Sept. 20, 1960 J. B. TIERNEY 2,952,924

DEVICE FOR MAKING PAIR COMPARISONS

Filed Aug. 21, 1957 2 Sheets-Sheet 1

Fig. 1

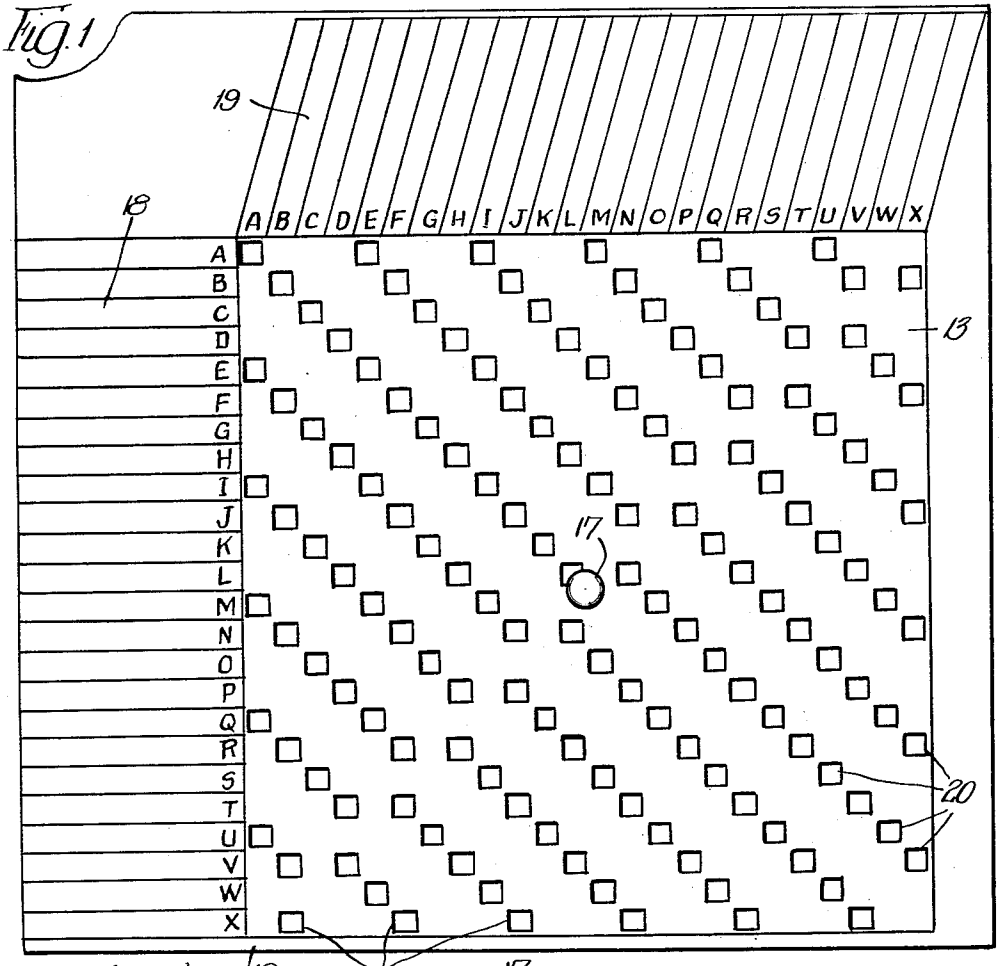


Fig. 2

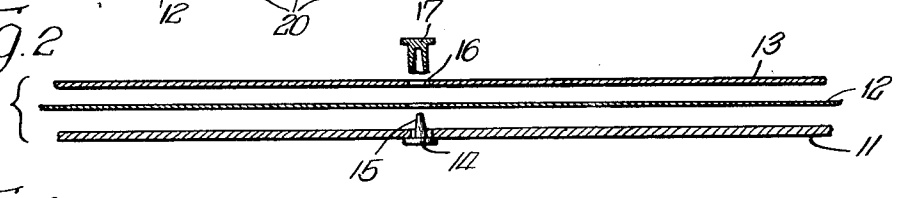
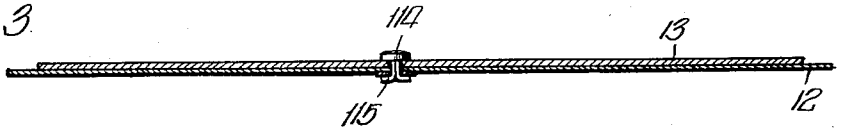


