Feb. 20, 1962 A. M. RUBIN 3,021,614

CIRCULAR CHART ASSEMBLY

Filed June 27, 1958

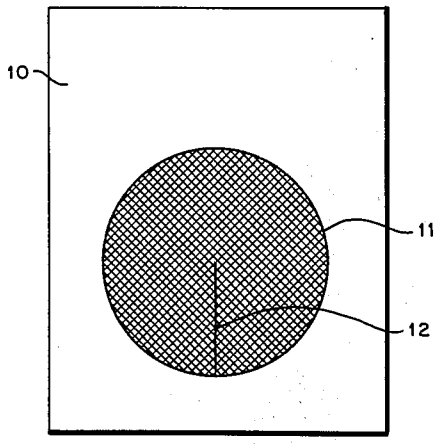


Fig. 8

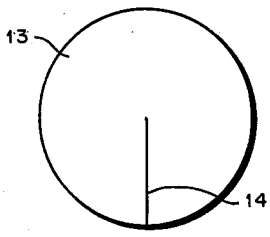


Fig. 2

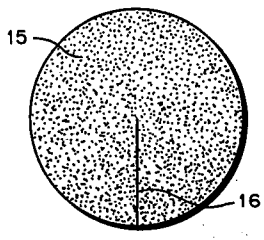


Fig. 3

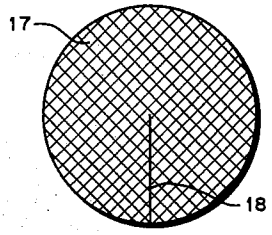


Fig. 4

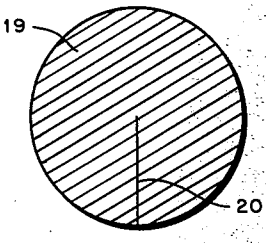


Fig. 5

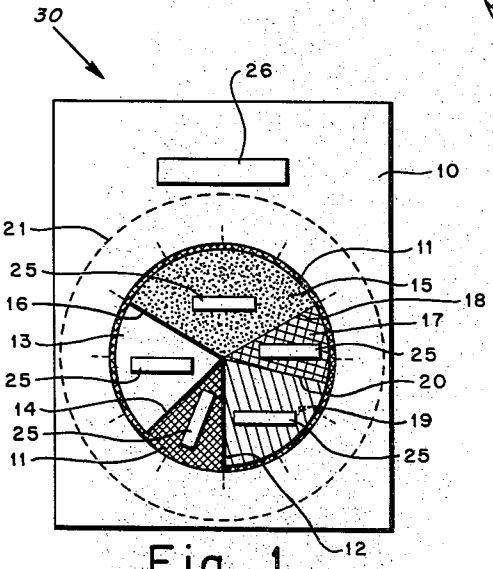


Fig. 1

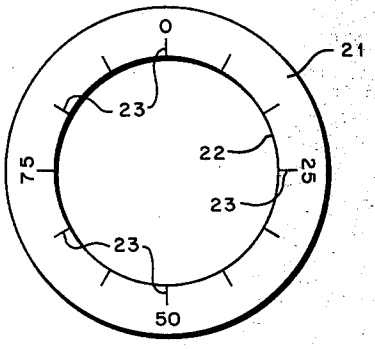


Fig. 6

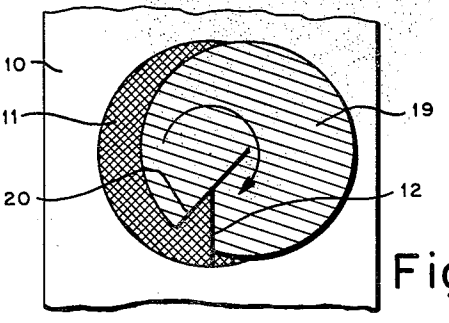


Fig. 9

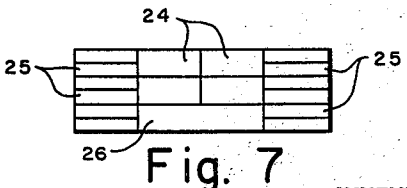


Fig. 7

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3,021,614

Patented Feb. 20, 1962

3,021,614

CIRCULAR CHART ASSEMBLY

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Filed June 27, 1958, Ser. No. 745,099
4 Claims. (Cl. 35—24)

This invention relates to charts, and more particularly it relates to those circular charts which are commonly known as "pie" charts. Such pie charts are commonly used for presentation of statistical information in a great many fields, such as education, business and finance, and scientific work. In a pie chart, a circle is divided into wedge-shaped segments by radial lines, the number of degrees subtended by each segment indicating, relative to the other segments, the percentage or amount represented by that segment.

