April 29, 1969 A. R. HATCH 3,441,928

ROTATING CYLINDER CHARACTER PROJECTION APPARATUS

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FIG. 1

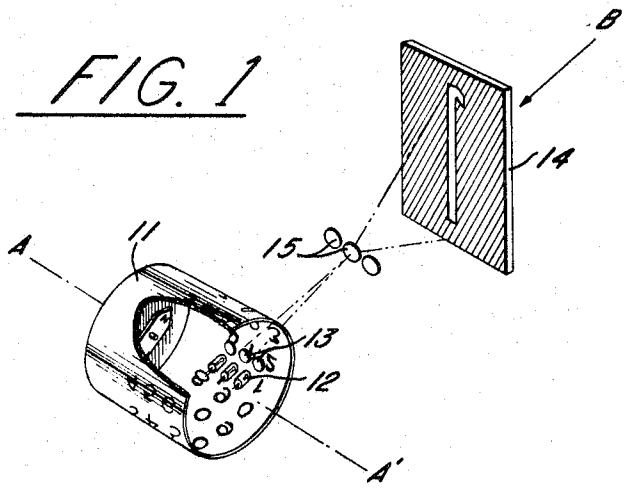
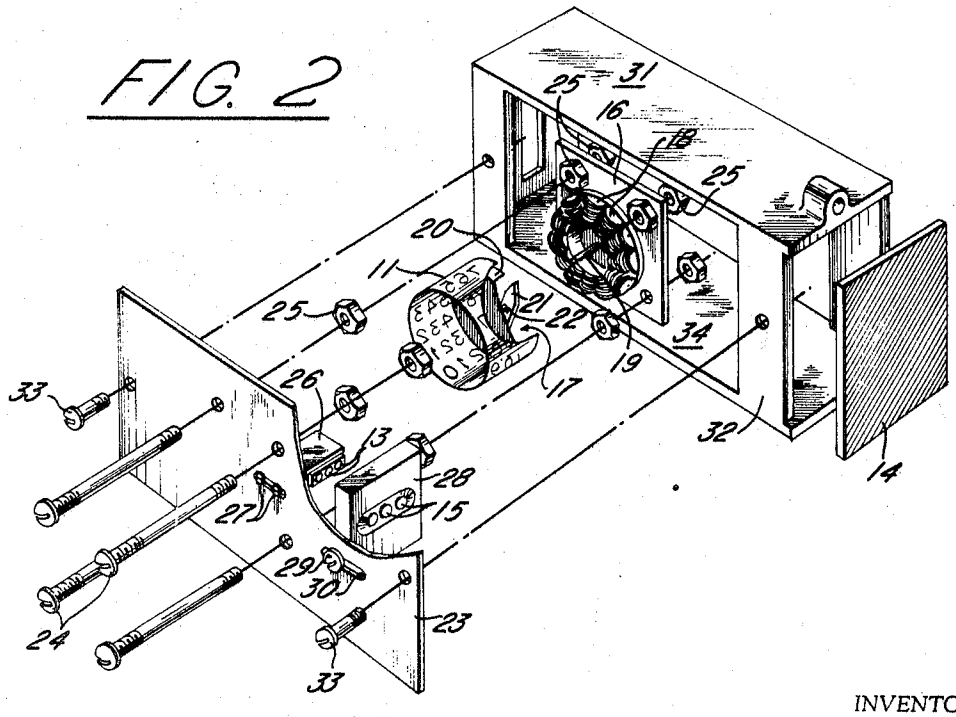


FIG. 2



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ROTATING CYLINDER CHARACTER PROJECTION APPARATUS

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U.S. Cl. 340—378 5 Claims

ABSTRACT OF THE DISCLOSURE

A rear-projection type data readout device having a high capacity of different characters. A film containing numerous particular indicia or characters is arranged in the shape of a cylinder and rotatably mounted along its central axis. The characters on the film are circumferentially arranged in a plurality of rows. Associated with each row is a light source which when energized will project a particular character on the film to a ground glass plate for readout. The film cylinder is angularly positionable by means of an electromagnetic device. Any character on the film can therefore be displayed on the ground glass by selectively energizing the proper light source and rotating the film cylinder to a particular angular position.

Background of the invention

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to a multiple-character rear-projection data indicator and more particularly to such a data indicator wherein any one of a predetermined number of characters can be displayed on a ground glass by selective energization of the device.

Readout and display devices are of great importance, presently, in connection with the ever-expanding field of data processing. Such devices translate electrical signals into visual displays which a human operator may readily perceive. Readout devices which are small in overall size and readily mountable on the operating panels of various data processing equipment are particularly useful. A prime consideration in the design of such panel mounted type of readouts is their character capacity. Ideally, it is desirable for a particular readout to be able to display as many different characters as possible.

