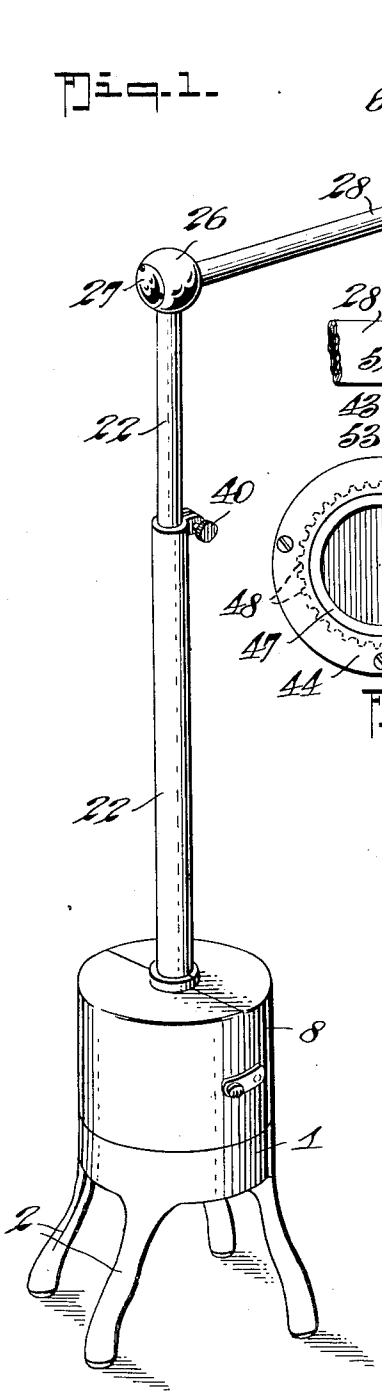
Feb. 27, 1934. G. L. MANDAVILLE 1,949,022

BINOCULATOR

Filed Nov. 13, 1930 3 Sheets-Sheet 1

Fig. 1.



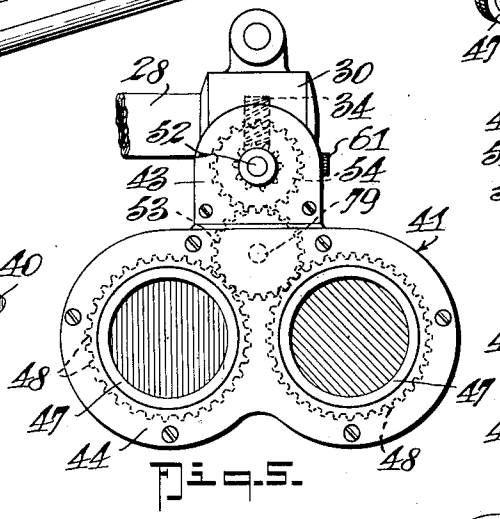


Fig. 5.

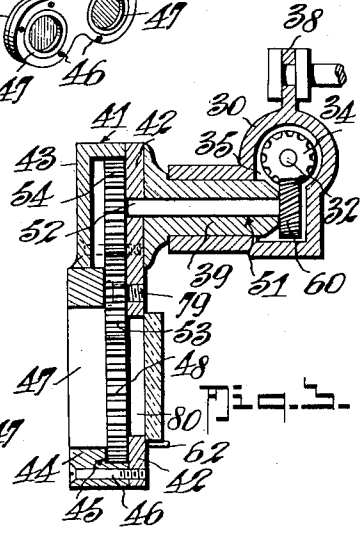


Fig. 3.

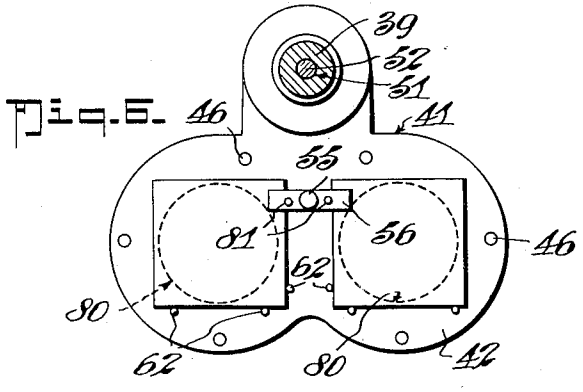


Fig. 6.