Pie charts are often prepared in single copies for use in displays and reports. For example, many reports prepared by students contain pie charts on standard sized paper. In addition, many pie charts are prepared for later photographic or other reproduction for the purpose of printing or otherwise producing multiple copies of the chart. For example, charts to be used in advertising or in any published work must be prepared for reproduction. A detailed description of the application of this invention to various uses is made below.

It is customary, in preparing pie charts, either for single copy presentation or for reproduction, to individually prepare each chart, either by the simple expedient of laboriously scribing the complete chart on the paper or cardboard, or by the use of the more professional means as described below.

It is an object of this invention to provide an assembly or kit whereby neat, accurate, and professional looking pie charts may be rapidly and easily produced, either for immediate presentation, or for reproduction.

It is an object of this invention to provide a sheet of paper or other backing material having thereon a circular outline and segment receiving means, a plurality of discs of different surface appearance, each of said discs having means to engage the said segment receiving means whereby each disc may be assembled with said sheet to produce a pie chart segment.

Yet another object of this invention is to provide a pie chart assembly or kit comprising a backing sheet, a set of chart segment discs adapted to interlock with said sheet, a segment measuring means, and labeling means.

A still further object of this invention is to provide a pie chart assembly or kit comprising a backing sheet having thereon a relatively dark circle, and a plurality of discs, each disc having a diameter equal to that of every other disc and slightly smaller than the diameter of said darkened circle, and each disc being adapted to be attached to said sheet concentric with the said darkened circle whereby chart segments may be formed and a border provided around said chart.

Another object of this invention is to provide a method of rapidly assembling a neat and accurate pie chart.

Other objects and aims of this invention will be made apparent in the following specification.

This invention is best understood in connection with the accompanying drawing in which like reference numerals refer to like parts and in which:

FIGURE 1 is a plan view of the completed chart,

FIGURE 2, FIGURE 3, FIGURE 4, and FIGURE 5, are plan views of representative disc inserts,

FIGURE 6 is a plan view of the segment measuring device,

FIGURE 7 is a plan view of the assembly of prepared labels,

FIGURE 8 is a plan view of the backing sheet, and

FIGURE 9 is a partial view of the backing sheet showing a disc being assembled with the sheet to form a segment.

The presently used method of preparing pie charts as part of material to be reproduced is a tedious and time consuming one. For example, in preparing a layout for advertising use including a pie chart, the following steps are performed. The chart location is properly contered on the sheet and a circle is scribed thereon and allowed to dry. The circumference of the circle is marked off to indicate segments of the desired size. Lines delineating the segments are then drawn on the chart face and allowed to dry. The areas of the segments may be differentiated from each other in one of several available ways. One commercial way is to use pre-prepared sheets of plastic or cellulosic material whose surface is marked into varying patterns. Material of this type is sold under the trademark designation of Zipatone, for example. A different surface pattern is generally picked for each segment of the chart, and a sheet of the prepared material bearing the desired pattern is then cut to the appropriate segment size. The cut-out segment of patterned sheet material is then placed on the pie chart backing over the appropriate segment and is secured thereto, as by adhesives. The labeling of the chart and the segments is then performed and the layout is then ready for photographic or other reproduction preparatory to printing. It is of course possible to prepare the chart by inking the various patterns on the different segments and it will be appreciated that this also is an expensive and tedious process.

Through the use of the means and method described below, the preparation of pie charts is greatly facilitated.

In FIGURE 8, backing sheet 10 is illustrated. This sheet is pre-prepared with an imprinted circle 11 as shown. This circle 11 is preferably solidly printed, rather than outlined, and the preferable color is black. The advantages of these preferred embodiments are explained below.

A slot 12 is provided on backing sheet 10, the slot originating at the center of circle 11 and terminating at its circumference. Preferably, the slot 12 is oriented vertically, when the sheet 10 is held in its normal working position, and runs downwardly from the circle center.

