This invention relates to devices for reading well survey records, and among the objects of my invention are:
First, to provide a device of this character which is particularly designed to assist in the reading of photograph record discs obtained from well survey apparatus, such as described in my copending application, Serial No. 35,183, filed August 7, 1935.
Second, to provide a reading device for survey record discs whereby the inclination and direction of a well bore recorded on such record disc may be conveniently and accurately interpreted;
Third, to provide a device of this character which receives a circular flat record disc bearing indicia indicating a plane of inclination in relation to other indicia indicating a plane of direction, said device incorporating means whereby known magnetic deflections of the direction-indicating indicia may be compensated for and the true azimuth of the inclination indicia obtained;
Fourth, to provide a device of this character which may be readily carried on the person so that it may be available in the field to interpret well bore record discs;
Fifth, to provide a device of this character adapted to operate in conjunction with a record disc bearing code indicia designed to prevent interpretation of the record disc without use of the reading device, thereby preventing unauthorized knowledge of the information occurring on the record disc.
With the foregoing and other objects in view, as may hereinafter appear, reference is made to the accompanying drawing, in which:
Figure 1 is an enlarged plan view of my reading device with a record disc shown in position, and parts and portions of the disc and reading device broken away to facilitate the illustration;
Figure 2 is a transverse sectional view through the reading device and disc, taken along the line 2—2 of Figure 1;
Figure 3 is a plan view of the record disc alone; and

The bearing 13 receives a record disc holder 20 which journals snugly therein. The upper end of the holder 20 is recessed to receive a flat record disc 21. The record disc 21 comprises a body portion, the upper surface of which has...
previously been sensitized and upon which has been photographed a plurality of concentric ring markings 22, a compass needle image 23 and a cross hair image 24 from a plumb bob or other inclinometer, all of which is obtained as more fully disclosed in my copending application referred to hereinbefore. The periphery of the disc is preferably reinforced by a metal rim 25. The concentric rings 22 indicate degrees of indication from the vertical, and in the drawings the rings have a range of five degrees. Of course, the rings may be arranged to indicate a larger or lesser number of degrees.

To facilitate the ejection of the record disc, the holder 20 is equipped with a plunger 26 set in a socket formed within the disc-receiving recess. A plunger stem 27, in the form of a screw, extends through the holder 20 with its head 28 exposed to the underside of the holder so that it may be engaged by one's thumb. The stem 27 may be locked in place by a set screw 29 screw-threaded from the upper side of the plunger 26. It is preferred to recess the underside of the holder 20 so that the protrude beyond the lower face of the holder.

The holder is yeldably retained in the bearing 3 by means of a ball keeper 30 backed by a spring 31 and adapted to engage an annular groove in the side of the holder 20. The ball keeper and spring are preferably mounted within a socket formed within a retainer 33 adapted to be screw-threaded laterally into the bearing 3.

Operation of the reading device is as follows: The record disc 21, after being taken from a surveying instrument and developed, is placed in the upper end of the holder 20 and the holder inserted in the bearing 3. Thereupon, the holder is turned until the axes of the compass needle and compass image 23 coincides with the dummy compass indicia 16, as shown in Figure 1. This may be accomplished with the aid of the radial hair line 19 by turning the dial plate 16 so that it functions as a reference line for the axis of the dummy compass and compass image. Thereupon, with the record disc retained in its proper position, the dial plate 16 is turned until the hair line 19 traverses the intersection of the cross hair image 24. Reading in terms of true bearing is then taken on the scale 9.

The figure 1 the dummy compass is shown as occupying a declination of approximately sixteen degrees east of north. The compass image of the record disc is turned so that it, likewise, indicates a declination of sixteen degrees east of north. Thereupon, it is found, when aligning radially the intersection of the cross hair image 24 with the center of the disc and the scale 9, that the direction of inclination of said cross hair image is three degrees west of south. By counting the number of circles 22 from the center of the record disc to the cross hair image 24, it is found that the inclination from vertical is slightly over four degrees.

It is sometimes desirable that the information obtained by the record disc be held confidential. Therefore, a special record disc 34 is employed with code markings 35 in the form of radial photographic lines obtained by a special card mounted on and masking the survey compass, but bears the cross hair image 24 of the plumb bob, as in the first described record disc. The inner ring 5 is inscribed with radial lines 37 corresponding to the radial image lines 36, so that when the record disc 34 is inserted, the lines 36 and 37 may be brought into registry, whereupon the azimuth of the cross hair image 24 may be obtained. In order to read the inclination from vertical of the cross hair image 24, concentric circles corresponding to the inclination circles 22 may be inscribed on the underside of the dial plate 16.

Thus, without knowing the relationship that the lines 36 bear to the compass needle and the scale employed for the inclination rings on the record disc, it is impossible to obtain any record disc without the use of the reading device and the record may, if desired, be kept in strictest confidence.