Most available panel type readouts, however, are severly limited in their character capacity by physical space considerations. A typical example of such a readout device is shown in U.S. Patent No. 3,201,785 issued Aug. 17, 1965 to Knotowicz. The character capacity of the Knotowicz device is limited to the number of discrete angular positions which a cylinder on which the characters are printed can occupy. The device shown in the Knotowicz patent has a capacity of ten different characters. It is desirable to provide such a device with a much greater character capacity.

An object of this invention, therefore, is to provide a data readout device having a high character capacity.

A further object of this invention is to provide a panel-mounted type data readout which is capable of displaying any one of a substantial plurality of different characters.

Summary of the invention

The above and other objects of this invention are achieved by providing a character readout device with a cylindrically formed sheet of film on which a plurality of rows of circumferentially disposed indicia are contained. A plurality of light sources, equal in number to the number of rows of indicia, are mounted within the cylinder of film. Associated with the film cylinder is an electromagnetic positioning arrangement which is adapted to rotate the cylinder to a predetermined angular position in response to an electrical signal. By selectively energizing one of the light sources and a particular angular position of the film cylinder, a predetermined one of the indicia may be projected to a suitable light diffusing plate forming the front panel of the readout device.

The above and further objects and features of this invention will be better understood from the following detailed description and drawings wherein:

FIG. 1 is a diagram of the optical features of this invention.

FIG. 2 is an exploded view of the typical structure of a device constructed in accordance with the principals of this invention.

Description of the preferred embodiment

It should be noted that throughout the specification and drawings like numerals have been used to indicate like parts in the two figures. Referring now to FIG. 1, the general scheme of the invention can best be understood.

A drum or cylinder **11** is rotatably mounted along its central axis AA'. The details of the mounting structure will be described in relation to FIG. 2 and need not be considered at this time. The cylinder **11** preferably comprises a rolled sheet of transparent film on which a plurality of axially spaced rows of indicia are arranged. The indicia may be Arabic numerals as shown, letters, or any desired symbols. The particular manner of placing the indicia on the film is not important and could be done, for example, by a photographic process, printing, etc. In the example of FIG. 1, three rows of numerals are shown, however, it should be understood that a greater or lesser number of rows could be utilized depending on the particular requirements of the display device. The particular indicia in each row are circumferentially equally spaced and each row in turn is in a plane parallel to the other rows and spaced therefrom along axis AA'.

Within the cylinder **11** are located a plurality of light sources such as **12**. The number of light sources is equal to the number of rows of indicia and consequently in the example shown in FIG. 1 three light sources **12** are shown. Each light source is aligned to cooperate with a particular one of the rows of indicia. Also within the cylinder are located a plurality of condensing lenses such as **13** for concentrating light from the sources **12** on to the film. The number of lenses **13** is equal to the number of rows of indicia on the film and each lense is arranged to be in alignment with a particular light source and row of indicia.

External to the film cylinder is located a light diffusing plate **14** aligned to receive images from the projected indicia on the film. The plate or screen **14** may typically be of a material commonly referred to as ground glass.

Between the screen or plate **14** and the film cylinder **11**, a plurality of objective lenses such as **15** are arranged. The number of lenses **15** is equal to the number of rows of indicia and each is arranged to focus indicia from its associated row onto the screen **14**.

It can therefore be noted by viewing from a direction indicated by arrow B the viewer will see a particular one of the indicia or characters on film **11** depending on the angular position of the film cylinder **11** and the particular light source which is energized.

Referring now to FIG. 2, the mechanical structure of the invention will be better described. As noted above, means are provided for positioning the film cylinder **11** to discrete ones of a plurality of angular positions. The positioning means is of the electromagnetic type and can be, for example, the arrangement disclosed in the

Knotowicz patent previously referred to. It comprises a stator portion **16** and a rotor **17**. The stator **16** comprises a plurality of electromagnets such as **18** disposed in a circumferential manner about a centrally located shaft **19**. Each of the electromagnets **18** is arranged to be separately energized by an electrical signal.