Fig. 3



INVENTOR.
John B. Tierney,
BY Brown Jackson Boettcher & Dunner

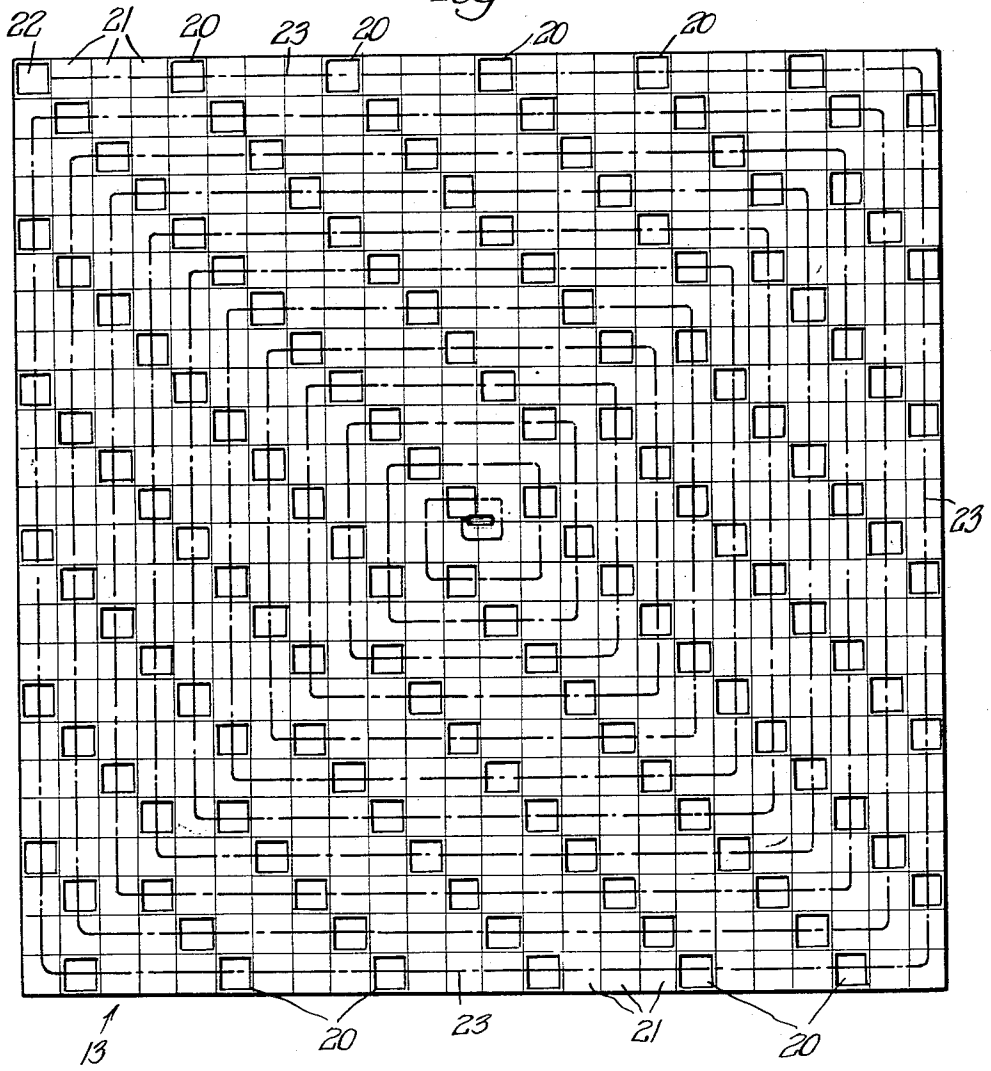
Attys.

Sept. 20, 1960 J. B. TIERNEY 2,952,924

DEVICE FOR MAKING PAIR COMPARISONS

Filed Aug. 21, 1957 2 Sheets-Sheet 2

Fig. 4



INVENTOR.
John B. Tierney,
BY Brown Jackson Boettcher & Dunner
Attys.

United States Patent Office 2,952,924
Patented Sept. 20, 1960

2,952,924

DEVICE FOR MAKING PAIR COMPARISONS

John B. Tierney, 74 Birch St., Park Forest, Ill.

Filed Aug. 21, 1957, Ser. No. 679,492

6 Claims. (Cl. 35—48)

This invention relates to novel means for rating and/or ranking individual items of a group in a manner so as to encourage subjective judgment on the part of the checker in the rating and/or comparing process and consequently to increase the reliability of the results. More particularly the invention relates to a novel device for job analysis utilizing the principles of pair-comparisons and random judgments. The invention, altho primarily conceived as a tool for use in rating individuals and/or the relative importance of their jobs in an organization, also has application in market research, as for use in comparing slogans, brand names, colors, etc. Generally speaking, it will have utility in comparison checks of anything where subjective judgments is important such as in selecting between alternate courses of actions, alternate proposals, experimental formulae, etc.

