

Nov. 30, 1948.

R. W. GILBERT
DUAL ELECTRIC INSTRUMENT
Filed Nov. 15, 1944

2,455,167

Fig. 1.

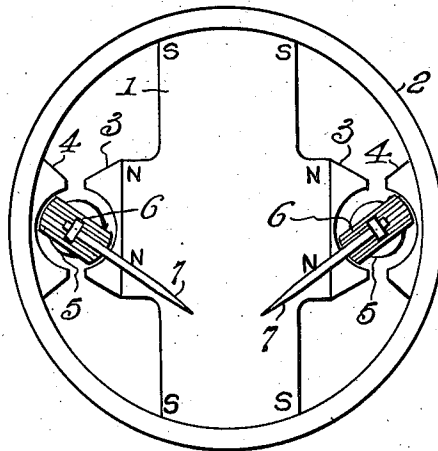
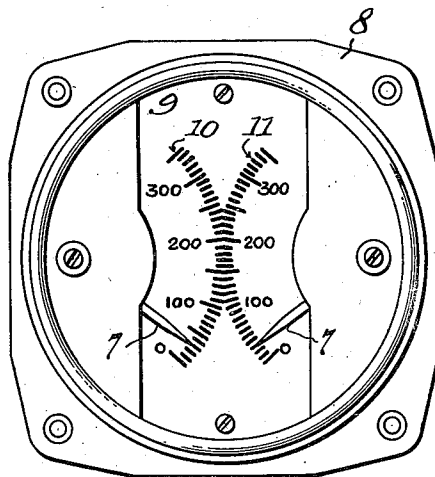


Fig. 2.



Inventor:

Roswell W. Gilbert,

By

Pierce & Scheffler,
Attorneys.

UNITED STATES PATENT OFFICE

2,455,167

DUAL ELECTRIC INSTRUMENT

Roswell W. Gilbert, Montclair, N. J., assignor to
Weston Electrical Instrument Corporation,
Newark, N. J., a corporation of New Jersey

Application November 15, 1944, Serial No. 563,618

2 Claims. (Cl. 171-95)

1

This invention relates to dual electrical instruments in which two independently movable coil and pointer systems have a common magnet structure, and particularly to a magnet structure for such instruments.

The conventional magnet structure for dual electrical instruments includes a bar permanent magnet having soft iron pole pieces fixed to the pole faces of the magnet, cooperating soft iron pole pieces spaced from the pole pieces of the magnet, cylindrical cores in the gaps between the sets of pole pieces, and a cylindrical soft iron yoke carrying the second pair of pole pieces. The iron yoke forms a shield for the permanent magnet and this self-shielding action results in a particularly small space requirement for a dual instrument that replaces two separate instruments. Unfortunately, however, prior dual instruments of the self-shielding type have been of relatively low sensitivity as the ratio of the effective magnet length to magnet cross-section has been too low for efficient use of high coercive force magnet materials of the recently developed aluminum-iron alloy types. There are two gaps in the magnetic flux path and, for an instrument in a circular case of about 3 inches diameter, the total length of the bar magnet may be about $1\frac{1}{8}$ " or $\frac{3}{4}$ " for each gap or instrument movement.

An object of the invention is to provide dual electrical instruments of greater sensitivity, for a given overall casing size, than has been possible in the prior constructions. Objects of the invention are to provide dual electrical instruments of the self-shielding type in which the effective ratio of magnet length to magnet cross-section is substantially higher, and up to approximately double, the ratios obtained in prior instruments. More specifically, objects are to provide dual electrical instruments in which the permanent magnet is of generally cruciform shape with a longer bar extending diametrically across a cylindrical yoke and a shorter bar carrying pole pieces that cooperate with pole pieces on the yoke and with cylindrical cores to form the air gaps in which the moving coils are pivotally supported.

These and other objects and advantages of the invention will be apparent from the following specification when taken with the accompanying drawings in which:

Fig. 1 is an elevation of a magnet structure embodying the invention, the moving systems of the dual instrument being shown in place in the air gaps of the magnet structure; and

Fig. 2 is a front elevation of a dual electrical instrument having a magnet structure as illustrated in Fig. 1.

In the drawings, the reference numeral 1 identifies a permanent magnet of generally cruciform shape having a longer bar terminating in curved polar surfaces of the same polarity, as indicated

2

by the letters "S," that snugly engage and are secured to a cylindrical yoke 2 of soft iron. The shorter, symmetrically located bar of the magnet 1 has plane polar faces of like polarity, but opposite to that of the longer bar, as indicated by the letters "N."

Soft iron pole pieces 3 are attached to the ends of the shorter bar of the magnet 1, and cooperating soft iron pole pieces 4 are secured to the yoke 2. Cylindrical cores 5, 5 are arranged between the opposed cylindrical surfaces of the sets 3, 4 of pole pieces, and moving systems comprising coils 6 and pointers 7 are pivotally supported for angular movement in the air gaps.

The weighted average length of the magnet structure for each moving system is, for a cylindrical yoke of the same diameter as that of the prior instrument mentioned above, approximately $1\frac{3}{8}$ ", i. e. approximately twice the effective magnet length in the prior constructions. The sensitivity of instruments having the new magnet structure is therefore substantially higher than that of the prior instruments.

The casing 8 of the dual instrument may be of the same size and shape as the casings used with the less efficient dual magnet structures of the prior art. The instrument scale plate 9 may have scales 10 and 11 that merge at their central portions when the separate sections of the dual instrument are to indicate or measure the same factor, for example temperature in the particular case of the instrument shown in Fig. 2. This merging of the scales is not essential, however, as independent scales may be used when different factors or values are measured by the respective moving systems.

It is to be understood that the invention is not limited to instruments of the particular sizes herein mentioned, and that various modifications in the size and shape of the instrument and the magnet structure fall within the spirit of my invention as set forth in the following claims.

I claim:

1. A dual electrical instrument of the self-shielding type comprising a permanent magnet of generally cruciform shape having one relatively long bar and a shorter transverse bar, the end faces of each bar being of the same polarity and the polarity of the end faces alternating around the permanent magnet, a shielding yoke of high permeability encircling the permanent magnet, means including cooperating sets of pole pieces secured to the shorter bar of said permanent magnet and to said yoke forming magnetic flux circuits through the air gaps between the pole pieces of each set, cores in said gaps, and coils angularly movable about said cores.

2. A dual electrical instrument as recited in claim 1 wherein the longer bar of said cruciform

3

permanent magnet has pole faces engaging said yoke.

ROSWELL W. GILBERT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
655,852	Collins	Aug. 14, 1900
840,569	Lea	Jan. 8, 1907
1,985,082	Faus	Dec. 18, 1934
2,189,524	Randolph et al.	Feb. 6, 1940

4

Number	Name	Date
2,235,390	Smith	Mar. 18, 1941
2,350,741	Ford	June 6, 1944

FOREIGN PATENTS

Number	Country	Date
23,958	Great Britain	Dec. 23, 1898

OTHER REFERENCES

10: "Permanent Magnets Have Four Major Jobs," by Charles A. Maynard, page 1, reprinted from November 1944 Electrical Manufacturing. "Electronic Industries," of January 1945, page 38.