May 7, 1929. E. M. ANDRES ET AL 1,711,980

MECHANICAL GRAPH

Filed Nov. 9, 1926 2 Sheets-Sheet 1

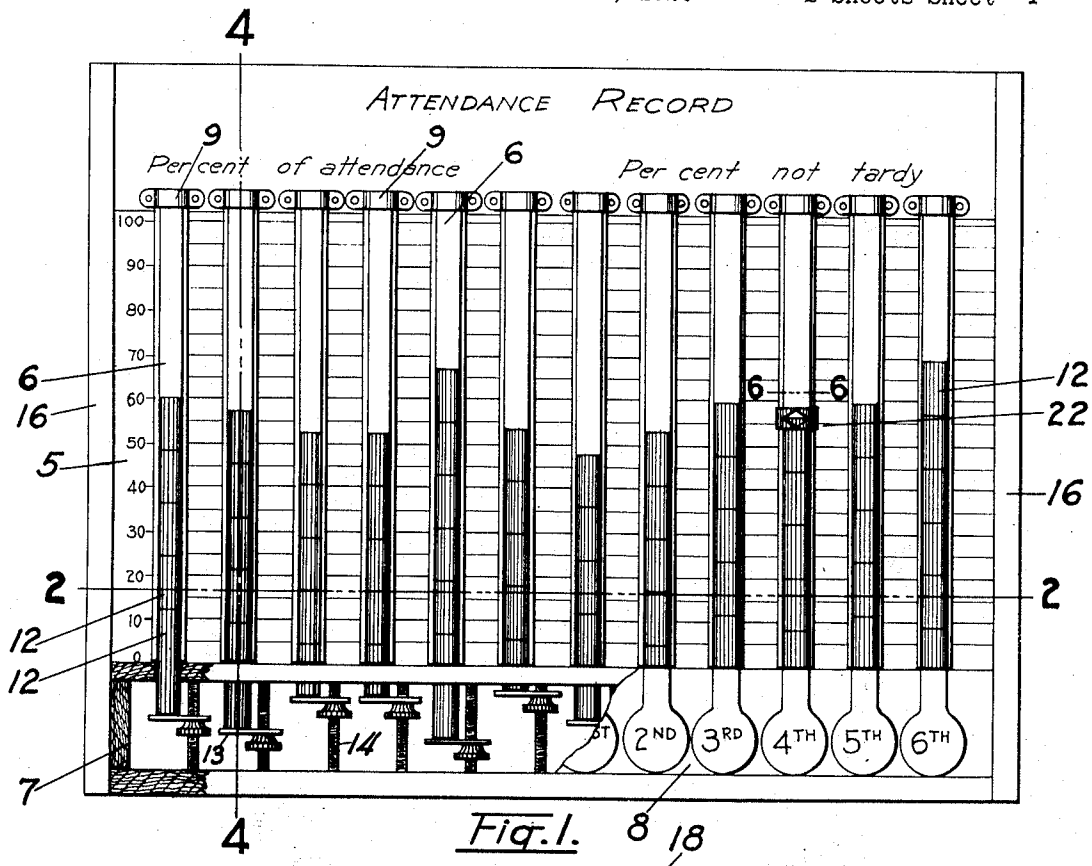


Fig. 1.

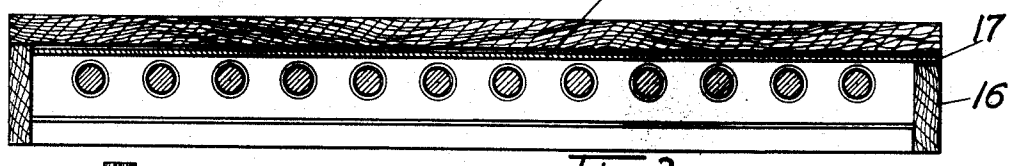
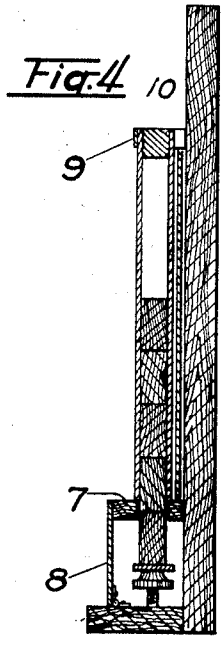


Fig. 2.



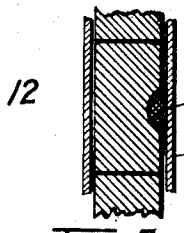


Fig. 5.

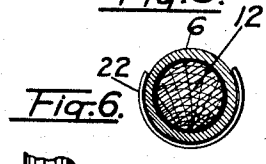


Fig. 6.