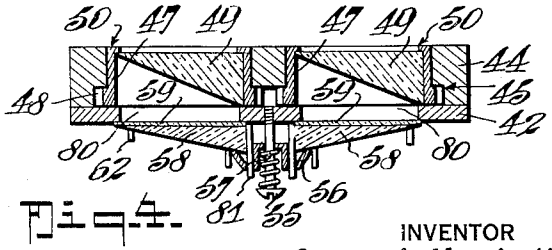


Fig. 4.

INVENTOR
Gurney L. Mandaville.
BY
Albert G. Davis
ATTORNEY

Feb. 27, 1934. G. L. MANDAVILLE 1,949,022

BINOCULATOR

Filed Nov. 13, 1930 3 Sheets-Sheet 2

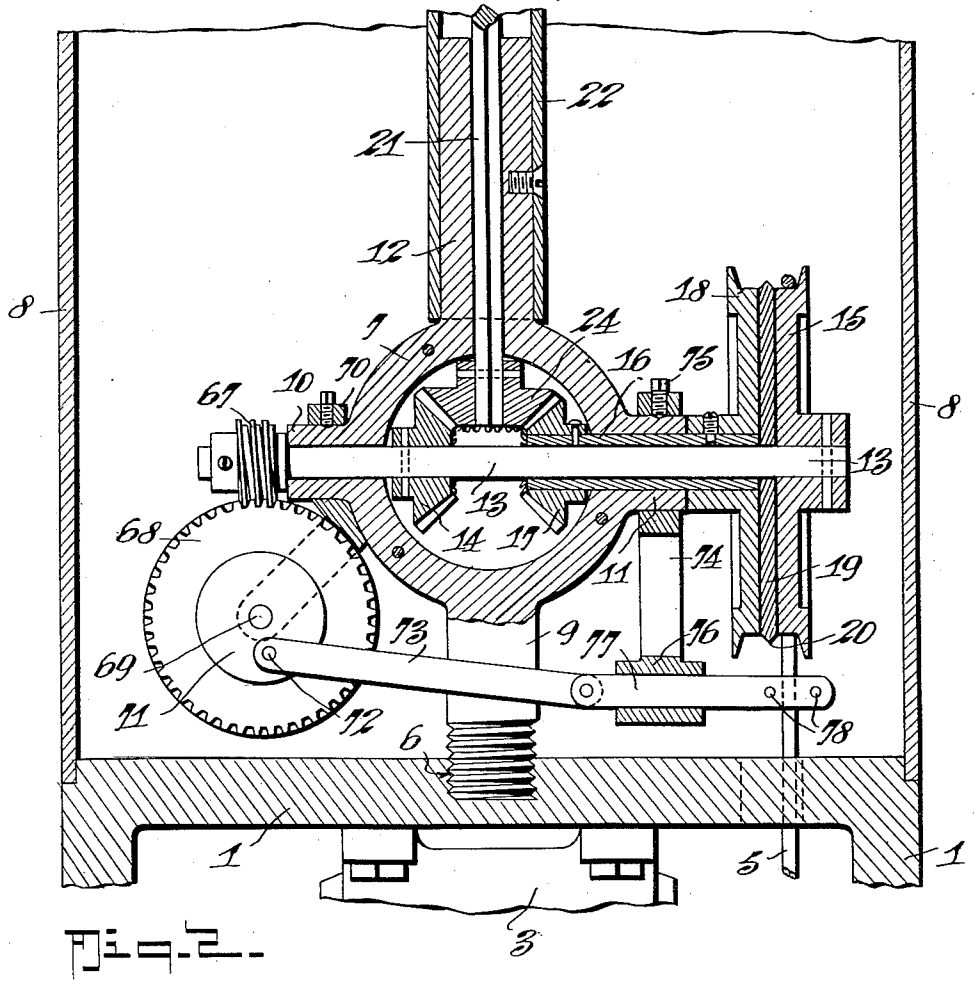


Fig. 2.