The invention is predicated on an assumption that subjective judgment can be easier, and more effectively and satisfactorily exercised, when an individual is requested to compare two things than is possible when he is asked to compare one with many. For example, in judging two oranges, as for overall appearance, an individual can usually readily pick one over the other. However, when he has to pick one from a group of ten oranges, and then one from nine as second best and so on, the test becomes more difficult, and the reliability of the comparison suffers.

Thus a first and principal object of the invention is to provide a means of presenting to a judge in pairs the various items of a group to be compared, whereby the task is made simple, judgments are improved, and the results more reliable.

Another object of the invention is to provide means of making pair comparisons among the items of a group wherein the items to be thus compared are arranged without regard to any preconceived pattern or notion and so that the area of judgment of the individual making pair-comparisons between the different items of the group is constantly interrupted and it is made difficult for him to fall into a routine. For example, if a judge were rating oranges all the time, there would be a tendency for him to become lax in judgment. But if he is required to judge oranges for a while, and then something else for a while, as apples, followed by pears, then peaches and back again to oranges, a reorientation in the judge's mind is continuously required as to standards etc., and, at least theoretically, better judgments result.

Still another object of the invention is to provide means of making pair-comparisons of several items, wherein both items in the pair are constantly changed so that the judge cannot easily fall back on experience gained by his previous judgment, but is forced to constantly alert himself as to the standards involved in a comparison of the pair at hand.

Still another object of the invention is to provide a simple workable device which will be useful in pairing items of a group for comparisons in a manner such that

the area of the checker's judgment is constantly interrupted and thereby forces him into subjective thought in the comparison of each pair as it is presented to him for judgment.

With these and other objects of the invention in mind, and which are intended to be included within the scope of the invention as hereinafter defined in the appended claims, specific embodiments of the invention and the manner in which it is practiced will now be described with reference to the accompanying drawing wherein:

Figure 1 illustrates a pair-comparison device according to the present invention;

Figure 2 is a fragmentary section taken therethrough, its parts being shown in exploded relation;

Figure 3 is a sectional view showing an alternative construction; and

Figure 4 illustrates schematically how the openings in the rotatable baffle or template are preferably arranged.

Referring to Figures 1 and 2 the device is seen to comprise a base **11** which may be of rigid durable material, such as pressed paper, cardboard, or the like which presents a smooth writing surface and serves as a support for a record sheet **12**. Mounted thereon in offset relation to rotate about its center is a square-shaped template **13** which may be of thin metal, plastic, cardboard or other opaque shape retaining material. Any suitable means **14** such as a pin, screw or the like, which may be permanently or otherwise mounted in or on base **11** and has a shank portion **15** to pierce the record sheet **12** and pass through opening **16** in the template **13** to rotatably support the same may be employed. If thought necessary or desired, in order to more positively hold the parts together, locking means, in the form of a cap or nut such as **17**, may be provided for connection with shank **15** of pin **14**.

In a more simple form of the device, base **11** could be eliminated and template **13** rotatably attached directly to the record paper **12** itself, by any desired means, such as the aforementioned pin or screw or by one of the commonly available round head fasteners or rivets **114** having bifurcated flexible shank portions **115** which can be bent back to hold the template and record sheet therebetween and the head of such a fastener, see Figure 3.

As illustrated in Figure 1 template **13** is rotatably mounted on sheet **12**, and base **11** if used, in offset relation thereto so as to leave space on the sheet **12** along the left hand side of the template for a vertical column **18** of spaces in which the jobs or other items to be compared are randomly listed and for a horizontally disposed column **19** along the top of the template having spaces in which the items can be similarly listed.

So that the template may be used for its intended purpose of guiding the judge in his pair-comparison of the items, as seen in said Figure 1, the template **13** is provided with a plurality of staggered openings **20**, each of which will be aligned with an item in column **18** and also with an item in column **19** in any of the four possible positions to which the template **13** may be rotated about its connection, i.e. while maintaining its sides in normal and/or paralleling relation to the two mentioned columns **18** and **19**, one of which possible positions is illustrated in Figure 1. The number as well as locations of said openings **20** in the template **13** is such that in each of the four possible positions to which the template may be thus rotated, each item in column **18** will be aligned with a line of spaced openings each of which in turn is aligned with an item in column **19**. Thus the openings in the template serve first as an indicator to the user which items are to be paired for comparison. Secondly, said openings also serve as a guide through which the record sheet **12** beneath may be marked to

record the results of each pair comparison. Although any desired system of marking may be utilized, one particularly useful system devised involves marking a plus (+) through the opening when the item in column **18** is considered of greater significance that the one in column **19**, a minus (−) when it is considered of less significance, or with a zero (0) when no difference is seen or the items are considered to be equal. Other marking systems such as would permit the sheet **12** to be scored for processing through or by electronic computing machines are also contemplated and are intended to be included within the scope of the invention.

