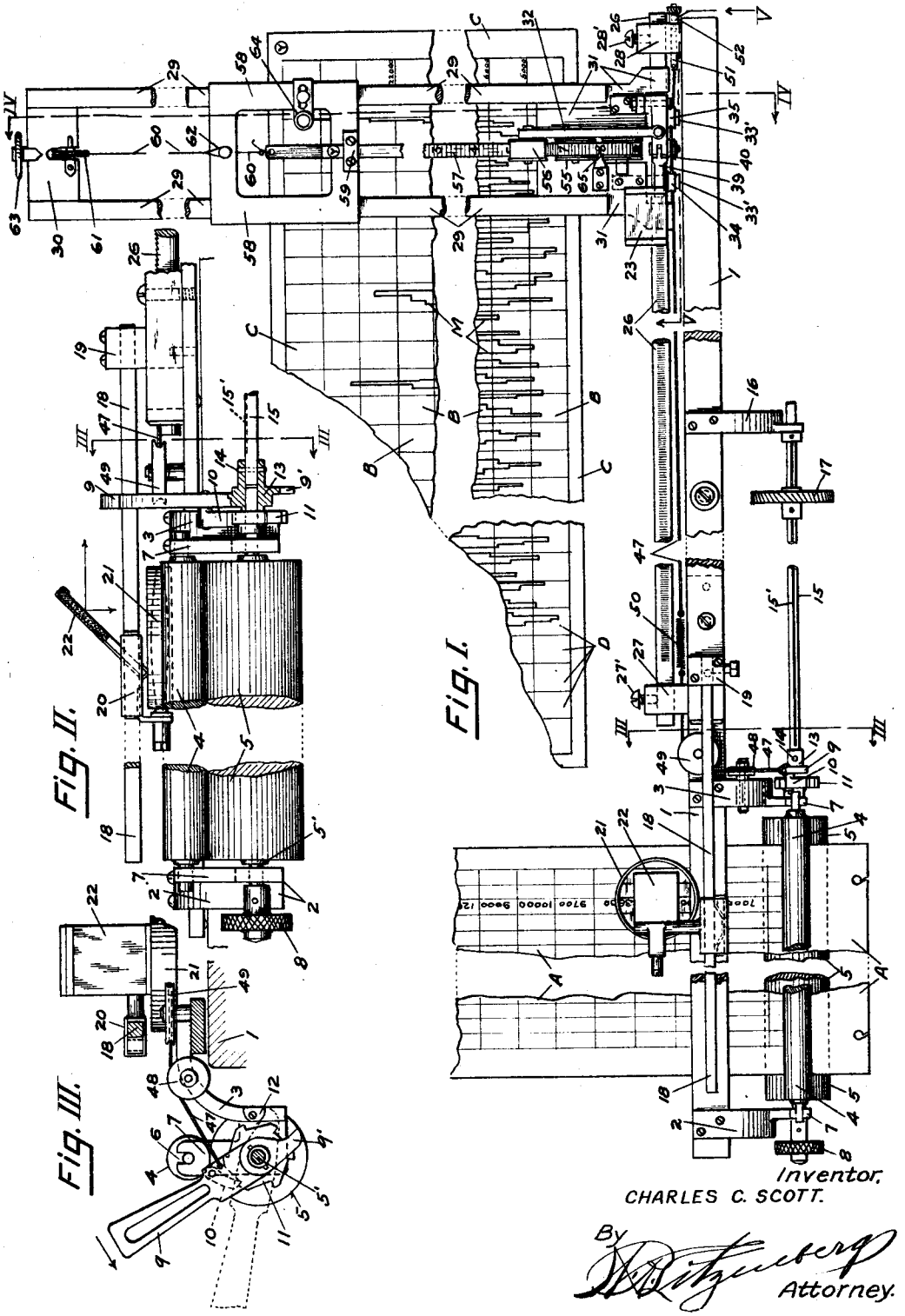


Fig. I.

Fig. II.

Fig. III.

