

July 25, 1939.

R. E. MATHES

2,167,460

FACSIMILE REPRODUCING DEVICE

Filed Feb. 17, 1938

Fig. 1

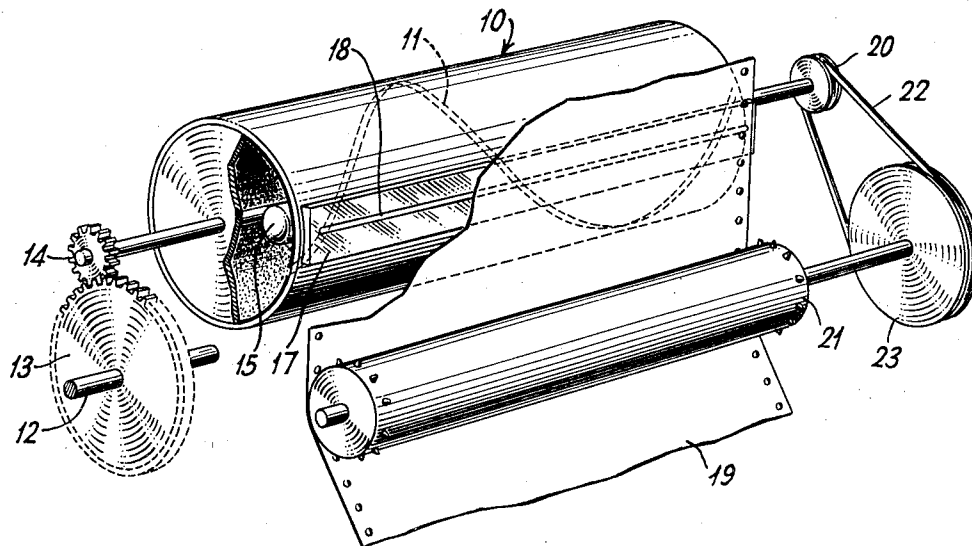
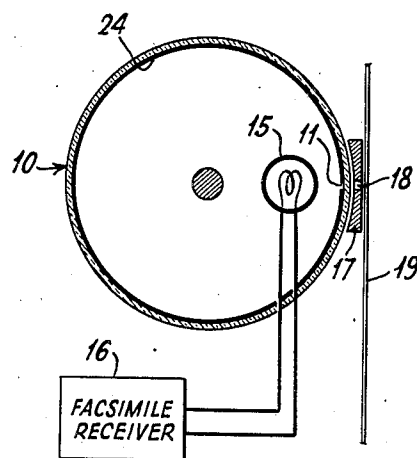


Fig. 2



BY

INVENTOR.
RICHARD E. MATHES
H. B. Soren
ATTORNEY.

UNITED STATES PATENT OFFICE

2,167,460

FACSIMILE REPRODUCING DEVICE

Richard E. Mathes, Westfield, N. J., assignor to
Radio Corporation of America, a corporation
of Delaware

Application February 17, 1938, Serial No. 190,930

3 Claims. (Cl. 178—7.4)

My invention relates broadly to facsimile receiving and reproducing devices, and more particularly to that form of reproducer or recorder known as the optical recorder. Facsimile receivers known in the prior art have heretofore had the disadvantage that they were comparatively slow in their recording speeds, and, as a result, there has been a great demand for high speed facsimile reproducers particularly in the light of desirability of competing with code messages, due to the inherent advantage obtainable by facsimile of providing an actual facsimile copy of what the sender desires to send.

Also in the light of present day newspaper work, it is just as desirable that photographs of important news events be transmitted quickly and accurately as it is that written messages be sent in facsimile. Accordingly, it is an object of my invention to provide a desirable high speed facsimile receiver and reproducer.

