United States Patent

[11] 3,626,159

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[45] Patented **Dec. 7, 1971**

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[54] **HOLDDOWN DEVICE FOR ENCODED MEMBER READER**
5 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** ..... **235/61.11 R,** 226/35
[51] **Int. Cl.** **B65h 23/16,** G06k 7/00, G06k 21/00
[50] **Field of Search** ..... 235/61.11, 61.11 A–61.11 E, 61.1, 61.6 N; 226/37, 35

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ABSTRACT: An encoded card reader is disclosed which includes a chamber for receiving an encoded card to be scanned by a reading mechanism, and a holddown mechanism including resiliently compressible rollers movable between a first position wherein the peripheral surfaces of the rollers facing the encoded card are shaped to permit insertion of the encoded card past the rollers, and solenoid means for rotating the rollers into a second position wherein other peripheral portions of the rollers resiliently engage and urge the card into a desired predetermined position for scanning.

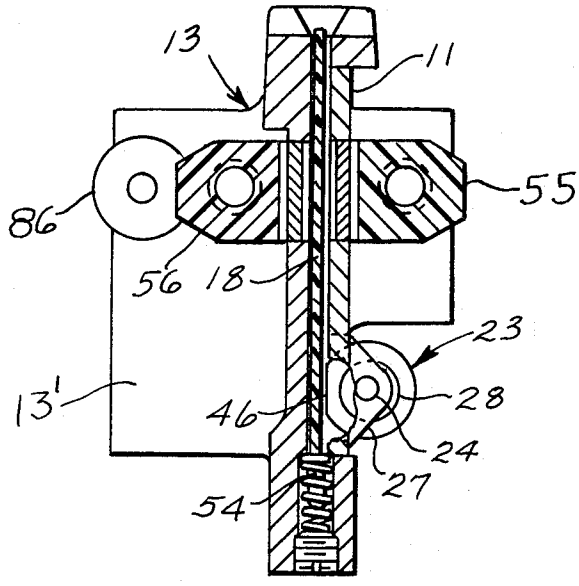
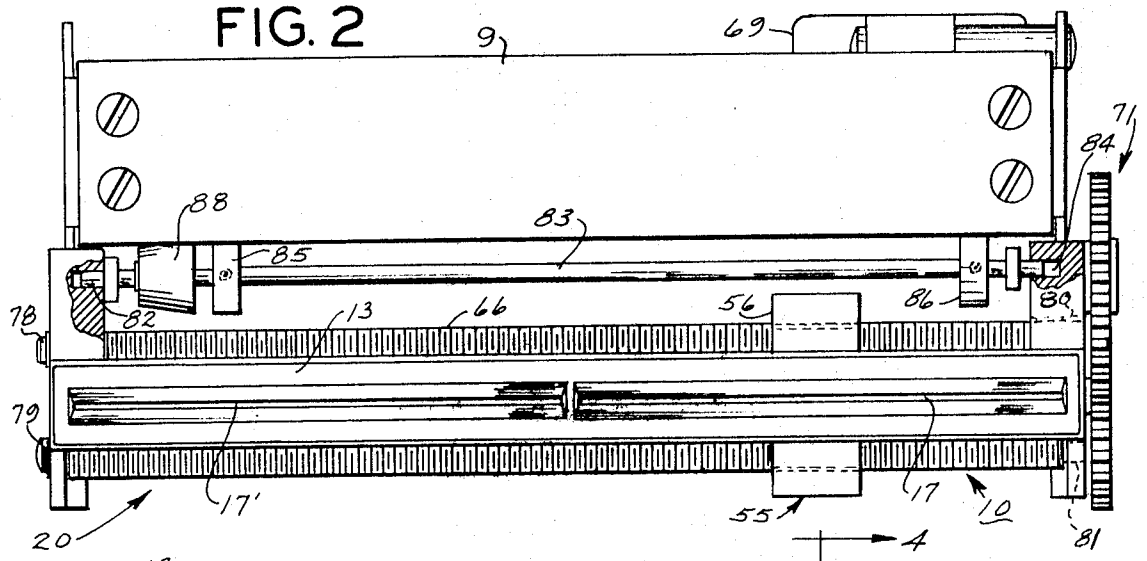


