

UNITED STATES PATENT OFFICE

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OSCILLATION GENERATION APPARATUS

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My invention pertains in general to oscillation generation apparatus, and specifically relates to oscillation generation apparatus in which means are provided for interrupting a light beam incident upon a photoelectric cell.

It is well known in the art to interrupt a light beam incident upon a photoelectric cell to produce oscillatory currents in the photoelectric cell output. Such a system is commonly employed in television transmitters to produce carrier impulses to be modulated in accordance with photo-intensities of an image. Such an arrangement is known as a light "chopper" which usually comprises a disk having an annular series of apertures and which is rotated at a constant speed to interrupt a light beam incident upon a photoelectric cell.

One of the objects of my invention consists in providing oscillation generation apparatus in which the frequency of an oscillatory current produced in a photoelectric cell by a rotating aperture disk can be multiplied by simple and effective mechanical means.

Another object consists in providing oscillation generation apparatus having two rotatable aperture disks interposed in juxtaposition between a light source and a photoelectric cell whereby a selected one of a plurality of predetermined frequencies can be produced.

I accomplish the above desirable objects in a novel oscillation generation apparatus in which a disk having a plurality of different groups of apertures can be positioned to render any one of the different aperture groups effective to multiply the frequency of a beam of light intercepted at a constant frequency by a rotating aperture disk.

In the drawing which accompanies and forms a part of this specification and in which like reference numerals designate corresponding parts throughout:

Fig. 1 is a side elevation of one embodiment of the oscillation generation apparatus of my invention;

Fig. 2 is a rear elevation of the embodiment of Fig. 1;

Fig. 3 is a front elevation of the embodiment of Fig. 1;

Fig. 4 is a fragmentary view of an aperture disk employed in my invention; and

Fig. 5 is a fragmentary view of another aperture disk employed in my invention.

Referring to the drawing in detail, and particularly to Fig. 1, a motor 1 is mounted on a base member 3 by means of standards 2. An aperture disk 4 is mounted upon the armature shaft 5 of the motor 1. Referring to Fig. 2, it will be seen that the disk 4 is provided with an annular series of evenly spaced apertures 6. The disk 4 is composed of an opaque material, while the apertures 6 are adapted to transmit a beam of light in accordance with the shape of apertures.

Referring again to Fig. 1, another aperture disk 7 is mounted upon a shaft 8 in juxtaposition to the disk 4. The shaft 8 is rotatably mounted in a bearing member 9 which forms an integral part of a supporting member 10 which is secured to the base member 3. An indicating dial 11 is rigidly mounted on the shaft 8, as shown, and is adapted to rotate with reference to an index 12 mounted upon the supporting member 10.

Referring to Fig. 3, it will be seen that the disk 7 is provided with apertures 13. The disk 7 is composed of an opaque material, while the apertures 13 are adapted to transmit a beam of light in accordance with the shape of the apertures. The apertures 13 are arranged, as shown, in several different groups, each group of which has a different number of evenly spaced apertures. In the present embodiment of my invention I provide six groups of apertures in the disk 7, the first group of which comprises two apertures, the next group three apertures, and so on up to the sixth group comprising seven apertures. The apertures in each of the groups in the disk 7 are spaced in a manner such as to divide, into equal parts, an arcuate distance substantially equal to the arcuate distance between any two of the apertures 6 in the disk 4. Figs. 4 and 5 illustrate this relation. The five apertures 13 comprising the group of apertures shown in Fig. 5 are spaced so as to divide the arcuate distance between the apertures 6 of Fig. 4 into five equal parts. To accomplish this, the distance "p" be-

tween the extreme apertures 13 in Fig. 5 is made equal to four-fifths of the distance between the apertures 6 in Fig. 4. It is to be understood that the number of apertures shown in the disk 4, as well as the number of groups of apertures in Fig. 3, is purely arbitrary and that various arrangements can be employed without departing from the intended scope of my invention.

