

Jan. 16, 1923.

M. SCHULER.
LIGHTSHIP BEACON.
FILED JUNE 9, 1922.

1,442,543

3 SHEETS-SHEET 1

Fig. 1.

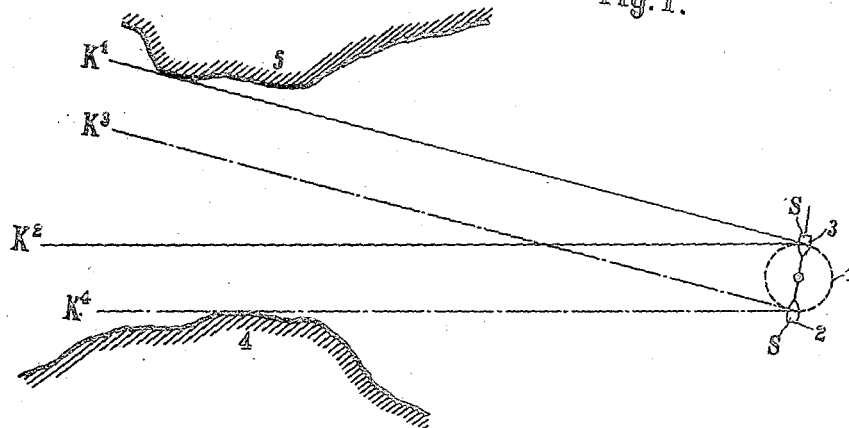


Fig. 2.

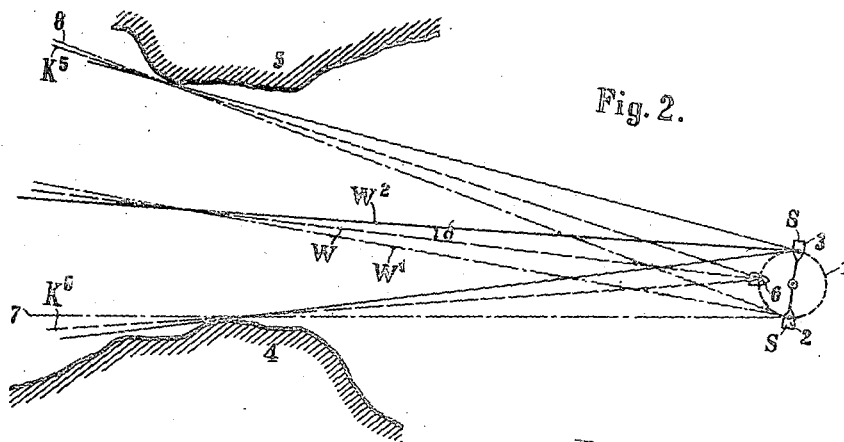
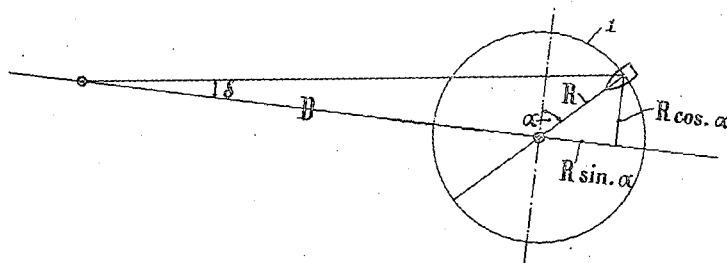


Fig. 3.