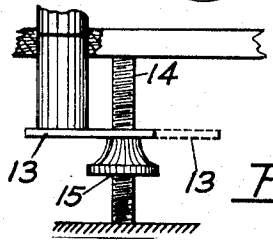


Fig. 7.

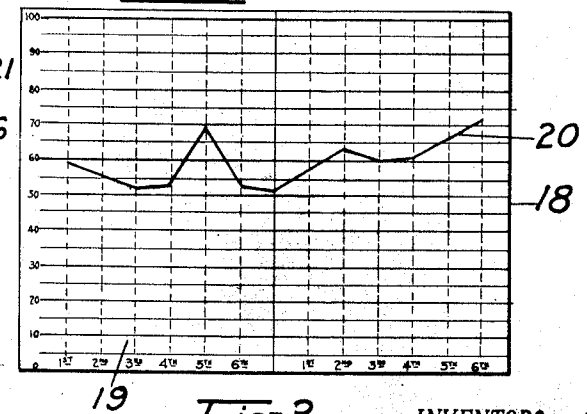


Fig. 3.

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MECHANICAL GRAPH

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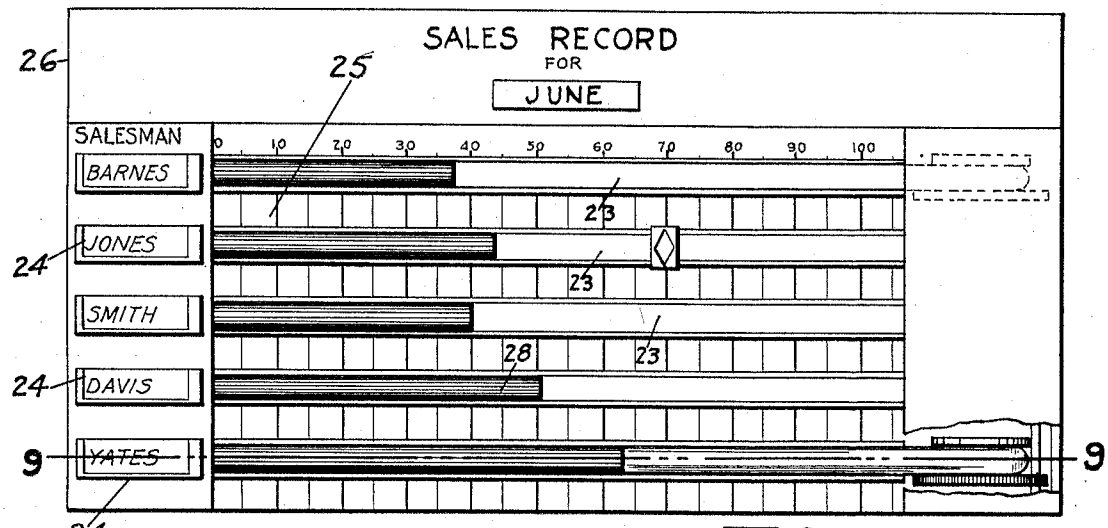


Fig. 8.