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MACHINE FOR REDUCING RECORDS TO GRAPHS

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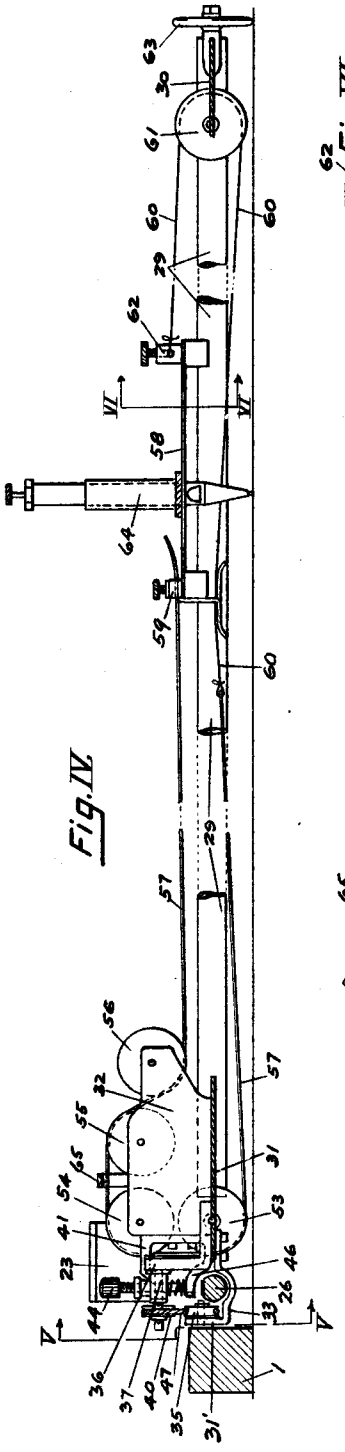


Fig. IV.

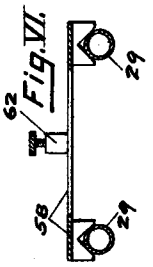


Fig. VII.

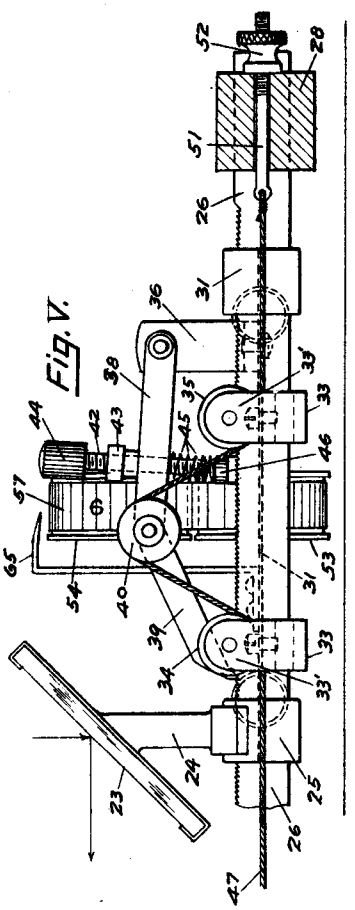


Fig. V.

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UNITED STATES PATENT OFFICE

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MACHINE FOR REDUCING RECORDS TO GRAPHS

Application filed May 28, 1928. Serial No. 280,987.

My invention relates to machines for reducing records to graphs, and more particularly to a machine into which a tabulated record can be placed with a curve sheet, for example, and onto which curve sheet said record can be represented as a curve or graph.

Among the salient objects of my invention are: to provide a machine in which the record sheet can be moved intermittently a predetermined distance, according to the record spacing thereon, and the curve or graph sheet be also moved relatively, with indicating means to assist the operator in making the proper movements, and with marking means movable with each adjustment to draw the graph as said marking means is moved; to provide in a machine of the character referred to, means for transferring the record to a reading position, whereby the operator need not turn his head any considerable distance to view the different records or indications which determine the movement of the marking means; and, in general, to provide a simple, practical, and accurate mechanism for quickly and accurately putting a record in graph form, thus saving a great deal of time and reducing the chances for error to a minimum.