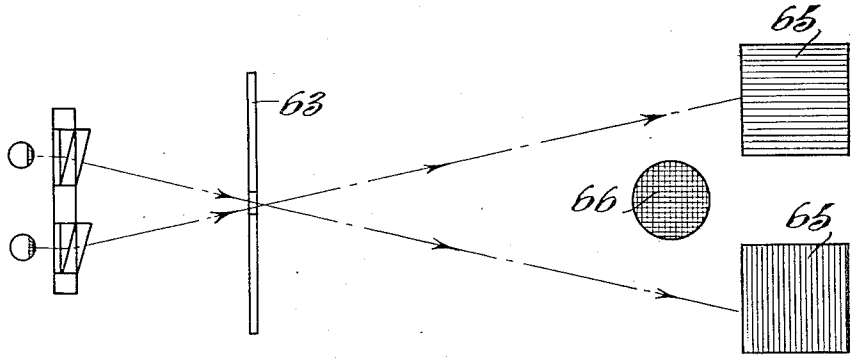


Fig. 11.

INVENTOR
Gurney L. Mandaville.
BY
ATTORNEY

Feb. 27, 1934. G. L. MANDAVILLE 1,949,022

BINOCULATOR

Filed Nov. 13, 1930 3 Sheets-Sheet 3

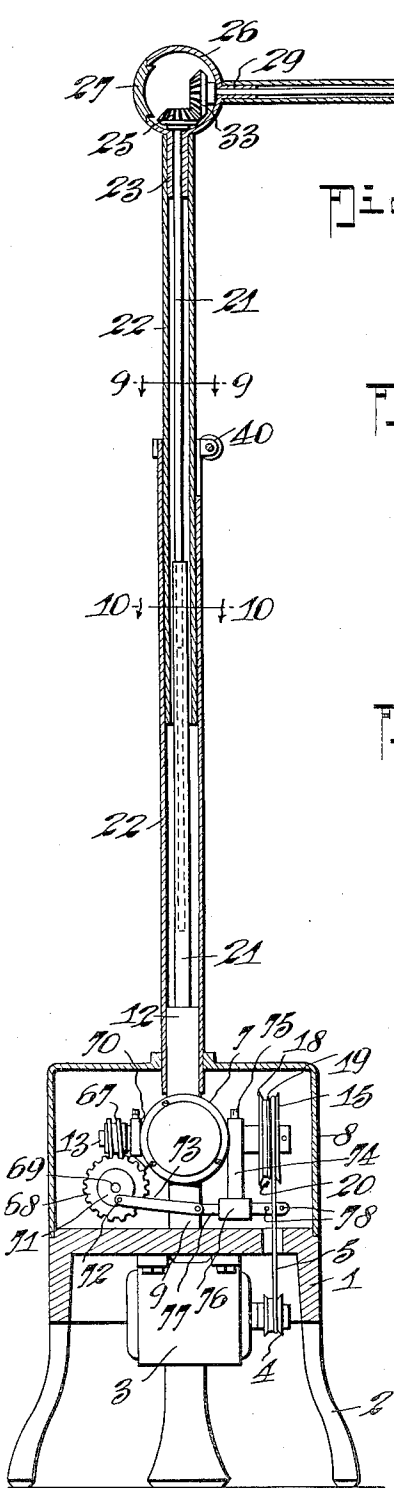
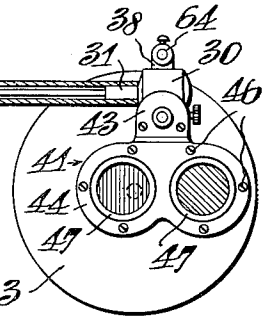


Fig. 7.