FIG. 2



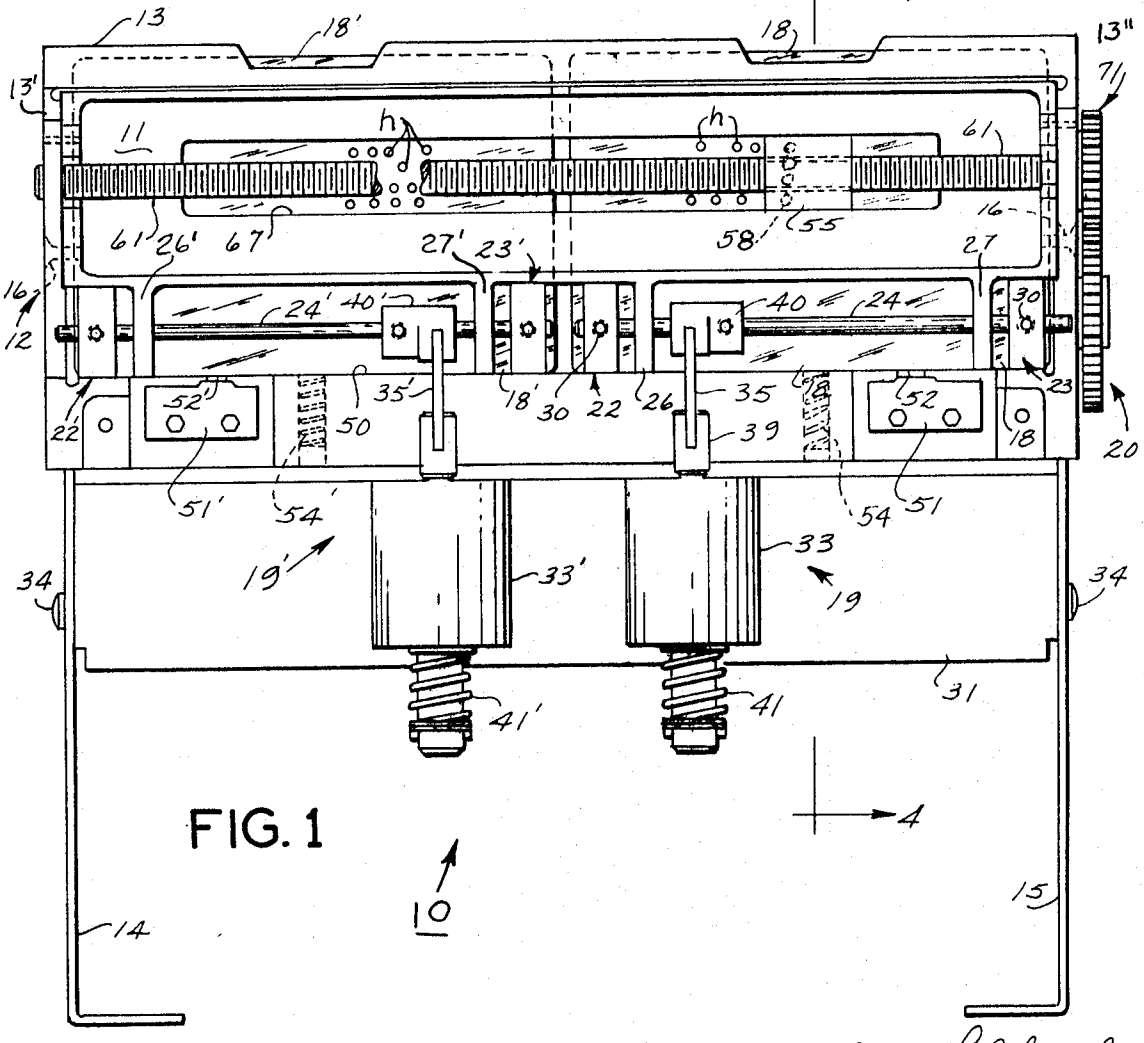


FIG. 1