The stator portion **17** comprises a drum **20** with a permanent magnet **21** rigidly mounted therein. In the embodiment shown the magnet is mounted on a short section of tube **22** which has an inside diameter chosen to cooperate with the diameter of shaft **19**. Shaft **22** is also rigidly attached to the center of drum **20**. Drum **20** is bonded to one end of the film cylinder **11** whereby rotation of the drum will result in rotation of the film cylinder. By sliding tube **22** over shaft **19** and providing a suitable retaining ring on the end of shaft **19** the rotor portion is free to rotate within the stator. Furthermore, magnet **21** is rotated within the plane of the magnetic fields of electromagnets **18**. Consequently, energization of a particular electromagnet **18** will cause permanent manget **21** to align itself with the resultant magnetic field. It can therefore be noted that by proper selection of a particular electromagnet **18**, film cylinder **11** may be rotated to a desired angular position.

The internal rotating drum structure described is attached to a rigid plate **23** by screws such as **24** and nuts **25**. Screws **24** are of sufficient length to permit the spacing of stator portion **16** from rigid plate **23** to be sufficient to permit drum **11** to fit therein. Screws **24** can be threaded along their entire length so that with three nuts such as **25** on each screw **24** the stator **16** will be rigidly spaced from the plate **23**. The particular mounting details in this respect should be understood merely to be exemplary and any manner of rigidly spacing stator **16** from plate **23** would be suitable.

The condensing lenses **13** are mounted on a supporting block **26**. Block **26** is provided with a plurality of holes bored through it and each such hole accommodates a particular one of the light sources within it. Block **26** is attached to plate **23** with screws **27** and is slidable to permit optical focusing. When assembled, the entire block **26** is contained within the film cylinder **11**. A second mounting block **28** contains the objective lenses **15** and is similarly mounted to plate **23** by screw **29**. The exact positioning of the block **28** and consequently the lenses **15** is variable within the slot **30** in the plate **23** to permit focusing. When assembled, block **28** and consequently the objective lenses **15**, is located outside of the cylinder **11** as described in relation to FIG. 1.

The entire structure is contained within an enclosure **31** having a sufficient opening in one of its sides **32** to permit receipt of the rotating drum, etc. Plate **23** is secured to the enclosure **31** with screws **33**.

Enclosure **31** is arranged to permit its mounting in the panel of equipment wherein it is to be used. The open end **34** of the enclosure **31** is adapted to receive the ground glass screen **4** whereon the indicia are to be projected.

By energizing a particular electromagnet **18** and a particular one of the light sources an image will be presented on screen **14**. The capacity of a readout device of this invention is only limited by the number of discrete angular positions achievable and the number of rows of indicia which can be arranged on the film **11**. Typically, it has been found that in the same volume where other types of readouts yields a character capacity of **12**, use of the present invention permits a character capacity on the order of **70**.

It is therefore readily apparent that this invention provides a new and useful manner of displaying any one of a substantial plurality of different characters while requiring only a minimum physical volume.

What is claimed is:

1. Indicating apparatus for displaying desired ones of a predetermined plurality of characters comprising:

a sheet of film formed in the shape of a cylinder and having a plurality of axially-spaced rows of indicia arranged in equipspaced circumferential relationship about the cylinder,

said indicia representing said predetermined plurality of characters,

said cylinder being arranged to be rotatable about its central axis,

a plurality of light sources equal in number to said plurality of rows of indicia and disposed within said cylinder,

each light source being associated with a respective one of said rows,

a light diffusing plate spaced from said film cylinder and aligned to display a projected image from said film when one of said light sources is energized,

electromagnetic positioning means connected to said film cylinder and arranged to selectively rotate said cylinder about its central axis to any one of a plurality of discrete angular positions,

whereby selective energization of a particular one of said light sources and said positioning means causes said light sourec to project one of said indicia on said film to said light diffusing plate where said indicia may be visually observed.

2. The apparatus of claim **1** further including a plurality, equal in number to said number of light sources of pairs of lenses, one of each of said pairs being disposed between said film and a respective one of said light sources with the other being disposed between said film and said plate,

said lenses being aligned so that indicia projected from said film are focused on said plate.

3. The apparatus of claim **2** wherein said light diffusing plate comprises a ground glass.

4. The apparatus of claim **3** further including:

an enclosure arranged to contain said film cylinder, positioning means, light sources and lenses and being open at one of its ends,

said ground glass plate being mounted in said open end.

5. The apparatus of claim **3** wherein said electromagnetic positioning means comprising:

a stator portion comprising a plurality of electromagnetic coils radially disposed about said central axis of said cylinder,

a rotor portion comprising a permanent magnet rotably supported at its center about said cylinder's central axis,

said rotor being rigidly attached to said cylinder whereby rotation of said magnet causes rotation of said cylinder,

said rotor and said stator portions being adjacent to each other whereby energization of one of said electromagnetic coils causes said permanent magnet to align itself with the resultant magnetic field and said cylinder accordingly rotates.

References Cited

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U.S. Cl. X.R.

340—325