Referring to Figure 1, it will be seen that each item in column **18** is thus paired for comparison and marking of sheet **12** by said openings **20** with a limited number of items from column **19** and that not only are the items from column **19** selected so as to be in non-adjacent relation but so that each successive item in column **18** is paired with a group of items in column **19** whose members differ from those in the group with which the preceding item was checked. Although the number from column **19** with which each item in column **18** may be thus paired in any one position of template **13** is less than the total, the relation of the openings in the template is such that by rotating the template in increments of 90° to its four possible aligned positions, each item in column **18** will be eventually paired by said openings **20** with all of the items in column **19**.

Although conceivably a number of arrangements of the openings **20** in template **13** might be worked out for accomplishing the described result, I have found the relation of openings **20** can be correctly arranged, as illustrated in Figure 4, by dividing the square template into equidimensional square areas **21**, the number of which in its two dimensions equal the number of spaces or items in columns **18** and **19**. In the illustrated example this would require 24 to a side or a total of 576 squares. One of the corner square areas, indicated in Figure 4 by **22**, is then designated for aperturing as the first of said openings **20** and then, proceeding in a spiral pattern about the template to the center thereof as indicated by dot-dash line **23**, every fourth squared area is similarly designated as the location for the other of said openings **20**.

In using the device, if the jobs in a particular organization are to be rated by one or more judges, each judge may be supplied with a record sheet **12** in which the jobs have been randomly listed in vertical column **18** and horizontal column **19**, the letters A through X being used in Figure 1 for convenience of illustration. Opaque template **13** is rotatably mounted thereover by means **14** or **114** and the judge or judges asked to mark their sheet **12** through each of template openings **20** to indicate their preference between the two jobs from each of column **18** and **19** that are paired by the openings **20** in template **13**. Thus in Figure 1 he would compare job A with A (itself), then with E, I, M, Q and U; then job A with B (itself), F, J, N, R, V and X and so on until each of jobs A through X had been rated for said position of template **13**. Thereupon they would turn the template 90° either clockwise or counterclock and repeat the steps of comparing A through X from column **18** with the items paired therewith by openings **20** in the template. The template is twice more turned 90° at a time and said pairing and marking steps followed through for each of the four possible positions of the template to which it may be adjusted. This completes the check and the marked sheet **12** is ready for the analysis.

Most of the prior systems used to rate individuals and/or jobs (for which the device is primarily intended) relied on factors, point values, weightings, degrees and the like to establish relative values. Obviously, an observer or judge using one of these systems had to be aware of the system itself, how it was used, what could be expected of it, its idiosyncrasies and a general appreciation of the field of job evaluation. In the use of applicant's device, no such education or prior experience of the user is required. No lengthy discussion or explanations are necessary since the judge is merely asked to select one of the two jobs paired by each of the openings **20** in the four adjusted positions of the template **13**.

Conceivably a pair-comparison system using cards could be utilized; however, it would be complicated by the requirement that $n(n-1)$ cards would be required. Thus in the illustrated instance, to similarly pair 24 subjects, 24×23 or 552 cards would be needed. The advantages by way of simplicity and convenience of the described device are at once obvious. Not only is the task considerably lightened but sheet **12** serves simultaneously as an element of the device and as a record or score of the results, whereas when cards are used the score has to be tallied on a separate sheet and in a less convenient, accurate manner.

Not only does the device disclosed tend toward more reliable checking because of the judgment interruption factor resulting from the staggered relation of the openings which keeps the judge on the alert and increases his use of subjective judgment, but it also affords a means for checking the checker and thus giving an indication of the care and judgment exercised by him. This is possible since in the check, the judges have been asked to make each pair comparison twice. For example, at one time they are asked to compare job A with job D and then again to compare job D with job A. Also it permits a check against the use of "circular" reasoning. For example, has the judge indicated in his judgment that A is more than D, D is more than E but that E is more than A when to be correct or consistent he should have judged E to be less than A. The analyzer thus can learn from a study of marked sheet **12** both the relative importance of the jobs in the judgment of those doing the checking and also the reliability of the judgment of the checkers.