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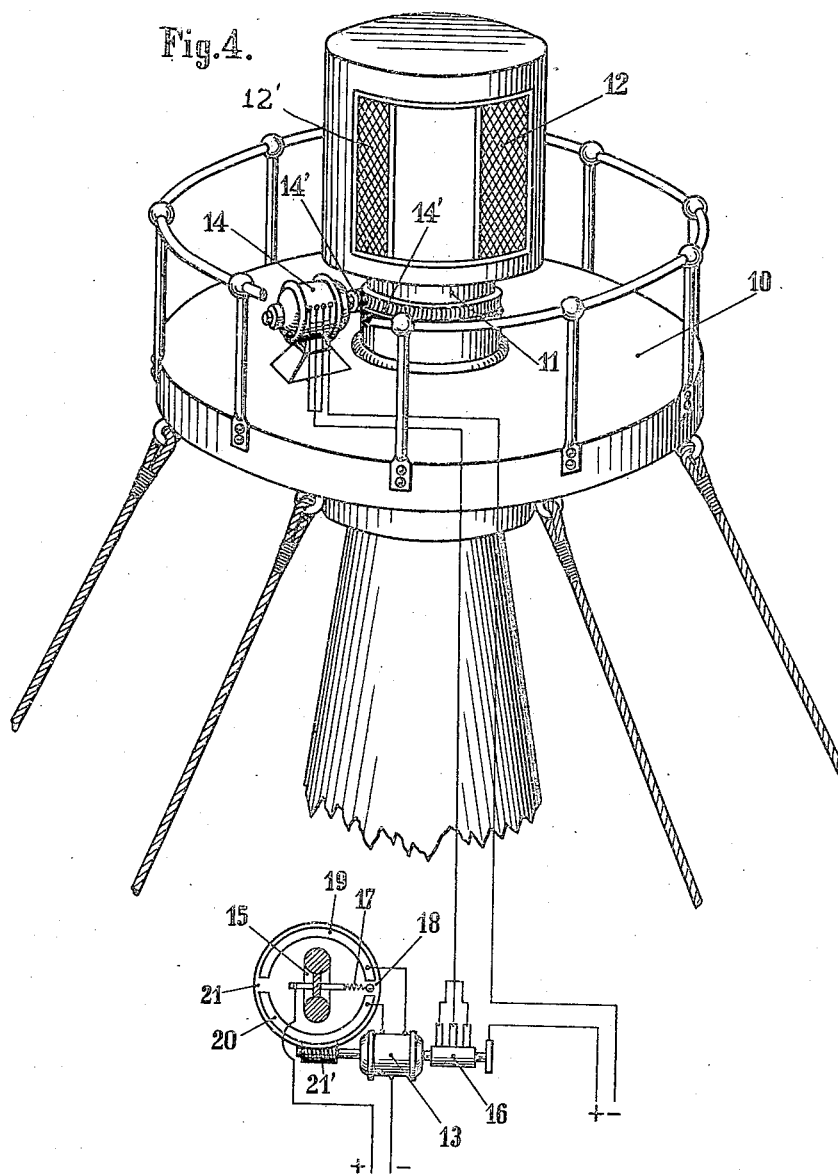
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3. SHEETS-SHEET 2



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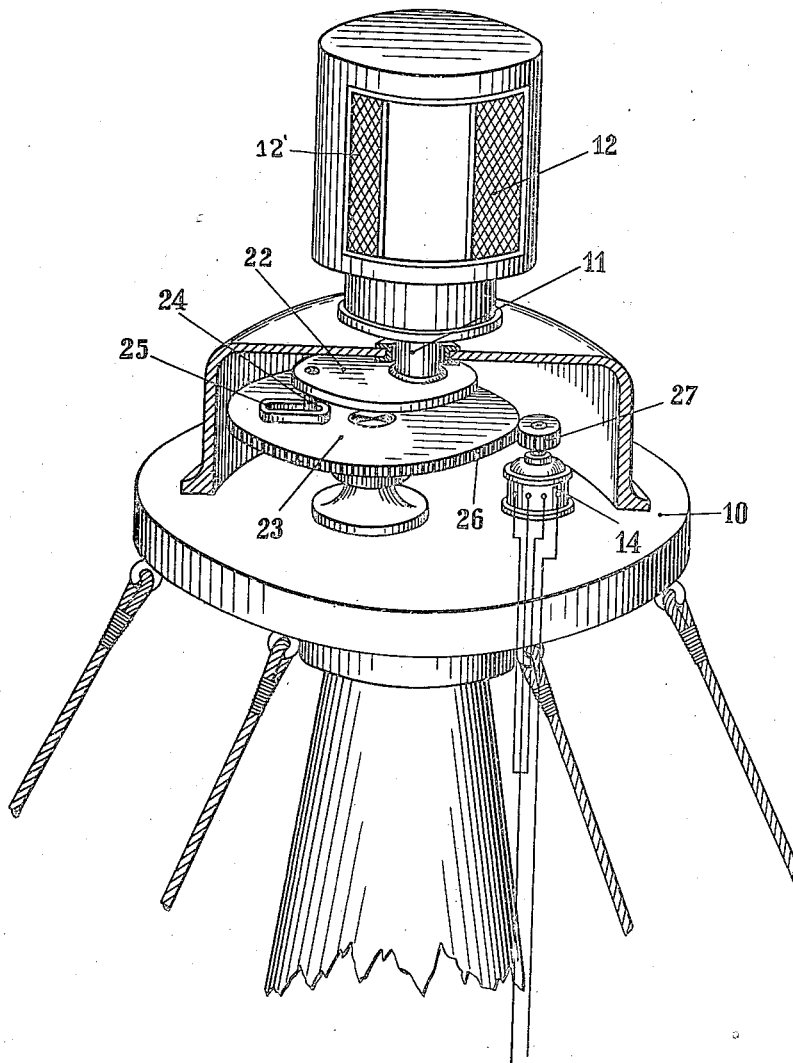
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1,442,543