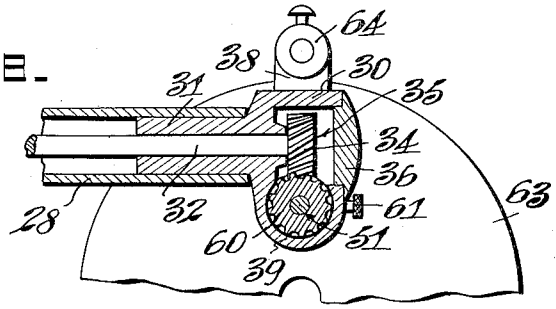


Fig. 8.

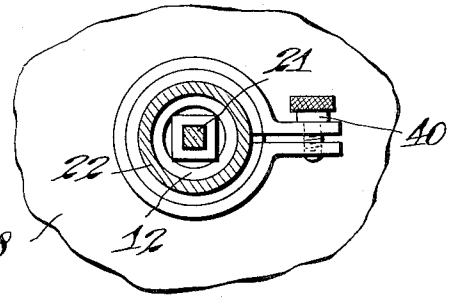


Fig. 9.

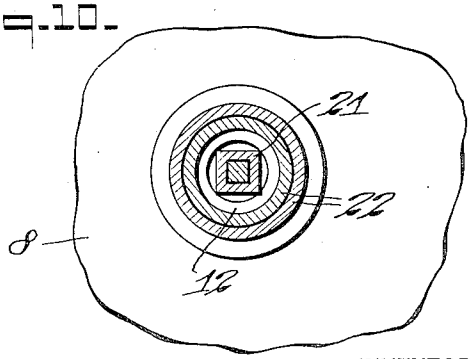


Fig. 10.

INVENTOR
Gurney L. Mandaville.

BY
ATTORNEY

Patented Feb. 27, 1934

1,949,022

UNITED STATES PATENT OFFICE

1,949,022

BINOCULATOR

Gurney Lee Mandaville, Fort Pierce, Fla.

Application November 13, 1930
Serial No. 495,473

15 Claims. (Cl. 128—25)

My invention is an instrument which is designed for the purpose of equalizing and normalizing the action of the motor muscles of the human eye.

Primarily the invention has for its object to provide a simple, practical and inexpensive apparatus for the purpose stated in which the object is effectually accomplished by the use of prisms in revolving cylinders, both of which rotate in the same direction, with the bases of the prisms placed at the same angle from the center, i. e., base down or base up, together with prisms in addition placed at the front of the cylinders to aid or overcome the defective action of the motor muscles of the eyes.

Further it is an object to provide an apparatus in which the prisms and their cylinders are caused to rotate in their sockets by gears and a power transmission drive from a motor, there being included means which permits or renders it possible to rotate the cylinders in either direction as desired, or to revolve the same a certain number of times in one direction, and then automatically reverse the direction of rotation and revolve them in the opposite direction.

Further it is an object to provide means whereby, when it is desirable to break up a relationship between convergence and accommodation, in order to correct muscular interbalance, as strabismus or squint, this can be done by having a disk with a hole in the center placed between the instrument and charts; the patient's vision being directed through the instrument converges to a point in the center of the disk while accommodating for a more distant point to the chart or charts, the charts being arranged to give a stereoscopic effect of the character or pictures contained thereon.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends, my invention consists in the novel features of construction and combination, connection and arrangement of parts, hereinafter more fully described, and then pointed out in the appended claims.

In the drawings:

Figure 1 is a perspective view of my instrument.

Figure 2 is a detail vertical section of the transmission and reversing mechanism.

Figure 3 is an enlarged vertical section of the instrument head.

Figure 4 is an enlarged horizontal section through the head support on the end of the horizontal arm.

Figure 5 is an enlarged face view of the gear case and head support.

Figure 6 is an enlarged rear elevation of the gear case showing manner of mounting the prisms.

Figure 7 is a central vertical longitudinal section, some parts being shown in elevation, of my machine.

Figure 8 is an enlarged detail sectional view of the worm drive at the far end of the horizontal arm.

Figure 9 is an enlarged horizontal section on the line 9—9 of Figure 7.

Figure 10 is an enlarged horizontal section on the line 10—10 of Figure 7.

Figure 11 is a diagrammatic view of my machine in use.