In FIGURE 2, a disc insert 13 is illustrated. The diameter of the disc or disc insert 13 is slightly smaller than the diameter of the imprinted circle 11, for a reason made apparent below. The disc 13 is preferably provided of a thin sheet material, such as the plastic or cellulosic sheet material described above. A slot 14 is provided in disc 13, originating at the center of disc 13 and terminating at the circumference. In FIGURE 2, the disc 13 is shown made of white material. In FIGURES 3, 4, and 5, discs 15, 17, and 19 are illustrated respectively, respectively bearing slots 16, 18, and 20. The description of the disc made in connection with FIGURE 2, is identical with the discs illustrated in FIGURES 3, 4 and 5 with the exception of the surface appearance of these discs. In FIGURE 3 for example, discs 15 is pre-prepared with a stippled surface texture. In FIGURES 4 and 5, the discs 17 and 19 are prepared with other surface textures.

In FIGURE 1, a section of backing sheet 10 is shown with imprinted circle 11. A disc insert 13 is positioned manually over the sheet 10 and is inserted through backing sheet slot 12 at the right hand circumference terminus of its own slot 14. By rotating disc 13 in a clockwise direction after the insertion, it is seen that the disc 13 and the backing sheet 10 are interlocked or interleaved. The disc 13 is centered directly over imprinted circle 11 and the amount of interleaving determines the amount of the surface of disc 13 which is exposed.

The discs 13 is rotated and hence interleaved until the desired angle of arc is subtended by the exposed por-

tion of the imprinted circle **11**. When the desired segment of the imprinted circle **11** is exposed, the disc **13** is carefully centered over the imprinted circle and is made as nearly concentric thereto as possible.

Disc **13** is then secured or affixed to the backing sheet **10** in the desired position. The commonest method of securing is by the application of paste or glue between backing sheet **10** and discs **13**. It is possible to provide the pre-cut and pre-prepared discs with a pressure sensitive adhesive back or other commonly known adhesive back. If the discs are supplied with adhesive backings, care must be taken to avoid unwanted sticking of the discs during the adjusting step.

The step described above in connection with disc **13** is then repeated with other discs, such as discs **15**, **17**, and **19**, in the same manner. Whereas the placing of the first disc **13** exposed a measured portion of imprinted circle **11**, the next disc to be assembled on sheet **10** is positioned and fastened so as to expose a measured segment of the surface of discs **13**. As many discs as desired are assembled and fastened in this manner, the number of discs depending on the number of discrete segments desired in the final graph or chart. As illustrated in FIGURE 1, the several measured segments have been assembled in a clockwise direction, starting from the vertical slot **12**. It is understood of course, that the discs may be assembled in a counter-clockwise direction if so desired.

FIGURE 9 shows a disc **19** being inserted into slot **12**. Disc **19** is rotated in the direction of the arrow to position it on imprinted circle **11**. Reading clockwise from slot **12**, the first segment would be part of circle **11**, the second segment would be part of disc **19**, and successively added discs would produce additional segments clockwise of the disc **19** segment.

As has been described, in the preferred embodiment, the discs are slightly smaller in diameter than the imprinted circle **11**. Thus, when the discs are positioned in concentric relationship with the circle **11**, the outermost edge of said circle is exposed and forms a margin or border around the completed chart or graph. This is a desirable aspect and is achieved automatically. Furthermore, in the preferred embodiment, the slots **14**, **16**, **18**, and **20** in the discs **13**, **15**, **17**, and **19** respectively (and in all the pre-prepared discs) are outlined in a dark shade, preferable black. Thus, when the chart is completed, dark radial lines will automatically exist to neatly separate the several segments. It is understood of course, that any combination of colors or patterns or both may be provided on the backing sheet **10**, the inscribed circle **11**, and on the several discs. The provision of a black circle **11**, a white sheet **10**, and black outlines or margins adjacent to the disc slots are preferred shadings, but not mandatory to the practice of this invention.

In assembling the discs as illustrated in FIGURE 1, the desired angle to be subtended must be measured in each instance. A valuable tool to aid in this assembly is illustrated in FIGURE 6. A segment measurer or protractor **21** is provided. This segment measuring means comprises a flat, thin piece of sheet material. The segment measuring means has an interior cut-out, **22**, circular in shape and having a diameter equal to or slightly larger than the diameter of inscribed circle **11**. The rim or border of the segment measuring means circle is marked with graduations **23**. In FIGURE 6, these graduations are shown only in sketch form; in the actual unit, they would be more detailed. In contradistinction to the usual protractor graduations, the preferred graduations on segment measuring means **21** are in percentages, rather than degrees. Most pie charts are segmented by percentage, or by other values which can best be converted into percentages for graphic illustration. In operation, the segment measuring means **21** is positioned over the imprinted circle **11** with its zero index mark positioned

at the start of the segment to be measured. In FIGURE 1, which shows a completed pie chart, the use of segment measuring means **21** is illustrated by the phantom line showing. The segment measuring means **21** can be calibrated in any desired absolute units instead of percentage or degrees of a circle. For example, it can be calibrated in kilowatts, and the segments could be laid out on the chart without the necessity of converting information in kilowatts to percentage or degrees.