Referring to Fig. 1, an incandescent lamp 14 is positioned within a housing 15 mounted upon a base member 3. The housing 15 is provided with a pair of condensing, or short focus, lenses in front of the lamp 14. The condensing lenses 16 orient the light rays from the lamp 14 to a direct beam of light through a lens 17 in the extreme end of the housing 15. The light beam oriented by the condensing lenses 16 is projected by lens 17 along a path extending through the disk 4 and 7 to a lens 18 mounted in another housing 19. A photoelectric cell 20 is provided within the housing 19 in a manner such that the cathode of the photoelectric cell 20 is positioned substantially at the focal point of the lens 18. A battery 21 is provided as a source of current for the lamp 14 under control of a switch 22. The output from the photoelectric cell 20 is directed to an amplifier 23 and thence through inductance 24 to a work circuit 25. The amplifier 23 may be of any conventional type, adapted to amplify photoelectric currents, such as a resistance-coupled multi-stage thermionic amplifier.

When it is desired to produce an oscillatory current in the work circuit 25 the motor 1 is rotated at a substantially constant frequency so that the disk 4 rotates in the path of the beam of light projected from the housing 15 to the housing 19. Since the apertures 6 in the disk 4 are evenly spaced, the light beam falling upon the cathode of the photoelectric cell 20 will be interrupted at a substantially constant frequency. When it is desired to obtain an oscillatory current twice that produced by the normal rotation of the disk 4, the disk 7 is rotated by means of the dial 11 into a position indicated by the letter "A" on the dial 11 where two apertures 13 will be interposed between the housings 15 and 20. When it is desired to further multiply the frequency of the interruption produced by disk 4, the disk 7 is moved, by means of the dial 11, into a position such that one of the other multiple groups of apertures 13 is positioned between the housing 15 and 20, for example, when a group of three apertures 13 is positioned between the housings 15 and 20 the frequency will be tripled. The multiplication factor for the frequency produced by the disk 4 is dependent upon the number of apertures in the group of apertures, in the disk 7, which is positioned between the housings 15 and 20.

It will now be evident that the oscillating generation apparatus of my invention provides a novel system for producing one of a selective number of predetermined frequencies by interrupting a light beam incident upon a photoelectric cell. It will be obvious that, whereas in the usual light "chopper" the frequency can be varied only by adjustment of the speed of the driving motor, which is an unsatisfactory procedure, in my system the speed of the motor is maintained constant and the frequency multiplied by simple and conveniently operated mechanical means. Although I have shown a preferred embodiment of my oscillation generation apparatus, it is of course to be understood that changes can be made therein without departing from the intended scope of my invention. I do not, therefore, desire to limit myself to the foregoing except insofar as may be pointed out in the appended claims.

What I claim as new and original and desire to secure by Letters Patent of the United States is:

1. Oscillation generation apparatus comprising, a source of light rays, photosensitive means under control of said light rays, mechanical means for interrupting said light rays at a definite predetermined frequency, other mechanical means for interrupting said light rays at any one of several predetermined discrete frequencies, and manually operated mechanical means for rendering only a selected one of said last mentioned frequencies effective.

2. Oscillation generation apparatus comprising, a source of light rays, photosensitive means under control of said light rays, a screen interposed between said light source and said photosensitive means and having disposed therein in a single row a plurality of evenly spaced apertures, means for moving said screen to interrupt said light rays at a substantially constant frequency, a second screen in juxtaposition to said first mentioned screen and having disposed therein in a single row a plurality of groups of apertures, each of said groups having a different number of apertures, and manually operated mechanical means for moving said second screen.

3. Oscillation generation apparatus comprising, a source of light rays, a photoelectric cell under control of said light rays, a disk interposed between said source of light rays and said photoelectric cell, said disk having annularly disposed therein a plurality of evenly spaced apertures; means for moving said disk to interrupt said light rays at a substantially constant frequency, a second disk in juxtaposition to said first mentioned disk and having a plurality of groups of apertures, each of said groups having a different number of apertures, and manually

operated means for selectively rendering any one of said groups of apertures effective to further interrupt the light emerging from said first mentioned disk and incident upon said photoelectric cell.

5 4. Oscillation generation apparatus comprising, a source of light rays, a photoelectric cell under control of said light rays, a disk interposed between said source of light
10 rays and said photoelectric cell and having an annular series of evenly spaced apertures, a second disk in juxtaposition to said first mentioned disk and having an annular series of groups of evenly spaced apertures,
15 each of said groups having a different number of apertures, means for rotating said first mentioned disk at a substantially constant speed, and means for rotating said second disk to selectively expose any one of
20 said groups of apertures to said light rays.

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