In the drawings, in which like numerals of reference indicate like parts in all of the figures, 1 represents the base which is preferably of circular form and is supported on legs 2, (preferably four in number). A motor 3 is mounted under the base and has a drive pulley 4 around which the driving belt 5 passes.

The base 1 is provided with a threaded recess 6 into which the gear case threaded mounting stud 9 is adapted to be screwed for supporting the gear case 7 and its carried parts on the base. The gear case 7 has a removable cover 8 by which access to the interior of the gear case may be had. It is also provided with horizontal bearings 10 and 11 and a vertical bearing 12 for the vertical transmission shaft 21.

Mounted in a suitable bearing 10 and in the bearing sleeve 16 is a transmission gear shaft 13, to one end of which is pinned, or otherwise secured, a pulley 15.

Secured to the shaft 13 within the gear case 7 is a bevel gear 14 and secured to the sleeve 16 is another bevel gear 17, the two gears 14 and 17 meshing with the bevel gear 24 on the vertical transmission shaft 21, as shown.

18 is another drive pulley mounted on the sleeve 16 to turn with it, the drive pulleys 15 and 18 being separated by a loose central disk 19 which turns freely on the shaft 13 and has a bevelled or V-shaped periphery 20 to cooperate with the flanges of the pulleys 15 and 18, respectively, the driving belt 5 taking around these pulleys 15 and 18 and being adapted for shifting over the disk 19 from one pulley to the other, either by manual action or automatically (the automatic action being explained later).

22 designates a vertical telescopical sectional support which fits over the bearing 12 and sustains the upper bearing 23 in which the upper section of the telescoping shaft 21 is mounted. The tubular telescopic support 22 is held in its proper extension by means of a suitable clamping device 40.

25 is a bevel gear secured on the uppermost section of the shaft 21 and it has an elbow or support constituting a gear housing 26, this housing having a removable cap or cover 27 as shown. A horizontal tubing 28 extends from the housing 26 and has a bearing 29 adjacent the housing for the horizontal shaft 32 with bevel gear 33 to mesh with the bevel gear 25 hereinbefore referred to, the other end of the shaft 32 being mounted in a bearing in the shank 31 of the adjustable gear case 30, and at its end within the chamber 35 of the gear case the shaft 32 carries a worm gear 34 for a purpose presently explained.

The gear case 30 has a removable cover 36 and it has a head bearing 37 for the reception of the shank 39 of the head 41.

The gear case 30 also carries an upwardly projecting lug 38 provided with an eye for the reception of the rod which carries an apertured disk hereinafter again referred to.

The instrument head 41 is composed of a back plate 42 to which the shank 39 is secured, an upper gear case cover 43 and a lower gear case and bearing member 44, the latter having bearing portions 45 for the cylinders 47. The covers 43—44 are secured to the back plate 42 by screws 46, or in any other suitable way.

The cylinders 47 have gear teeth 48 which mesh with the intermediate gear 53 that is mounted on the stud 79 projecting from the back plate 42. The intermed'ate gear 53 meshes with a pinion 54 on the prism rotating shaft 52 that is journalled in the bearing bore 51 of the shank 39.

The prisms 49 are held in the cylinders 47 by engaging shoulders 50.

55 is a back prism clamping post which carries the clamp 56 and spring 57 that holds the added prisms 58 in place against the back plate 42. The back plate 42 has openings 80 registering with the interior opening of the cylinders 47.

59 are color glasses that may be placed over the prisms 58 for a purpose presently explained.

60 is a worm gear on the shaft 52 which meshes with the worm 34 on the shaft 32, when the shank 39 is in place in the head bearing 37 and is secured by the set screw 61. The back plate carries a series of pins 62 on which the added prisms 58 rest while being held in place by the clamp 56, the clamp 56 being held against swivelling by means of pins 81 projecting from the back plate 42.

63 is the apertured disk which is adjustably mounted on the rod 64 that is secured on the eye 38 and 65 designates the charts, see Figure 11. By reference to Figure 11, the action of the instrument will be clear to those skilled in the art. In that figure, 66 represents the mental image seen when viewing the chart 65 through the apertured disk or target 63.