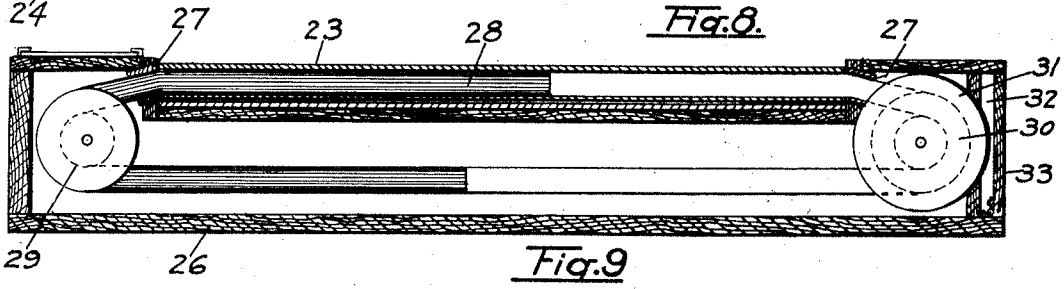


Fig. 9

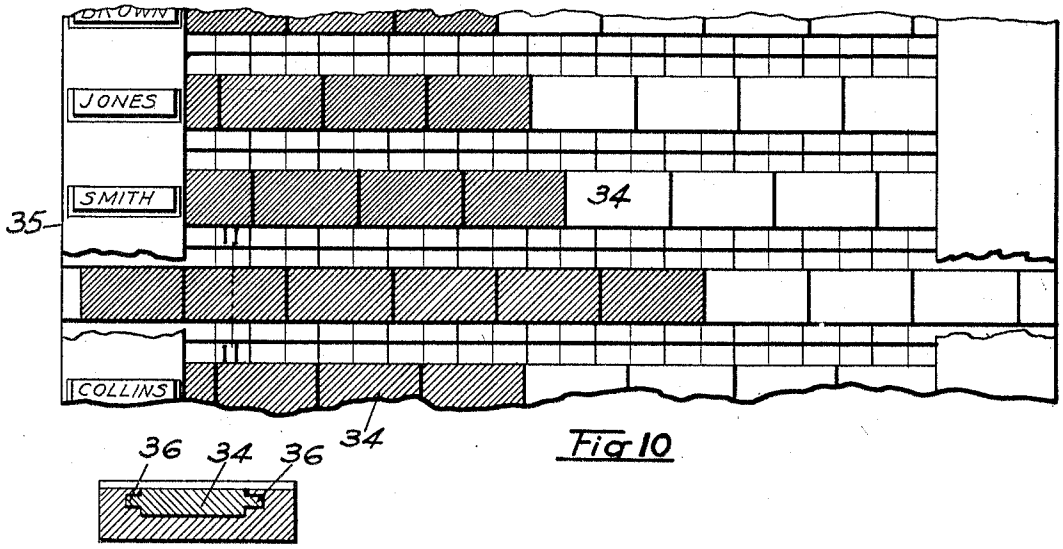


Fig 10

Fig. 11.

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Patented May 7, 1929. 1,711,980

UNITED STATES PATENT OFFICE.

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MECHANICAL GRAPH.

Application filed November 9, 1926. Serial No. 147,253.

Our invention relates to mechanical graph-charts and an object of the invention is to provide a simple and efficient device for presenting and recording statistical facts by means of mechanically adjusted indicative devices.

Another object of the invention is to provide a chart of the above described character which permits of the use of removable record-sheets without interference with either the position or operation of the mechanical indicators.

A further object is to provide a graph-chart in which the indicative devices move in guide-ways preferably made of transparent material; still further objects are to be found in details of construction and novel arrangements and combinations of parts as will be fully and clearly brought out in the course of the following description.

A mechanical graph-chart made in accordance with our invention is adapted to graphically display comparative facts in an intelligent and readily understood manner and to make permanent records of such facts; and it may be effectively employed in the commercial field for recording sales records, grades of efficiency, business progress, and other data too numerous to mention or it can be used in educational institutions for the purpose of recording attendance, progress, and motivation of pupils in different grades or classes. In fact, the usefulness of a mechanical graphic appliance of the character herein defined is so wide spread that the illustrations given in the accompanying drawings should be considered merely as exemplary of the many uses for which the apparatus is adapted.

In the drawings in which like characters of reference designate corresponding parts throughout the views

Figure 1 represents a face-view, partially in section, for a preferred form of our invention,

Figure 2, a section taken on the line 2—2, Figure 1,

Figure 3, a face view on a smaller scale, of one of the record-sheets removed from the apparatus,

Figure 4, a vertical section along the line 4—4 Figure 1,

Figure 5, an enlarged section through one of the tubular guide ways included in the construction and the indicative devices movably supported therein,

Figure 6, an enlarged section of one of the guide ways along the line 6—6 in Figure 1,

Figure 7, an enlarged detail of the mechanism by which the position of the indicative devices in their guide ways is adjusted,

Figure 8, a face-view of a chart of modified construction,

Figure 9, a section along the line 9—9 Figure 8,

Figure 10, a fragmentary face view illustrating another modification in the construction of the chart, and

Figure 11, a section taken on the line 11—11 Figure 10.

Referring first to Figures 1 to 7 of the drawings, the reference numeral 5 represents a board or back made of any desired size and material, upon the face of which are mounted a plurality of equidistantly spaced guide tubes 6. At the bottom of the back is a casing 7 for the operating mechanisms, the front of which is normally closed by a hinged door 8.

The top of the casing has a series of holes axially in alinement with the guide tubes which are supported on the casing in spaced relation to the face of the board. The tubes are fastened at their upper end by U-shaped clevises 9 and they may be closed by plugs 10 as shown in Figure 4 of the drawings.

The indicating devices of the chart consist of a number of blocks 12 slidably fitted in the guide-tubes and preferably colored in contrast with the surface upon which the graphic presentation or record is to be made. The blocks are made of wood or other suitable light material and are inserted into the tubes at the lower ends thereof in end-to-end arrangement.