3 SHEETS-SHEET 3

Fig. 5.



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UNITED STATES PATENT OFFICE.

MAX SCHULER, OF NEUMUHLEN, NEAR KIEL, GERMANY, ASSIGNOR TO THE FIRM
ANSCHUTZ & CO., OF NEUMUHLEN, NEAR KIEL, GERMANY.

LIGHTSHIP BEACON.

Application filed June 9, 1922. Serial No. 567,143.

To all whom it may concern:

Be it known that I, MAX SCHULER, a citizen of the German Republic, residing at Neumuhlen, near Kiel, Germany, have invented certain new and useful Improvements in Lightship Beacons, of which the following is a specification.

This invention relates to lightship beacons and the like, and more particularly to beacons adapted for emitting a plurality of ray pencils of different characters.

The light-houses or beacons placed on shore are often provided with a device by which the beams in different sectors of the horizon are made to differ from each other. Thus for example the beams in one sector may be of unvarying intensity, while those in a neighbouring sector may be made to act like a flashlight. The two sectors of light of different characters may be arranged to illuminate a channel or a mouth of a river, the one sector indicating the course over which ships can pass with safety, while the other indicates the water that should be avoided. If a ship passes out of the sector of light which illuminates the safe course it will be apprised of this fact by the different character of the beaconlight and will be advised as to how its course may be changed in order to return to the safe course. In this way a beacon emitting a number of sectors of light of different characters is often capable of substituting a number of beacons or lighthouses each emitting a single sector of light.

"Sectorial lights" or light projectors have as yet not been employed on lightships, because such a ship is not a fixed support or foundation, i. e., it is able to swing or turn around its anchor or moorings and thus capable of altering its position so that the pencil of rays sent out by the search light or light projector does not always illuminate one and the same strip or tapering sheet of water, and therefore it would be useless to subdivide the pencil of rays into sectors in which lights of different characters appear.

The object of this invention is to provide an arrangement which enables sectorial lights to be utilized also on lightships. This is accomplished by mounting the beacon or light projector on a support capable of turning on a vertical axis which, whenever the

lightship tends to turn the pencil of rays out of the proper position, is turned by means of a compass controlling gear through an angle corresponding to the angle of rotation or to the movement of the ship so that the median line of the sectors of the pencil of light is always kept directed toward a single point. The compass in the controlling gear provided on the ship is preferably one of the gyro type. A lightship equipped in this manner with sectorial lights can often be used as a substitute for a lighthouse with sector lights.

The fact that the lightship, when swinging around its anchor, does not only turn around its vertical axis, but also moves from one point to another, will, in most cases, be of no importance, because the radius of the circle that the lightship can describe around its anchor will be small in comparison with the breadth of the illuminated channel or passage. However, it is also possible in accordance with the invention to make allowance for these displacements of the ship by imparting a small additional rotary movement to devices by which the width of the sectors of light sent out by the light projector is defined. The extent of the said small additional rotary movement is made to depend on the position into which the lightship is shifted on the periphery of its circular path around its anchor.