In general, my invention consists in providing a pair of optical slots, one of which passes by the other to form an optical opening of elemental area which passes transversely of the recording medium. Back of these slots is placed an elongated glow tube (neon, argon, mercury, xenon, helium, or the like) or, as has been used here, what is commonly called a stroboscopic tube. The light output of this tube may be modulated in accordance with variations in the input signals, or, where desired, the glow tube or other light source may be keyed in known manner. One of the optical slots has been formed in the surface of a cylindrical member and has been helically (spirally) shaped. The other optical slot has been formed in a stationary member mounted immediately adjacent the cylindrical member. With this arrangement the cylindrical member is arranged to rotate rapidly with respect to the stationary slot so that an optical opening moves transversely along the stationary slot. The recording medium, for instance, may be a photographic paper or film, and moves upwardly one line each time the optical opening passes transversely across the entire width of the recording medium. The passage of the paper, naturally, is synchronized with the movement of the cylindrical drum on which is formed the helical slot of elemental width. Thus a passage of the recording surface bears a definite relationship to the time of completion of each line.

Applicant is aware of the fact that two optical slots have heretofore been used in reconstructing an image or view. Jenkins, Baird, and others used a pair of discs in the face of which was a spirally cut slot, and these discs were placed immediately adjacent each other so that the optical opening formed moved in a direction transverse to the direction in which the picture was totally reconstructed. Back of these two discs

was placed a glow tube. These prior art arrangements have been subject however to severe disadvantages as will herein be pointed out.

A facsimile reproduction is one which is permanent in nature, and, as a result, errors and flaws therein are accentuated to the human eye rather than minimized. With the use of two scanning discs each with a spirally cut slot, the hurried reconstruction of the picture made the errors in reconstruction practically unnoticeable. However, with a plurality of moving parts of this nature, the errors in each are multiplied on the reconstructed picture, and insofar as a permanent record is concerned, such errors are nearly prohibitive from a commercial standpoint.

Again, it would be impossible to draw a recording medium very close to the scanning disc without having the recording medium itself subjected to stresses due either to wind currents or electrostatic attraction in such a fashion that the movement of the paper itself would accentuate and produce errors which would be prohibitive and could not be tolerated in commercial operations.

Further, if the paper were placed sufficiently distant from the scanning disc so as not to be subjected to the forces hereinbefore set out, then there would be so much of a loss of light between the optical opening and the recording medium that either the use of an additional lens system would be necessary or in any event there would be so much light lost that the darker portions of the image would suffer in detail.

In my invention, the recording medium is made to pass immediately adjacent, or arranged to rest directly upon the stationary elongated member in which one of the optical slots is cut. This minimizes loss of light between the slots themselves and the recording medium.

The receiver is arranged to receive either modulated or keyed energy from which the electro-optical signal representations are made upon the recording medium. Transmission methods being largely standard and well known are not herein described in detail.

Other objects and advantages will be apparent from a reading of the following specification, in which

Fig. 1 shows an embodiment thereof, and

Fig. 2 is a schematic cross-section taken transversely the drum.

Referring to Fig. 1, there is shown a cylindrically shaped drum member 10 on the face of which is formed an optical groove 11 of elemental width. This groove is a single turn helix or spiral, and passes down the length of the drum peripherally. The drum itself may be formed in a number of ways. It may be formed of glass which has its surface painted in such a fashion

as to leave unpainted the helically or spirally shaped slot of elemental width. On the other hand, the drum might be made of metallic composition, and the optical slot could be appropriately cut therein. Again, the drum might be made of glass and the optical slot might be formed of quartz, in order that light in the invisible portion of the spectrum may be used to record.

The drum is arranged to be rotated by means of a prime mover (not shown) attached to the shaft 12 to which is fixed a gear 13 which meshes with the driven gear 14, the latter being joined to the shaft of the drum 10. It will be appreciated that this is a matter of detail as to how the drum is driven since the proper gear ratios may be calculated by a designer for any desired speed. Synchronization may be established by any known means and controlled, for example, as shown by Ranger Patent 1,829,420.

Located and mounted inside of the drum 10 is a stroboscopic lamp 15 which is arranged to receive the output energy from a receiver 16. Thus the modulated or keyed electric wave received is transformed into a modulated light, or a keyed light signal, as the case may be.