The lowermost block of each series rests on an arm 13 projecting laterally from a screw-threaded rod 14 which is fixed between the top and bottom of the casing. The arm is slidable on the rod as best shown in Figure 7, and its position may be vertically adjusted through the medium of a nut 15 mounted on the rod below the arm.

At the sides of the board 5 are forwardly projecting upright flanges 16 and one of these flanges is provided with a slot 17 for the insertion of a record sheet 18 in the space between the face of the board and the guide-

tubes. The sheet which may be otherwise fastened in any desired manner and by any suitable means, bears on its face lineations in accordance with the graphic presentation or record to be made by means of the apparatus.

The chart of the illustration is particularly adapted to indicate the attendance in different grades of an educational institution. The back 5 bears with this purpose in view captions above the series of guide tubes reading "Attendance record," "Percent of attendance" and "Percent not tardy" the latter two captions being each placed over a separate number of the tubes.

On the face of the door 8 which closes the casing at the lower portion of the board, are numbers in alinement with the various tubes, indicative of the different grades in the school, the numbers being preferably placed in border lines leading to the respective tubes whereby to avoid possible confusion.

The record sheets, shown in detail in Figure 3, bear a series of equidistantly spaced horizontal lines 19 and at the ends thereof numbers indicative of degrees. It is desirable that the same lineation be printed or otherwise affixed to the face of the back board of the chart so that if so desired the chart may be used without the record sheets for exhibition purposes only.

In the use of the apparatus as hereinabove described, the blocks inserted in the lower ends of the tubes, are pushed upwardly and increased in number in accordance with the degrees to be indicated on the face of the backboard or the record sheet inserted in the space between the board and the tubes. The blocks are thus moved and increased in number until the upper one has its upper end in adjacency to the line corresponding to the degree to be indicated, after which further adjustment of the columns of blocks in the tube is effected by means of the respective nut after the arm 13 which during insertion of the blocks-units was removed from the lower end of the tube as indicated in broken lines in Figure 7, has been replaced in the position below the tube in which it supports the columns.

After the different columns in the tubes have been adjusted to indicate the comparative degrees of attendance for the different grades represented by the guide tubes, a permanent record may be made by puncturing or marking the record sheet, the record sheet being first shifted slightly to one side to mark the datum points which after the sheet has been returned to its original position, will be directly back of the columns. The marks or punctures of the sheets may subsequently be connected by graph lines as indicated at 20 in Figure 3.

It is to be noted that the record sheets may thus be removed, marked and replaced if necessary without disturbing the position of the indicative elements of the device, which may be maintained in their adjusted position to represent the graph on the back board, or further adjusted to indicate further progress or retrogression in the degrees of attendance.

For the purpose of showing maximum or minimum points on a previous record or to indicate two different things at the same time resilient clips 22 are provided which embrace the tubes and are held in their adjusted positions by clamping engagement.

The clips may be moved along the tubes to any desired point. Two or more clips may be used on one and the same tube and the clips may be of different colors for different indications.

In order to prevent the blocks in the columns from being displaced by vibration or other causes, particularly when the blocks are used in horizontal tubes, the blocks at either end of the columns may be provided with a pad 21 of rubber or other suitable material which extends slightly beyond its surface as indicated in Figure 5, to hold the blocks in place by frictional contact with the respective tube.

The blocks may also be used to indicate the maximum degree to be attained in any one column while the other blocks of the columns are being removed or replaced.

In the operation of the device the blocks are inserted in the tubes after the arms on the screw rods have been turned aside and when the arms are subsequently replaced further adjustment of the columns is effected by means of the nuts until they have reached the upper ends of the screw rods when further advance of the columns necessitates the addition of other blocks and a reversed movement of the nuts.

When it is desired to lower the columns the arms are removed from beneath the tubes or when the columns contain one or more of the friction blocks, the latter can be removed by means of a rod, stick or pencil after the plug 10 has been withdrawn from the respective tube.

In the modified construction illustrated in Figures 8 and 9 the indicative elements move through horizontally disposed tubes 23. The chart as shown is adapted to designate sales records for a given period and it supports at one end opposite to the tubes, cards 24 bearing the names of different salesmen.

The record sheets 25 which as before are inserted in the space between the tubes and the back of the apparatus have a scale composed of vertical dividing lines designated at their upper ends by numbers of degrees. The back of the apparatus consists of a hollow casing 26 provided with a recess or depression in which the tubes are fastened in equidistantly spaced relation to each other. The ends of the tubes connect with short nipples 27 extending through the walls of the recess and

the indicatory elements are composed of endless bands 28 which extends through the nipples and the tubes.