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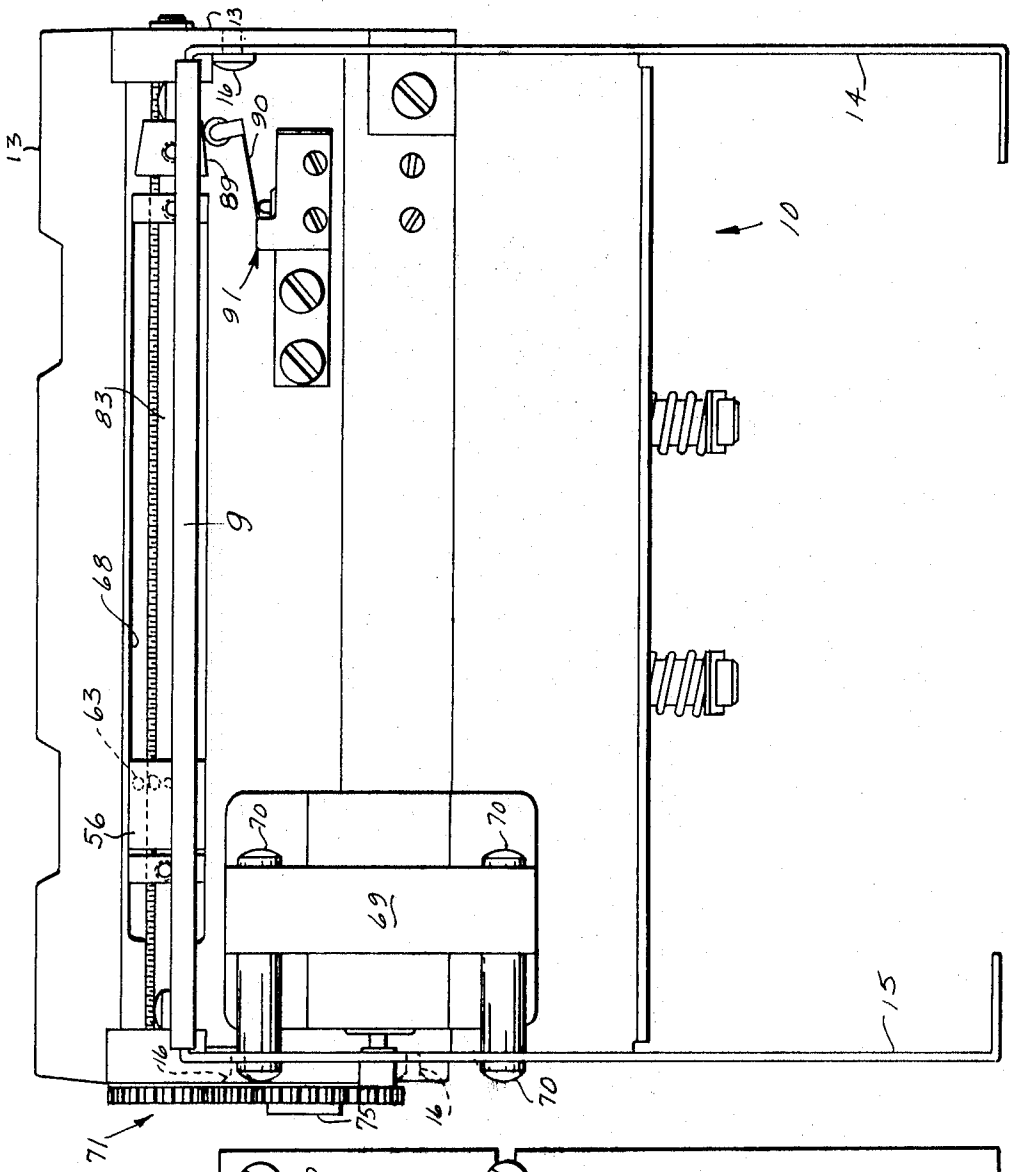