Immediately adjacent the periphery of the drum 10 is a member 17 which is mounted in a stationary position with respect to the drum, and cut in the member 17 is an optical slot 18 of elemental width.

It will be apparent from the drawing therefore that as the cylinder 10 rotates, the optical slot 11 in its face will pass across the optical slot 18 in a fixed member and progressively form an optical opening of an elemental cross-sectional area between the lamp 15 and the exterior face of the member 17.

The recording medium is drawn past the optical slot 18 at the recording rate, and at a rate bearing a predetermined relationship with respect to the rate of transmission. There has been illustrated one means of feeding the recording medium 19 past the optical opening at a rate which bears a predetermined relationship to the rate of transmission. Since the drum 10 is maintained in synchronism with the transmitter by means of the gear arrangement 13, 14, and well known synchronizing systems, the pulley 20 may be joined to the paper feed drum 21 by means of a belt 22 and the driven pulley 23. It will be appreciated, of course, that this is a simple form of arrangement, and it should be understood that I am not limited to this particular detailed form of recording medium feed, this being shown for the purposes of inventive concept. As the light modulations, or keyings, are produced by lamp 15, the resultant light will expose the recording medium and produce thereupon a latent or optical image of the intelligence.

Referring to Fig. 2, there is shown a schematic arrangement taken on the cross-section through the drum containing the spiral or helix. The drum 10 is clearly shown and on the inner surface thereof there has been indicated a cutting material 24 in which the optical slot may be formed. In one embodiment of my invention, this might be a paint material and the opening might be formed by leaving the glass surface bare of paint in the shape of a single turn helix or spiral. The positioning of the stationary member 17 containing the slot 18 relative to the drum

is clearly shown, and there is brought out more fully the stroboscopic lamp 15. The receiver 16 has been shown schematically since such receivers are well known per se. The position of the recording medium 19 is shown as it is drawn adjacent to or resting upon the stationary member 17.

It will be appreciated, of course, that there are a number of modifications which may be made as, for instance, the lamp 15 might be located outside of the stationary member and the recording material might be passed inside the drum.

Also, the optical slots 11 and 18 might be formed in a number of different ways as has been indicated hereinbefore for use with light in either the visible or invisible portion of the spectrum. Where the lamp 15 produces light in the invisible portion of the spectrum, the drum may be made of any material which is opaque to light in that part of the spectrum. The optical slot may be formed of material which is transparent to light in that portion of the spectrum.

What I claim is:

1. A facsimile reproducer comprising a light sensitive medium, a glass cylindrical member having a spirally shaped optical slot therein formed of quartz, an ultra violet light producing member inside of said cylindrical member adapted to reproduce modulated electric waves as modulated ultra violet light, an elongated stationary member having a linear optical slot of elementary width mounted immediately adjacent said cylindrical member, means for rotating said cylindrical member, and means for passing said recording medium across said stationary member in a direction perpendicular to the optical slot on said stationary member.

2. A facsimile reproducer comprising a light sensitive medium, a glass cylindrical member having a spirally shaped optical slot therein formed of quartz, an ultra violet light producing member comprising an elongated neon tube inside of said cylindrical member adapted to reproduce modulated electric waves as modulated ultra violet light, an elongated stationary member having a linear optical slot of elementary width mounted immediately adjacent said cylindrical member, means for rotating said cylindrical member, and means for passing said recording medium across said stationary member in a direction perpendicular to the optical slot on said stationary member.

3. A facsimile reproducer comprising a light sensitive recording medium, a glass cylinder having an opaque substance deposited on the periphery thereof so as to form an optically transparent spiral strip around the periphery thereof, and ultra violet light producing member positioned inside of said cylindrical member and adapted to reproduce modulated electric waves as modulating ultra violet light, an elongated stationary member having a linear optical slot of elementary width, said member being positioned immediately adjacent said cylindrical member, means for rotating said cylindrical member, and means for passing said recording medium across said stationary member in a direction substantially perpendicular to the optical slot on said stationary member whereby modulations of the ultra violet light producing means are recorded on said light sensitive material.

RICHARD E. MATHES.