Another tool or aid is illustrated in FIGURE 7. FIGURE 7 shows a sheet of assorted size labels, the various labels being separated by perforations, dotted lines, or other cutting guide means or rapid tear means. A typical sheet is illustrated, consisting of a plurality of medium sized labels **24**, a plurality of small sized labels **25** and a large sized label **26**. The sheet comprising this assortment of labels is preferably provided with an adhesive coated backing to facilitate easy attachment to the completed graph or chart.

In FIGURE 1, a complete graph or pie chart, generally designated **30**, is illustrated. Five segments are shown as a typical pie-chart in this illustration. One segment consists of the exposed portion of imprinted circle **11**, and the other segments consist of exposed portions of the several discs. The dark radial dividing lines between the segments are shown as is the preferably thicker dark margin around the border of the chart itself, consisting of the exposed outer rim of imprinted circle **11**. Labels from the sheet shown in FIGURE 7 are affixed to the appropriate segment of the chart **30**. The large label **26** is here shown as constituting the title label. The segment measuring means **21**, shown in phantom lines in FIGURE 1 is of course only used during the assembly operation and is not normally included as part of the finished pie chart.

A kit for the preparation of pie-charts includes one or a plurality of backing sheets **10** prepared as described, a plurality of discs prepared as described, a segment measuring means and a plurality of labels, as has been described. The user of this kit may rapidly, flexibly and accurately produce pie-charts as desired. It is understood that for each backing sheet supplied, a plurality of discs are supplied. The backing sheets may be perforated for inclusion in ring notebooks, or may be prepared in any other desired known way for subsequent use of the completed pie-chart. For instance, the components of the kit or assembly may be suitable in size for inclusion in school notebooks. Alternatively, for example, the components of the kit may be suitable in size for the preparation of large advertising presentations. The completed pie-charts may be used as is and incorporated directly into the finished product. Alternatively, the pie-chart assembled by this method and with these means may be photographically or otherwise reproduced for subsequent utilization.

The scope of this invention is to be determined by the appended claims and not limited to the specific embodiment shown and described, this embodiment being presented for illustrative purposes only.

I claim:

1. A pie-chart comprising a relatively thin flexible rectangular backing sheet, a circle imprinted on said backing sheet, said backing sheet being substantially larger than said imprinted circle, and said circle having a surface appearance differing from that of the remainder of the surface of said sheet, a slot through said backing sheet extending from the center of said circle to the circumference thereof, said slot being the only mechanical formation on said backing sheet, a relatively thin flexible circular disc having a diameter no greater than that of said circle and having a surface appearance differing from that of the surface of said circle and from the appearance of the said remainder of the surface of said sheet and only a slot in said disc extending from the center thereof to the circumference thereof, said backing

sheet and said disc being interleaved solely by mutual insertion into said slots respectively, said disc being positioned concentrically with said circle.

2. A pie-chart as defined in claim 1 wherein said disc has a diameter slightly smaller than the diameter of said circle, whereby the outermost portion of said circle is not covered by said disc and forms a margin, and said slot through said disc is outlined whereby a radial dividing line is formed between the surface of said disc and the surface of said circle.

3. A pie-chart as defined in claim 2 wherein a plurality of said discs are provided, each disc having a surface appearance differing from that of said circle and from other discs, each disc being interleaved with said backing sheet to a different extent and each of said discs being concentric with said circle, whereby a pie-chart having a plurality of delineated segments is provided.

4. A kit for the rapid, accurate and adjustable construction of a pie chart comprising a relatively thin, flexible rectangular backing sheet having a circle imprinted thereon, said backing sheet being substantially

larger than said circle, a slot through said backing sheet extending from the center of said circle to the circumference thereof, a plurality of circular discs of relatively thin flexible material adapted to be connected to said backing sheet, each of said discs having a distinctive surface appearance, each of said discs having a slot therethrough extending from the center thereof to the circumference thereof, said slots through said backing sheet and said discs constituting the sole connecting means.

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