FIG. 5

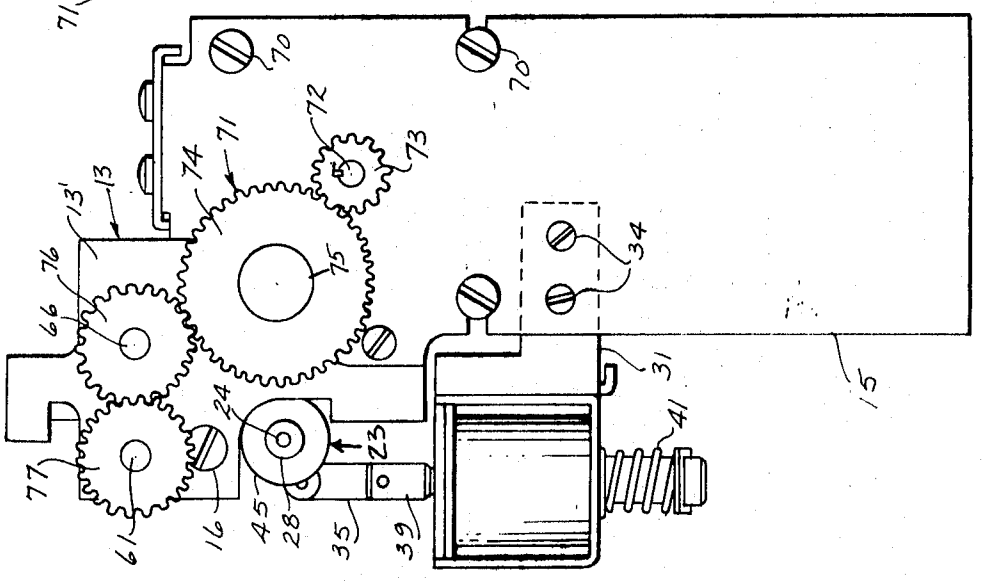


FIG. 3

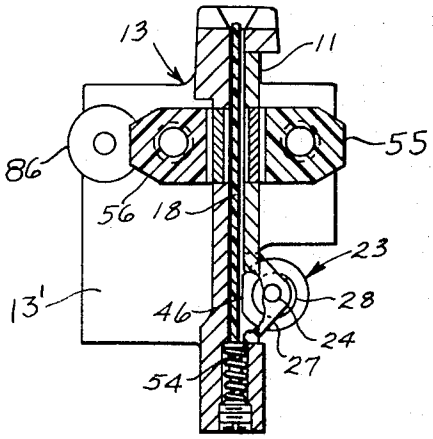


FIG. 4

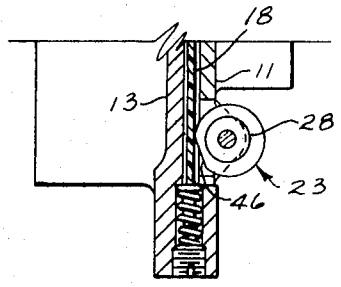


FIG. 8

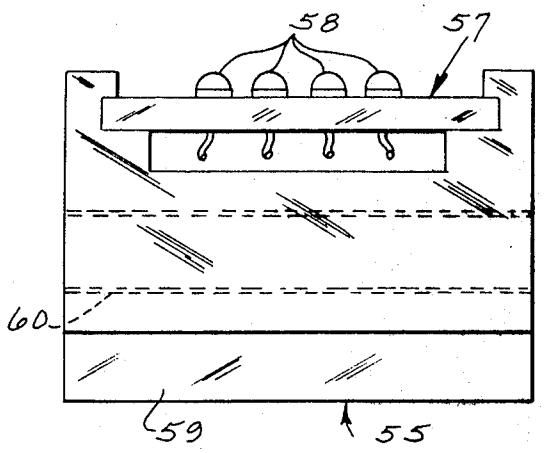


FIG. 6

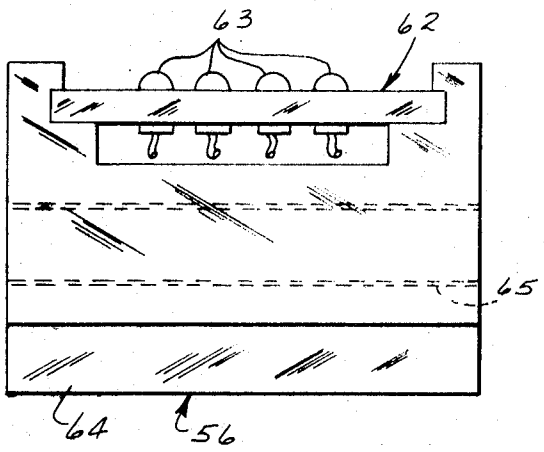


FIG. 7

FIG. 9

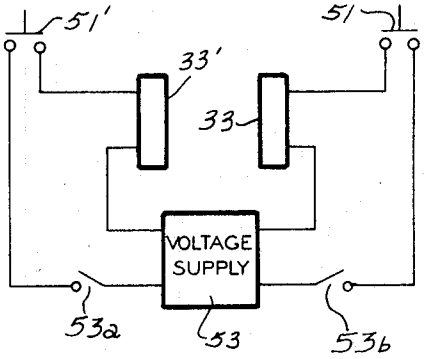
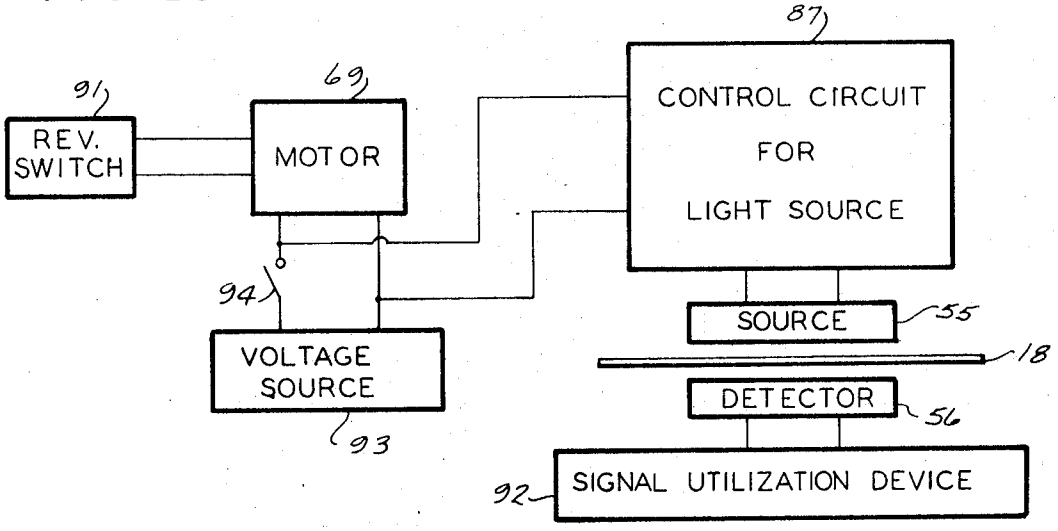

51'
51
33'
33
VOLTAGE SUPPLY
53a
53
53b

FIG. 10


87
91
69
REV. SWITCH
MOTOR
CONTROL CIRCUIT FOR LIGHT SOURCE
94
SOURCE
55
18
VOLTAGE SOURCE
93
DETECTOR
56
92
SIGNAL UTILIZATION DEVICE

HOLDDOWN DEVICE FOR ENCODED MEMBER READER

BACKGROUND OF THE INVENTION

This invention relates to encoded member reading devices and more particularly to means for positioning an encoded member in a reading device.

Generally, in encoded card reading devices, such as those of the type wherein cards are provided with indicia in the form of a pattern of holes, it is, of course, necessary to position the card to be read accurately in order to obtain an accurate reading of the indicia. This is especially true where the card reading means is of the type utilizing a light energy source and light-responsive means for indicia detection purposes because of light dispersion effects. It was necessary in some prior art devices to employ relatively complicated and expensive mechanisms for accurately locating an encoded card and to ensure accurate repetitive operations of the mechanism.

SUMMARY OF THE INVENTION

Accordingly, it is a general object of the present invention to provide an improved mechanism for accurately locating an encoded member in an encoded card reading device.

In accordance with one aspect of the present invention means for locating an encoded member is provided which includes a holder, roller means including a compressible peripheral member with an irregular configuration that is movable between a first position that permits the encoded member to be moved into the holder, and a second position wherein a portion of the peripheral member is rotatable into engagement with the encoded member to urge it resiliently into a desired position in the holder. Other objects and features will be apparent from the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of an encoded member reader in accordance with the present invention.