In order to explain my invention, I have illustrated one practical embodiment thereof on the accompanying two sheets of drawings, in which is shown a machine particularly adapted for reducing to graph form the hourly and daily consumption of electric energy. In the drawings:

Figure I is a plan view of a machine embodying my invention, with parts broken away to reduce the size of the figure;

Figure II is a front elevation thereof, with parts broken away and omitted;

Figure III is a vertical sectional view taken on line III—III of Fig. II;

Figure IV is a transverse sectional view taken on line IV—IV of Fig. I;

Figure V is a sectional view taken on line V—V of Fig. I and enlarged; and

Figure VI is a sectional view taken on line VI—VI of Fig. IV.

Referring now in detail to the drawings, 1 designates a longitudinal supporting member, provided with longitudinally spaced supporting brackets 2 and 3, between which are supported two rollers 4 and 5, for receiving and moving intermittently a record bearing sheet, designated A, shown in Fig. I, with a part broken out. The roller 4, is supported in U-shaped bearings 6, 6, in members 7, 7, extending upwardly from the brackets 2 and 3, as will be seen in Fig. III, so as to rest upon and turn with the larger roller 5, for feeding the record sheet A. The roller 5 is supported on a shaft 5′, provided at one end with a hand nut 8, for turning said roller, and at its other end said shaft is provided with an operating lever 9, operating a dog 10, on a ratchet wheel 11, connected with the roller 5, whereby as said lever 9 is moved downwardly the limit of its stroke, which is determined by the toe 9′ thereof engaging with a fixed part 12, turns said roller 5 a predetermined distance, which is in the present instance the same as the spaces representing hour periods on said record sheet A. Said lever 9, at its lower end is provided with a hub-like portion 13, turning loosely on the shaft 5′, and having secured therein, with a pin 14, a shaft 15, having therein, longitudinally thereof, a key-way 15′. The other end of said shaft 15, is supported in a bracket 16, from the member 1, and has slidably thereon a wheel 17.

Supported above the member 1, is a shaft 18, anchored at one end in a bracket 19, on said member 1. Slidably mounted on said shaft or bar 18, is a sleeve 20, supporting thereunder a magnifying glass 21, and supporting above said glass a mirror 22, said parts being movable along said bar 18, over the record sheet A, whereby a record on said sheet is enlarged by the magnifying glass 21, and reflected in the angular mirror 22, and to a second mirror 23, supported in a bracket 24, on a collar 25, moving along a ratchet bar 26, supported at one end in a bracket 27, on the member 1, the opposite end of said rack or ratchet bar 26, being supported at the end of said member 1, in a bracket 28. Set screws 27′ and 28′ are used to hold said rack bar 26 in said brackets 27 and 28.

Movably connected with said rack bar 26, which is in effect a feed bar, is a carriage frame extending at right angles to the member 1, and consisting of two parallel bars 29, 29, connected at their outer ends by means of a member 30, and at their attached ends by means of a plate 31, with a vertical web or bearing member 32, intermediate its opposite sides. Secured to the front edge of the connecting plate or member 31, Fig. IV, is an underlying member 33, which underlies the ratchet bar 26 and turns up in front of the same and forms a support for two pulleys 34 and 35, the upturned portions of said member 33 being designated 33′, 33′, as seen in Fig. V. An angle member 36 is mounted on the plate member 31, and this carries a spool or sleeve 37 extending over the ratchet bar 26, to which is pivotally mounted one end of a lever 38, the other end of which is pivotally connected with a pawl 39, with a pulley 40 mounted on the pivot connecting said lever 38 and pawl 39, as clearly shown in Fig. V. The free end of said pawl 39 engages with the notches of the ratchet bar 26, for a purpose hereinafter referred to. A second member or bracket 41 is connected with the vertical plate or web 32, Fig. IV, and carries a screw 42, operating through a part 43, with a knurled nut or head 44 on said screw for operating it, to increase or diminish the tension of a spring 45, under the lever 38, with its lower end seated upon a bracket 46, attached to the plate 31. Thus said lever 38, and the pawl 39 are normally raised and when the pulley 40 is moved downwardly with said lever and pawl, the engagement of the pawl 39 on the ratchet bar 26, operates to move the carriage to the right, and this is accomplished in a manner to be described.