The invention is shown by way of example in the drawing in which

Fig. 1 is a diagrammatic representation of an application of the invention to a lightship which illuminates a narrow channel in which the conditions are assumed to be such that a sufficient degree of safety is obtained if the pencil of rays sent out by the light projecting lantern or beacon is maintained in one and the same direction when the lightship swings around its moorings.

Fig. 2 shows an application in which allowance is also made for movements of the ship from one place to another.

Fig. 3 is a diagrammatic view showing the path of the ship as it shifts around its anchor and illustrates the factors that determine the additional rotary movement that has to be imparted to the beacon so as to make allowance for the shifting movements of the ship.

Fig. 4 is a perspective view of a beacon platform and a diagrammatic representation of a compass-controlled switching device for controlling the movements of the beacon-revolving motor, and

Fig. 5 is a perspective view of a beacon support or platform by means of which additional rotary movements are imparted to make allowance for the shifting of the anchored ship from one point to another.

In the drawing the circle 1 indicates the different points into which the anchored ship S can move. 2 is the point occupied by the ship in a north wind and 3 the position occupied by the ship when the wind blows from north to south. Now in order to keep the pencil of rays directed towards the channel during all these movements of the ship, special arrangements are provided which are illustrated in Fig. 4. Mounted on the ship S is the platform 10 which carries a rotary column 11 that supports the beacon 12. The said column is turned by means of a synchronous device of a well known kind controlled by a compass, the column being caused to remain turned in one and the same direction like a compass card irrespectively of the rotation of the ship. The synchronous device may be arranged in any preferred manner. In the example shown in Fig. 4 the synchronous device consists of 2 electric motors 13 and 14 of which the former 13 is switched on and off by a compass-controlled switch, the motor being arranged to actuate a current distributor 16, which, in turn, controls the second motor 14 coupled by a worm gearing 14' to the column 11. The transmission of motion from one motor to the other is such that both motors always rotate at equal speeds in the same direction. Hence the lamp comprising illuminated sectors 12 and 12' that emit lightbeams of different characters is always turned in the same sense as the motor 13 at a certain speed ratio. The switching on and off of the motor 13 by the compass-controlled switch provided with a gyro compass 15 is also effected in any preferred known manner. The gyro compass carries a spring 17 which, when the ship S is motionless, lies in the gap 18 between two crescents 19 and 20. These crescents are attached to a disk 21 mounted on a frame fixed to the ship. The disk 21 with the crescents 19 and 20 are arranged to be turned by frictional engagement around the center of the disk. The edge of the disk 21 is provided with worm teeth which engage with the worm 21' on the shaft of the motor 13. When the ship turns and carries the contact crescents 19 and 20 around with it, the one or the other crescent will strike against the contact 17 which is kept motionless or held turned in one and the same direction by the compass and thus the

motor circuit 13 is closed, so that the motor 13 rotates in one direction or the other as long as it is maintained closed by the contact between 17 and 19 or 20.

At the same time the worm 22 and therefore the disk 21 with the contact crescents are rotated, the direction of rotation of the latter being the opposite of that of the ship so that the crescent, say 19, now tends to move away from the middle contact 17. The contact between the middle contact 17 and the crescent 19 will be interrupted when the ship stops moving and the disk with the contact crescents has been moved around to such an extent that their normal position with respect to the longitudinal axis of the ship has been reestablished. The contact 17 will then again lie in the gap 18, the motor being switched off and everything remaining stationary until the ship executes another turning movement.