The bands are movably mounted on rollers 29 and 30 inside the casing and the rollers at one end of the latter have milled flanges 31 for their individual rotation. The flanges project through slots in the end wall of the casing so they may be moved by finger-pressure and in order to prevent unauthorized adjustment of the bands the projecting portions of the flanges may be enclosed in a compartment 32 of the casing, access to which can be had only by means of a hinged door 33.

Parts of the bands are colored distinctively of the other parts of the same and the ends of the colored portions are the indicia which designate the different grades on the scale of the record sheet.

In Figures 10 and 11 has been shown a modified construction in which the indicating elements consist of blocks 34 slidably fitted in recesses in the face of a back 35. The blocks have tongues fitted in longitudinal grooves at opposite sides of the recesses and the recesses are open at their ends so that the blocks may be moved by means of a rod or stick or by pushing one block against another. The blocks are of two different colors and arranged in two groups so that the dividing lines between the groups may be used to indicate the grades on a scale which in this instance is preferably printed or painted on the face of the board, and in order to permit of interchanging the blocks, they may be differently colored at opposite sides.

Other variations in the construction and arrangement of the parts comprised in our improved graphic chart may be resorted to within the scope of the invention as defined in the hereunto appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:—

1. A device of the character described comprising a support having a transparent tube, an indicatory element in the tube, and an indicatory member adjustable along the tube.

2. A device of the character described comprising a support having a guide way, an indicatory element in the guide way, and a maximum-indicating member adjustably clamped on the guide way.

3. A device of the character described comprising a support having a guide way, an indicatory element in the guide way, including alined separable sections, and means apart from the sections for holding the element in any of a series of positions in the guide way.

4. A device of the character described comprising a support having a guide way, an indicatory element in the guide way, including alined separable sections, and a screw-driven member for adjustment of the element in the guide way.

5. A device of the character described comprising a support having a guide way, an indicatory element in the guide way, including alined separable sections, and resilient frictional means on one or more sections for holding same in the guide way.

6. A device of the character described comprising a support having a plurality of guide ways, indicatory elements in the guide ways, composed of sections in end-to-end arrangement, the guide-ways being open at an end for insertion of the sections, the elements being inaccessible except at the ends of the guide ways, and means for adjustment of the elements in the guide ways.

7. A device of the character described comprising a support having a plurality of guide ways, indicatory elements in the guide ways, composed of sections in end-to-end arrangement, the guide ways being open at an end for insertion of the sections, and means for preventing unauthorized access to said ends of the guide ways.

8. A device of the character described comprising a support having a tube of transparent material upon a face thereof, and segmental indicatory elements in the tube.

9. A device of the character described comprising a support, movable indicatory elements loosely supported on each other and permanently spaced from a face of the support, to provide a space for the insertion of a record sheet, and a record sheet in said space, bearing a scale cooperative with the elements for the designation of records.

10. A device of the character described comprising a support having a guide way, an indicatory element in the guide way, including alined separable sections and means for the adjustment of the sections, including a screw actuated plate, the plate being movable to permit of the insertion or removal of the sections in the guide way.

11. A device of the character described comprising a support, transparent guide ways spaced from a face thereof to provide a space for insertion of a record sheet, indicatory elements in the guide ways, and a record sheet in said space, apparent through the transparent guide ways and indicating a record visibly comparable with that shown by the indicatory elements.

12. A device of the character described comprising a support, guide ways spaced from each other and from a face of the support, indicatory elements in the guide ways, and a record sheet in the space between the guide ways and the face of the support, apparent between the guide ways and indicating a record visibly comparable with that shown by the indicatory elements.

13. A device of the character described comprising a support having a guide way, an indicatory element adjustable in the guide way, and frictional means on the element,

extending slightly beyond the same, and bearing against the guide way for holding the element in adjusted positions.

14. A device of the character described comprising a support, a guide way spaced from a face thereof, an indicatory element in the guide way, and a graduated record sheet in said space, said graduations cooperating with the indicatory element to designate comparable records.

15. A device of the character described comprising a support having a guide way, an indicatory element movable in the guide way, and resilient frictional means carried by the element and bearing against the guide way for holding the element in the guide way.

16. A device of the character described comprising a support, a transparent tube on the support, and a plurality of loose blocks slidably fitted in the tube in end-to-end arrangement.

17. A device of the character described comprising a support, a transparent tube on the support, and a plurality of loose blocks loosely supported one upon another in end-to-end arrangement in the tube.

18. A device of the character described comprising a support, a transparent tube on the support, indicatory means including a plurality of loose blocks slidably fitted in the tube in end-to-end arrangement, and a record sheet on the support cooperating with the indicatory means.

In testimony whereof we have affixed our signatures.

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