Connected to the lever 9, which is operated to turn the rollers 4 and 5 for feeding the record sheet A, is a cable 47, which runs over a pulley 48, on the bracket 3, and thence over another pulley 49, at right angles to the pulley 48, said cable being connected to a coiled spring 50, with the cable extension from the opposite end of the spring, as shown in Fig. I, and passing thence under pulley 34, Fig. V, up over pulley 40, and down under pulley 35, and thence to an anchor bolt or member 51, provided with an adjustment nut 52, outside of the member 28, as clearly shown in Figs. I and V. Thus when the hand lever 9 is operated, said cable 47 is drawn to operate the pulley 40 and lever 38 and pawl 39, to move the carriage 29—31 along the ratchet bar 26.

Mounted on the vertical plate or member 32, are four pulleys, 53, 54, 55 and 56, and a flexible scale or tape 57 runs around said pulleys, as shown in Figs. I, V and VI, one end of which is attached to a carrier frame 58, sliding on the two parallel members 29, 29, said scale being attached by means of a set screw 59, on top of said carrier frame 58, while the opposite end of said scale 57 is secured to a cable 60, extended around a pulley 61, in the plate 30, and back to the carrier frame 58, to the rear of which said cable is attached, as at 62. A supporting wheel 63 is mounted on the member 30, at the extreme end of said carriage members 29—29. Said carrier frame 58, is provided with means for supporting a pen or pencil, as at 64, for leaving a mark along the course of its movement upon a curve or graph sheet B, on board C.

A pointer 65 is mounted on the plate member 31, and extends up over the scale or graduated tape 57, as will be clear from Figs. I, V and IV.

It will be noted that the record sheet A has the mirror 22 and the magnifying glass 21 adjusted over a record in the hour spaces. It will be understood that this record is reflected from mirror 22 to mirror 23, which is positioned near the pointer 65 and the graduated tape or scale 57, whereby it is easy for the operator to see in the mirror 23, and at the same time, with little or no movement of the head, see the graduations on the flexible tape 57. This pyroscope arrangement makes it possible to quickly and conveniently adjust the graduated scale 57 to bring the corresponding number to the pointer 65 by moving the carrier frame and pen or pencil, which in turn marks on the graph or curve sheet B a corresponding curve or graph.

The operation of the machine may be briefly described as follows;

The record sheet A is put into place, and the mirror 22 and glass 21, being moved together are moved to overlie the particular line or record which it is desired to represent on the curve or graph sheet B, which has been put in place on the board C, under the members 29—29. Assuming that the first space on the sheet A is under the glass and mirror and is reflected to the mirror 23, the operator then moves the lever 9 one throw, which moves the record sheet A one hour space. At the same time the cable 47 has been operated to operate the pulley 40, lever 38 and pawl 39, which operates to move the carriage along the ratchet bar 26. The operator then moves the pen and its frame again to bring the corresponding number on scale 57 to the one now seen in mirror 23. The movement of the carriage along the bar 26 makes the short marks longitudinally of the sheet B, while the movement of the carrier frame 58 and pen or pencil makes the longer marks transversely of said sheet B, as illustrated by the marks M. The record is presumably read every hour and the hour's record is transferred or represented by the movement of the carrier frame 58 and the pen 64 in the two directions back and forth, at right angles. The spaces on the sheets A and B are arranged to indicate

each an hour of time. There would be, therefore, one sheet B per month used for any one line of record on 30 or 31 A sheets.

Thus I have provided a machine in which the record sheet and the graph sheet can be placed, with means for moving the record sheet a predetermined distance with each operation of the machine, and with a marking means mounted to be moved over the fixed graph sheet a distance determined by the particular record in view on the record sheet. I have also provided a pyroscope for conveniently reflecting the particular record which is to be the determining factor for the next move of the marking means. This avoids the necessity of glancing from one record to the other with the almost certain probability of making errors in turning from one position to another. The inveniton makes it possible for one to quickly and accurately reduce a line of record from the record sheet A to a graph on sheet B, and while I have shown and described but one embodiment of the invention, I am aware that changes can be made in the details of construction and arrangement without departing from the spirit thereof, and I do not, therefore, limit the invention to the showing made for explanatory purposes, except as I may be limited by the hereto appended claims.