FIG. 2 is a top view of the reader of FIG. 1,

FIG. 3 is a right end view of the reader of FIG. 1,

FIG. 4 is a sectional view taken along the line 4–4 of FIG. 1,

FIG. 5 is a right side view of the reader as viewed in FIG. 3,

FIG. 6 is an enlarged top view of the radiant energy source of FIG. 1,

FIG. 7 is an enlarged top view of the detector shown in FIG. 5,

FIG. 8 is a fragmentary view similar to FIG. 4, but with parts broken and with the holddown wheel shown rotated, and

FIG. 9 is a schematic diagram of the electrical control for the holddown mechanism of the reader of FIG. 1, and

FIG. 10 is a schematic diagram of the electrical control for the reading mechanism of the reader of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and more particularly to FIGS. 1–5, an encoded member reader **10** is shown including a housing or frame **12** having a pair of opposed housing portions or sides **11** and **13** connected together and to a pair of opposed end supports or plates **14** and **15** by a plurality of screws **16**. As seen in FIGS. **2** and **5**, a support or brace **9** is connected between plates **14** and **15**. The sides **11** and **13** provide chambers or slots **17** and **17'** adapted to receive a pair of encoded members or cards **18** and **18'** (FIG. 1) such as credit cards, identification cards, or the like. The reader **10** includes a pair of like card holddown mechanisms, indicated generally at **19** and **19'**, and an indicia reading or code detection mechanism, indicated generally at **20**.

The holddown mechanism **19** includes a pair of axially spaced wheel members or rollers **22** and **23** mounted on a shaft **24** which is supported for rotation in bearing support members **26** and **27** that are shown integral with housing side **11**. The rollers **22** and **23** each include a hub **28** secured to shaft **24** by fastening means shown as setscrews **30** in FIG. 1; only hub **28** of roller **23** is shown in the drawings (FIG. 3, 4 and 8). The shaft **24** is driven by a solenoid **33** through a link **35**. The solenoid **33** is connected to a mounting plate **31** that, in turn, is connected between end supports **14** and **15** by screws **34**. The link **35** is pivotally connected at one end to a solenoid armature **39** and at the other end to a collar **40** that is fixedly connected to the shaft **24** such as by a setscrew or the like to thereby effect concerted rotation of collar **40** and shaft **24**. A solenoid bias spring **41** biases the rollers **22** and **23** through the link **35** to the "open" position, i.e., a position in which an encoded card **18** can be freely inserted past the rollers **22** and **23**. Each of the rollers **22** and **23** includes a resilient peripheral member or tire **45** formed, for example, of a suitable rubber, such as of the neoprene or buna "N" type, and which may have, for example, a durometer reading of **50**. Each tire has a chordal surface or flat portion, such as indicated in FIGS. **4** and **8** at **46**, which permits complete insertion of a card **18** when the flat surface **46** is parallel to housing sides **11** and **13** and internal walls thereof, and the plane of card **18**. When the solenoid **33** is energized after a card **18** is disposed in the slot **17**, the arcuate portion of the tires **45** engages and urges the card downwardly against a bottom wall **50** (FIG. 1) of the housing side **13**, which wall forms the bottom of the slot **17**.

The holddown mechanism **19'** is shown for illustration as being identical to the above-described mechanism **19** in construction and operation, except that it cooperates with the encoded card **18'**, and corresponding parts are identified by like numerals but with prime marks associated therewith. In view of this, the description of the parts of only the holddown mechanism **19** is deemed necessary.

The holddown mechanism **19** is actuated by a switch **51** mounted to the housing **12** adjacent to the wall **50**, such as by means of screws. As seen in FIG. 1, switch **51** is shown as a pushbutton switch having an actuating button **52** which is engaged by the bottom edge of card **18** when inserted into slot **17**. Similarly, a switch **50'** having an actuating button **52'** adapted to be engaged by a card **18'** is connected to operate holddown mechanism **19'**. FIG. **9** shows a circuit diagram, for purpose of illustration, in which a voltage supply source **53** is connected to energize the solenoids **33** and **33'** upon the closing of switches **51** and **51'** when manual switches **53***a* and **53***b* are closed.