By providing extra screw holes in the inner ring 5 for accommodating screws 1, the ring may be adjusted to any angular position relative to the outer ring 4. This is particularly desirable when employing the code markings 31, as this affords a simple means of changing the code employed on the compass code mask employed in the surveying instrument and the reading device 20 so that the record disc may be adapted for use with other apparatus or methods.

Though I have shown and described particular embodiments of my invention, I do not wish to be limited thereto, but desire to include in the scope of my invention the constructions, combinations, and arrangements substantially as embraced in the appended claims.

I claim:

1. A reading device for interpreting a well survey record disc bearing survey indicia, comprising: a base having a dummy compass scale thereon; a ring carried by said base and angularly adjustable with respect to said scale, said ring being positioned co-planar with said scale and having indicia thereon; a record disc holder carried by said base and rotatable therein; and means rotatable on said base, having a radial index for aligning the indicia on said ring and on said disc with said scale.

2. A reading device for interpreting a well survey record disc bearing survey indicia, comprising: a base having a dummy compass scale thereon; a ring carried by said base and angularly adjustable with respect to said scale, said ring having indicia thereon; a record disc holder carried by said base and readily removable therefrom; and means rotatable on said base having a radial index for aligning the indicia on said ring and on said disc with said scale.

3. A reading device for interpreting a well survey record disc bearing survey indicia, comprising: a base, a dummy compass scale means and indicia bearing means coaxially mounted thereon and relatively adjustable angularly; a record disc holder carried by and rotatable in said base; ejector means associated with said holder for removing said disc therefrom, said holder adapted to position said record disc in coaxial association with said scale means and indicia bearing means; and means rotatable on said base having a radial index for aligning the indicia bearing means and on said record disc with said scale means.

4. In a device for reading direction indicia recorded with code markings thereon, the combination comprising: a base having a dummy compass scale thereon; a ring carried by said base and angularly adjustable with respect to said scale, said ring having indicia thereon; a record disc holder rotatable in said base and removable therefrom; spring detent means tending to retain said holder in said base; and means rotatable on said base hav-
2,129,395

In a device for reading direction indicia recorded on a disc, the combination comprising: a base having a dummy compass scale thereon; a ring rotatable on said base and having indicia thereon its surface being co-planar with said scale; clamping means to lock the adjustment of said ring with respect to said base; a record disc holder rotatable in said base and adapted to hold the disc substantially flush with said scale and ring; and rotatable means having a radial index thereon for aligning indicia on said ring and on said disc with said scale and in approximate contact therewith to minimize parallax effect.

6. In a device for reading direction indicia recorded on a disc, the combination comprising: a base having a dummy compass scale thereon; a ring rotatable on said base and having indicia thereon; a record disc holder in the form of a plunger rotatably mounted in said base and readily removable therefrom; and rotatable transparent means covering said ring and said scale and bearing a visible radial index thereon for aligning indicia on said ring and on said disc with said scale.

7. A reading device for interpreting a well survey record disc bearing survey indicia, comprising: a circular base having a dummy compass scale thereon; a compass needle declination indicator rotatable on said base; a record disc holder removably journaled in the center of said base; and transparent means rotatable on said base having a radial index marked thereon for aligning indicia on said indicator and on said record disc with said scale, and having a plurality of concentric circles marked thereon for reading inclination indicia on said record disc.

8. A reading device for interpreting a well survey record disc bearing codified symbols indicative of direction and inclination, comprising: means incorporating a compass scale and direction markings codified in correspondence with the direction symbols on said disc; means for revolvably supporting said disc in association with said direction markers whereby said markings and symbols may be brought into registry for intelligible direction indication; and an instrumentality revolvably mounted concentrically with said disc and incorporating an element for facilitating correlation of said markings and symbols.

9. A reading device for interpreting a well survey record disc bearing codified symbols indicative of direction and inclination, comprising: means incorporating a compass scale and direction markings codified in correspondence with the direction symbols on said disc; means for revolvably supporting said disc in association with said direction markers whereby said markings and symbols may be brought into registry for intelligible direction indication; and an instrumentality for coacting with said inclination symbols to render the same intelligible.

10. A reading device for interpreting a well survey record disc bearing codified symbols indicative of direction and inclination, comprising: means incorporating a compass scale and direction markings codified in correspondence with the direction symbols on said disc; means for revolvably supporting said disc in association with said direction markers whereby said markings and symbols may be brought into registry for intelligible direction indication; and an instrumentality for coacting with said inclination symbols to render the same intelligible.

11. A device for interpreting a well survey record disc having indicia appearing on the surface thereof, comprising: a base having correlated indicia thereon and a central aperture to receive said disc; means for revolvably holding said disc with its indicia substantially flush with said correlated indicia; and a transparent rotatable cover for said base and disc having index markings on its underside in proximity to said indicia.

ALEXANDER ANDERSON.