In this manner the beams sent out by the beacon illuminate a sector K1, 3, K2 when the ship S is in a position 3 shown in Fig. 1, and the sector K3, 2, K4 when the lightship is in the position 2, Fig. 1. Thus the beacon always illuminates the channel between the shores 4 and 5, but the sector of light is nearer to 5 in the first case and nearer to 4 in the second case. But, as has already been mentioned, an arrangement may be provided in accordance with the invention by which the pencil of rays emitted by a search-light or beacon illuminates the entire breadth of the channel in all positions of the lightship. To this end an additional rotary movement is imparted to the screen controlling devices of the beacon when the light-ship alters its position, these additional rotary movements being determined in accordance with the factors represented in Figs. 2 and 3. In these figures 1 is the circular path that the ship can describe around its moorings, and the ship will occupy a position 2 in a north wind or current flowing from north to south, and a position 3 in a south wind or a current flowing from a southerly direction. 6 is a middle position of the ship. When the ship is in its middle position the median line W which divides the sector K5, 6, K6 into halves extends due west, and it will be obvious that when the ship is in the position 2 the line W1, which divides the sector into halves, will extend in a more northerly direction, while when the ship is in position 3, the dividing line W2 will extend in a more southerly direction. The desired angle of deviation δ can be calculated, as will be seen from Fig. 3, by the formula tang

$$\delta = \frac{R \cdot \cos \alpha}{D + R \sin \alpha}$$

in which δ is the angle of deviation, D the distance of the center of the circular path that may be described by the ship around

its anchor from the passage between the two shores, R the distance between the beacon and the said center, and α the angle given by the compass card between the course of the ship and the meridian.

An additional rotary movement of the kind described may, however, as pointed out in the German Patent 302517, be accomplished by arranging the screening devices on a platform that is not directly turned in the opposite direction to that of rotation of the ship by the gyro compass, but by means of an oppositely turned part rotated through a proper angle in connection with an excentric coupling with appropriately dimensioned parts. The compass card is combined with the revoluble platform which carries the screening device in such a manner that the axes of rotation are excentric to each other and the connection is obtained by a coupling pin. By this means the illuminated sector is at all times automatically turned in such a direction that it indicates the entire breadth of the passage irrespective of the direction into which the light-ship itself may have been turned and of the amount of its displacement by wind or currents.

An arrangement of this kind is shown in Fig. 5. The rotary column 11 on which is mounted the beacon or the screening device comprising the sectors 12 and 12', which allows a certain pencil or pencils of light to be emitted, is not supported directly by the platform 10 as in Fig. 4, but upon a disk 22 which rotates around a different center from that of the disk 23 mounted on the platform 10. The two excentric disks 22, 23 are coupled by a pin 24 which engages with a slot 25 in the disk 22 in which the pin 24 can reciprocate. The disk 23 is provided with gear teeth 26 and is rotated by means of a spur gear 27 with the aid of a synchronous motor 14 controlled by a gyro compass arrangement in a manner similar to that shown in Fig. 4.

I claim—

1. In combination with a movable anchored light ship, a light projector for sending out rays of light and means for directing the projector so that the median line thereof constantly points toward a single

point irrespective of the position of the ship with respect to its anchor.

2. In combination with a movable, anchored light-ship that rotates around its vertical axis and shifts from point to point of a circle around its anchor, a rotary platform adapted to rotate around a vertical axis, a light projector for sending out sectors of rays of different characters mounted on the said platform, a compass-controlled turning gear for turning the platform in accordance with the rotation of the light-ship around its vertical axis, and means for imparting an additional rotary movement to the platform to allow for the shifting of the light-ship from one point to another, whereby the median line of the sectors of rays is always directed toward a single point and the sectors are caused to keep a channel between two definite points illuminated continuously.

3. In combination with a movable, anchored light-ship that rotates around its vertical axis and shifts from point to point of a circle around its anchor, a rotary platform adapted to rotate around a vertical axis, a light projector for sending out sectors of rays of different characters mounted on the said platform, a compass-controlled turning gear for turning the platform in accordance with the rotation of the light-ship around its vertical axis, and means for imparting an additional rotary movement to the platform to allow for the shifting of the light-ship from one point to another, whereby the median line of the sectors of rays is always directed toward a single point and the sectors are caused to keep a channel between two definite points illuminated continuously, the said means comprising two disks adapted to revolve around excentric vertical axes, and a pin-and-slot connection between the two disks.

In witness whereof I have hereunto signed my name this 12th day of May, 1922, in the presence of two subscribing witnesses.

MAX SCHULER.

Witnesses:

ERUA KASPAREK,

OTTO GRICKSBERG, Jr.