As seen in FIG. **4**, housing side **13** is provided with an opening which receives a spring **54** that is engaged and compressed by the card **18** when the card is inserted into slot **17** and when the holddown mechanism **19** is operated. Spring **54** urges the card upwardly when the holddown mechanism is deenergized to release the card and permit easy manual retraction thereof. A spring **54'** for card **18'** is shown in phantom in FIG. **1**. Housing side **13** also includes opposed integral end flanges **13'** and **13''** parallel to each.

The reading mechanism **20** is adapted to "read" or convert the code on both of the cards **18** and **18'** into electrical signals, such as digital signals which contain information corresponding to the indicia on the cards. Each of the cards **18** and **18'** will be assumed to have a code or indicia consisting of a predetermined pattern of marks or holes *h* (FIG. 1). Such holes or indicia may be thin areas or other areas which readily transmit the radiant energy of source **55**, at least more readily than other areas of the card. The cards **18** and **18'** may be a suitable plastic material, such as a plurality of plastic layers with the indicia such as holes in one or all layers of the card.

Mechanism **20** is shown including a source **55** of radiant energy and a detector or sensor **56** responsive to the radiant energy of source **55**, mounted for movement on opposite sides of the housing **12**. While various types of radiant energy sources can be used, the source **55**, also seen in FIG. **6**, is shown for illustration as including a diode light source member **57** secured in a slot of a support member **59** and having four spaced individual sources **58**. Diode light source elements **58** are well known and commercially available. For ex-

ample, one type is a gallium arsenide diode producing a noncoherent light in the infrared or near infrared portion of the light spectrum. The support **59** may be made of any suitable material, for example, of a suitable plastic material. Support **59** is provided with a threaded hole **60** which receives a rotatable screw **61** (FIG. **1**). The detector or sensor **56**, as seen in FIG. **7**, is shown including a light-responsive member **62** having four sensors or photodiodes for example, silicon photocells **63** responsive to the light from light sources **58**. The member **62** is secured in a support **64** made, for example, of plastic and provided with a threaded hole **65** which receives a rotatable screw **66** (FIG. **2**). The support **59** of the source **55** and the support **64** of the detector **56** are guided for reciprocal movement by the walls of openings or slots **67** (FIG. **1**) and **68** (FIG. **5**) provided in the housing sides **11** and **13**, respectively. The slots **67** and **68** prevent rotation of the source **55** and detector **56** so that they move linearly along the slots in response to rotation of the screws.

The diode light source **55** is adapted to be energized by a suitable control circuit **87**, as seen in FIG. **10**, which may include, for example, a source of direct current for energizing each of the light sources **58**. The photocells **63** of detector **55** are connected in a circuit such as a signal utilization circuit **92** which may include a circuit for producing signals, for example, signals responsive to changes in the resistance of the photodiodes **63** due to the light from sources **58** intermittently reaching the photodiodes during scanning of the encoded cards **18** and **18'**.

When the cards **18** and **18'** are locked in position by the holddown mechanisms **19** and **19'**, the patterns of encoded holes are accurately positioned relative to the source **55** and detector **56** within the openings **67** and **68**. The source **55** and detector **56** are, of course, aligned with respect to each other such that as they move past an encoded card, light from a light source element **58**, as the source passes a hole in the card, strikes the photodiode **63** opposite that source element, and a pulse is produced in the utilization circuit **92**. The indicia shown for illustration in FIG. **1** includes holes at four different vertical levels spaced apart the same distance as the light sources **58** and the photodiodes **63** so that there is a source and diode for each level.