The mechanism for effecting periodical reversals of the rotation of the prisms is best shown in Figure 2 by reference to which it will be seen that 67 is a worm secured on the shaft 13 and meshing with a worm gear 68 on a shaft 69 journalled in a bracket 70 that is mounted on the gear case 7. 71 is a crank disk whose crank pin 72 is connected through a connecting rod 73 with the reciprocating belt shifter 77 whose fingers 78 lie at either side of the belt 5. The reciprocating belt shifter 77 is mounted in a bearing 76 in a hanger 74 that is in turn mounted on the bearing projection 11 of the gear case 7 and held in place by a set screw 75. Thus, when the shaft 13 has made a certain number of revolutions the belt 5 is shifted from one pulley 15 to the other 18, and vice versa, over the bevelled periphery 20 of the freely rotating disk 19.

The disk or target 63 has a bearing at the top which fits over the mounting rod 64 and is held in position by a set screw, thus allowing the disk to be moved toward and from the instrument head to change the converging positions and also permitting the disk to swivel in order that it may be properly lined up with the instrument head. The surface of the disk may be plain or decorated, as desired.

In using the apparatus, the patient's vision is directed through the instrument head, and then through the hole in the center of the disk to the charts 65 which will give a stereoscopic effect forming a mental image 66 of the two charts.

It is found that in the treating of children's eyes it is very helpful to use the two-color system,—the green and yellow lenses, or other colors. The chart can be painted in the two colors, or it can be used as a screen and pictures projected in two colors on it. In using the two-color system I place a red lens over one eye and a green lens over the other eye, which fit in behind the prisms and are held by the same clamp that holds the prisms in place. Then with the color chart or picture in front of them as their vision is directed through the instrument the red on the chart or picture can be seen only with the eye having the red lens over it, and the green part of the picture or chart can be seen only through the green lens, thereby necessitating the vision of both eyes to see the full picture, which causes the patient to focus both eyes on the picture and while the eyes are being focused they are rotated and with the action of the prisms the muscles are being exercised in a manner that will increase the action and stimulate the muscles as desired.

It has also been found that certain colored motion pictures give the required desire for the use of both eyes through the filter lens and, no doubt, in time it will be one of the methods used in treating weak-eyed children. In using my instrument to view motion pictures the disk or target 63 is not employed.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be readily understood by those skilled in the art.

What I claim is:

1. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, and power transmitting mechanism between said motor and each of said cylinders for freely rotating the cylinders in the same direction.

2. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, power transmitting mechanism between said motor and each of said cylinders for freely rotating the cylinders in the same direction, and automatic

reversing gear cooperating with said power transmitting mechanism for the purposes described.

3. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, power transmitting mechanism between said motor and each of said cylinders for freely rotating the cylinders in the same direction, a prism securing means carried by said head and added prisms held to said head by said prism securing means.

4. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, power transmitting mechanism between said motor and each of said cylinders for freely rotating the cylinders in the same direction, automatic reversing gear cooperating with said power transmitting mechanism, a prism securing means carried by said head and added prisms held to said head by said prism securing means.

5. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, power transmitting mechanism between said motor and each of said cylinders for freely rotating the cylinders in the same direction, a prism securing means carried by said head and added prisms held to said head by said prism securing means, and color glasses held with said added prisms to said head.

6. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, power transmitting mechanism between said motor and each of said cylinders for freely rotating the cylinders in the same direction, automatic reversing gear cooperating with said power transmitting mechanism, a prism securing means carried by said head and added prisms held to said head by said prism securing means, and color glasses held with said added prisms to said head.

7. In instruments of the character stated, a base, a motor mounted on the base, a telescoping vertical columnar support and a transmission case mounted on said base, a horizontal support carried by said vertical support, power transmitting mechanism carried by said supports and connected with said motor, an instrument head on said horizontal support, a pair of rotatable cylinders carried by said head, prisms mounted in said cylinders, and cylinder rotating means in said head and coupled with said power transmitting mechanism for effecting rotation of said prisms.