It will of course, be understood that many other changes and/or modifications in the illustrated device may be made, and are intended to be included, within the scope and spirit of the invention as defined in the appended claims, the aforesaid description is therefore to be considered not in a limiting sense but as illustrative of the invention and how it may be practiced.

Now having described my invention, I claim:

1. A device for making pair comparisons between the items of a group comprising a squared baffle adapted for use with a record sheet having the items randomly arranged thereon in two columns one along each of two adjacent sides of the baffle, said baffle having openings therein arranged to define lines paralleling both dimensions of the baffle and spaced to align with the items columned on the record sheet along its two adjacent sides, the openings in each line being less in number than the number of lines of openings in said baffle and in offset relation to the openings in the lines thereof on their either side, said openings being further arranged and sufficient in number that by rotation of the baffle about its center to several such positions wherein the openings define lines in alignment with the items in the two columns, each of the items in each column may be individually paired by means of an opening with each item in the other column, the baffle effectively barring vision of the record sheet therebeneath other than through said openings.

2. A device for making pair comparisons between the items of a group comprising a squared baffle and a record sheet, the said record sheet being adapted to have the items randomly arranged thereon in each of two columns along two adjacent sides of the baffle, said baffle having openings therein arranged to define lines paralleling both dimensions of the baffle and spaced to align with the said items when the items are columned on the record sheet along its two adjacent sides, the openings

in each line being less in number than the number of lines of openings in said baffle, and said openings being further arranged and sufficient in number that by rotation of the baffle about its center to several such positions wherein the openings define lines in alignment with the items in the two columns, each of the items in each column may be individually paired by means of an opening with each item in the other column, the baffle effectively barring vision of the record sheet therebeneath other than through said openings.

3. A device for making pair comparisons between the items of a group comprising a squared baffle of essentially opaque material and a base having thereon columns of spaces along two adjacent sides of the baffle in which columns of spaces the items may be randomly listed, said baffle having openings therein arranged to define lines paralleling both dimensions of the baffle and spaced to align with the spaces columned on the base along its two adjacent sides, the openings in each line being less in number than the number of spaces provided in said columns and in offset relation to the openings in the lines thereof on their either side, said openings being further arranged and sufficient in number that by rotation of the baffle about its center to several such positions wherein the openings define lines in alignment with the spaces of the two columns, each of the spaces of each column may be individually paired by means of an opening with each space of the other column.

4. A device for use in making pair comparisons of a group of subjects comprising a base, a squared baffle member pivotally mounted on said base to turn about its center, said baffle member being effectively divided into squared areas of equal size and number in its two dimensions, said base having provision along two adjacent sides of said baffle member to list said subjects in vertical and horizontal columns such that each subject in each column is aligned with a line of effective squared areas on the baffle member, and beginning with, and including one of the corner squared areas, every fourth squared area only, following a spiral pattern to the center thereof,

being provided with an opening through which the base may be marked, said baffle essentially barring vision of material therebeneath other than through said openings.

5. A device for use in making pair comparisons of a group of subjects comprising a base, a squared opaque baffle member removably mounted on said base to turn about its center, said baffle member being effectively divided into square areas of equal size and number in its two dimensions in accordance with the maximum number of subjects to be compared, a record sheet positioned between said squared baffle member and said base having provision along two adjacent sides of said baffle member to list said subjects in vertical and horizontal columns, so that each subject in each column is aligned with a line of effective squared areas on the baffle member, and beginning with, and including one of the corner squared areas, every fourth squared area following a spiral pattern to the center thereof being provided with an opening through which the record sheet may be marked.

6. A device for use in making pair comparisons of a group of subjects comprising a squared baffle member effectively divided into lines of square areas of equal size and number extending in the direction of its two dimensions, said baffle member being adapted for rotatable mounting on a base having provision for listing said subjects along two adjacent sides of said baffle member in alignment with said lines of effective squared areas on the baffle member, and beginning with, and including one of the corner squared areas, every fourth squared area following a spiral pattern to the center thereof being provided with an opening through which the said base may be marked when mounted therewith, the baffle effectively barring vision therethrough other than through the openings therein.

References Cited in the file of this patent

UNITED STATES PATENTS

709,328	Jorgensen	Sept. 16, 1902
1,118,014	Jennings	Nov. 24, 1914
1,244,994	Leuchsenring	Oct. 30, 1917
1,647,276	Daman	Nov. 1, 1927