I claim:

1. In a machine for reducing records to graphs, means for holding and moving a record sheet, a sheet for receiving the graph, a carriage movable over said sheet, a marking device on said carriage and movable relative thereto and moving therewith, whereby said marking device marks upon said sheet, means for moving the record sheet, operating connections for simultaneously moving said carriage over the graph-receiving sheet, and means for moving the marking device on said carriage a distance corresponding with a particular record on the record sheet, whereby the record of the record sheet is reproduced in graph form on the graph-receiving sheet.

2. In a machine of the character referred to, means for holding a record sheet, means for moving said holding means intermittently a predetermined distance, a carriage movably supported, means for simultaneously moving said carriage as said record sheet moving means is operated, a graph-receiving sheet under said carriage, marking means on said carriage to move therewith and movable relative thereto to mark upon said graph-receiving sheet, means for relating the movement of said marking means proportional to an exposed record entry on said record sheet, and means for moving the marking means on said carriage.

3. In combination, means for holding and moving a record sheet intermittently to expose a record entry thereon, means for holding a graph-receiving sheet, a carriage movably mounted over said graph-receiving sheet, marking means carried by said carriage and movable relative thereto, means on said carriage for indicating a movement of said marking means relative to the carriage, means for moving the carriage and said marking means over said graph-receiving sheet holder, whereby each movement of said record sheet holder to expose a different record entry and the relative movement of said carriage over the graph-receiving sheet, positions the marking means for recording movement on a graph-receiving sheet as said marking means moves along the carriage.

4. In combination, means for holding and moving intermittently a record sheet, means for holding a graph-receiving sheet, a carriage movably mounted over said graph-receiving sheet holder, means for moving said record sheet holder and said carriage together, marking means on said carriage to move therewith and movable relative thereto, a scale member on said carriage movable with said marking means to indicate the movement of said marking means on said carriage, and means for reflecting a selected record entry from said record sheet to a position near said scale member, whereby both can be seen together, and means for moving said marking means and said scale member together.

5. In a machine of the character referred to, in combination, means for holding a record sheet, means for holding a graph-receiving sheet, a carriage movably mounted above the means for holding said graph-receiving sheet, marking means on said carriage to move therewith to mark upon a graph-receiving sheet as said carriage is moved, said marking means being movable relative to said carriage, connected means for simultaneously moving said record sheet holding means a predetermined distance to expose to a reading position record entrys thereon, and said carriage over said means for holding said graph-receiving sheet a related distance, and means for moving said marking means on said carriage a distance indicated by the record entry in the reading position.

6. In a machine of the character referred to, in combination, means for holding a record sheet, means for holding a graph-receiving sheet, a carriage movable over said means for holding a graph-receiving sheet, marking means on said carriage to move therewith to mark upon a graph-receiving sheet as said carriage is moved, said marking means being movable relative to said carriage, interconnected means for moving said record sheet holding means and said carriage simultaneously predetermined distances to expose to a reading position a record entry and to position said carriage over said graph-receiving sheet, and means for moving said mark-

ing means on said carriage a distance determined by said record entry.

7. In a machine of the character referred to, in combination, means for holding a record sheet, means for holding a graph-receiving sheet, a carriage movable over said means for holding a graph-receiving sheet, marking means on said carriage to move therewith to mark upon a graph-receiving sheet as said carriage is moved, said marking means being movable relative to said carriage, connected means for moving a record sheet and said carriage simultaneously predetermined distances to expose to a reading position a record entry and to position said carriage over said graph-receiving sheet, a scale element for movement with said marking means, said scale element being adapted to determine the movement of the marking means to represent the record entry on a graph-receiving sheet, and means for moving said marking means and said scale element.

8. In a machine of the character referred to, in combination, a record sheet holder, a graph-receiving sheet holder, a carriage movably mounted above said graph-receiving sheet holder, means for simultaneously moving said carriage intermittently a predetermined distance and said record sheet holder, marking means on said carriage and movable relative thereto, said marking means being positioned for marking upon a graph-receiving sheet as said carriage is moved thereover, means on said carriage to indicate the distance said marking means is moved relative to said carriage, and means for moving said marking means on said carriage to mark said graph-receiving sheet.

Signed at Portland, Multnomah County, Oregon, this 16 day of May, 1928.

CHARLES C. SCOTT.