8. In instruments of the character stated, a base, a motor mounted on the base, a telescoping vertical columnar support and a transmission case mounted on said base, a horizontal support carried by said vertical support, power transmitting mechanism carried by said supports and connected with said motor, an instrument head on said horizontal support, a pair of rotatable cylinders carried by said head, prisms mounted in said cylinders and cylinder rotating means in said head and coupled with said power transmitting mechanism for effecting rotation of said prisms, and added prisms and means to hold the same in place on said head in cooperation with said cylinders.

9. In instruments of the character stated, a base, a motor mounted on the base, a telescoping vertical columnar support and a transmission case mounted on said base, a horizontal support carried by said vertical support, power transmitting mechanism carried by said supports and connected with said motor, an instrument head on said horizontal support, a pair of rotatable cylinders carried by said head, prisms mounted in said cylinders, cylinder rotating means in said head and coupled with said power transmitting mechanism for effecting rotation of said prisms, and a target disk with an aperture adjustably mounted on said support in cooperation with said head.

10. In instruments of the character stated, a base, a motor mounted on the base, a telescoping vertical columnar support and a transmission case mounted on said base, a horizontal support carried by said vertical support, power transmitting mechanism carried by said supports and connected with said motor, an instrument head on said horizontal support, a pair of rotatable cylinders carried by said head, prisms mounted in said cylinders, cylinder rotating means in said head and coupled with said power transmitting mechanism for effecting rotation of said prisms, and means to reverse the direction of rotation of said cylinders at predetermined intervals.

11. In instruments of the character stated, a base, a motor mounted on the base, a telescoping vertical columnar support and a transmission case mounted on said base, a horizontal support carried by said vertical support, power transmitting mechanism carried by said supports and connected with said motor, an instrument head on said horizontal support, a pair of rotatable cylinders carried by said head, prisms mounted in said cylinders, cylinder rotating means in said head and coupled with power transmitting mechanism for effecting rotation of said prisms, added prisms and means to hold the same in place on said head in cooperation with said cylinders, and means to reverse the direction of rotation of said cylinders at predetermined intervals.

12. In instruments of the character stated, a base, a motor mounted on the base, a telescoping vertical columnar support and a transmission case mounted on said base, a horizontal support carried by said vertical support, power transmitting mechanism carried by said supports and connected with said motor, an instrument head on said horizontal support, a pair of rotatable cylinders carried by said head, prisms mounted in said cylinders, cylinder rotating means in said head and coupled with said power transmitting mechanism for effecting rotation of said prisms, a target disk with an aperture adjustably mounted on said support in cooperation with said head, and means to reverse the direction of rotation of said cylinders at predetermined intervals.

13. In instruments of the character stated, a base, a motor mounted on the base, a telescoping vertical columnar support and a transmission case mounted on said base, a horizontal support carried by said vertical support, power transmitting mechanism carried by said supports and connected with said motor, an instrument head on said horizontal support, a pair of rotatable cylinders carried by said head, prisms mounted in said cylinders, cylinder rotating means in said head and coupled with said power transmitting mechanism for effecting rotation of said prisms, means to reverse the direction of rotation of said cylinders at predetermined intervals, said reversing mechanism comprising a reversing gear, a pair of associated pulleys with

an intermediate loose disk, a driving belt from said motor taking over said pulleys and a periodic belt shifter for shifting said belt from one pulley to the other.

14. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, each of said cylinders including a ring gear, a common pinion meshing with each of said ring gears, and a power transmitting gear train from said motor to said common pinion for rotating said cylinders in the same direction.

15. In instruments of the character stated, a support, an instrument head carried thereby, a motor on the support, said head including a pair of rotating cylinders carrying prisms, each of said cylinders including a ring gear, a common pinion meshing with each of said ring gears, a power transmitting gear train from said motor to said common pinion for rotating said cylinders in the same direction, an automatic reversing gear cooperating with said power transmitting gear train for reversing the operation of the same upon said cylinders making a predetermined number of revolutions in one direction.

GURNEY LEE MANDAVILLE.