An electric motor **69** secured to end plate **15** by screws **70** effects rotation of screws **61** and **66** through a gear mechanism **71**. Motor **69** has a shaft **72**, as seen in FIG. **3**, to which is connected a drive gear **73** coupled to drive a relatively large gear **74** that is connected for rotation in a bearing **75** in an end portion of housing side **13** (FIG. **5**). Gear **74** is engaged with a gear **76** fixed to the right end of screw **66**, as viewed in FIG. **1**. The gear **76** is engaged with a gear **77** fixed to screw **61**. The left ends of screws **61** and **66**, as viewed in FIG. **2**, are provided with bearings **78** and **79** in the left end flange **13'**. The right ends of the screws are provided with bearings **80** and **81** in the right flange **13''**. In this way, the motor **69** rotates the screws **61** and **66** in synchronism.

Referring again to FIG. **2**, a rod **83** extends parallel to the screws **61** and **66** and is mounted for limited lateral or axial movement in a pair of openings **82** and **84** in the ends of the housing flanges **13'** and **13''**. A pair of abutments **85** and **86** are fixed to rod **83** adjacent the opposite ends thereof and in the path of movement of the light detector **56**. Also connected to rod **83** is a switch operating member **88** having an inclined surface at **89**, as seen in FIG. **5**, which is engaged by a resiliently urged switch actuating arm **90** of a motor winding reversing, pushbutton switch **91**. Whenever the detector **56** engages and moves one of the abutments **85** or **86** a predetermined distance, the rod **83** and member **88** also move to close or open switch **91** and effect a reversal of the direction of rotation of the motor **69**. The motor **69**, as seen in FIG. **10**, is connected to reversing switch **91** and a voltage source **93** through a switch **94** shown for purpose of illustration as a manual switch.

In operation, when an encoded card **18** is manually inserted into chamber **17**, it readily passes the flat surface **46** of the holddown rollers **22** and **23** and actuates switch **51** to effect energization of solenoid **33** to actuate holddown mechanism **19**. Rollers **22** and **23** of mechanism **19** are rotated in a direction to engage and urge the card **18** downwardly, the round portion of the tires **45** resiliently urging the card against the surface **50** to thereby firmly hold or lock the card in place. FIG. **4** illustrates the card **18** inserted into slot **17** just before actuation of the solenoid **33**. FIG. **8** illustrates the card **18** in its locked position after energization of solenoid **33'**. When a second card **18'** is inserted into chamber **17'** the holddown mechanism **19'** operates in similar manner to lock card **18'** in its predetermined location.

With the encoded cards **18** and **18'** accurately located in the chambers **17** and **17'**, the switch **94** (FIG. **10**) is operated to start the motor **69** so that the rotor rotates in one direction to rotate screws **61** and **66** through gear mechanism **71**. The screws **61** and **66** are suitably threaded to move the light source **55** and detector **56** along the slots **67** and **68** in a direction which is dependent upon the direction of motor rotation, as determined by the condition or position of the motor reversing switch **91**. As the light source **55** and detector **56** move past the cards, pulses are produced in circuit **92** (FIG. **10**) for example, each time the light from a source **58** strikes a photocell **63** a pulse may be produced in circuit **92**. A series of signals corresponding to the particular code on encoded cards **18** and **18'** may be transmitted to a suitable signal utilization device for storage, decoding, printing or the like, as desired.

After the source **55** and detector **56** pass by both cards **18** and **18'**, one of the abutments **85** or **86** (FIG. **2**) is engaged and moved by detector **56** to actuate the reversing switch **91** and thereby return the light source **55** and detector **56** to the starting end of the reader **10**. The holddown mechanism **19** and **19'** as well as the motor **69** may be then deenergized such as by switch **94**. The springs **54** and **54'** (FIG. **1**) then move the cards upwardly to facilitate removal thereof from the reader **10** by the operator. By making the outer surface of the rollers **22** and **23** irregular or asymmetric with respect to the axis of rotation of the rollers, the axis of rotation can be fixed as shown in the drawings. Because of the axis of rotation of the rollers is fixed, the holddown mechanism is mechanically sturdy, accurate for repetitive operations, and relatively simple and economical in construction.

Because the cards are accurately located by the holddown mechanisms **19** and **19'**, and since the diode light sources **58** provide a narrow beam of light generally about the size of the code holes *h*, erroneous signals, due to extraneous light, is substantially obviated and without complicated and extensive card holder or enclosure means.

In view of the above, it is seen that the several objects of the invention are achieved and other advantageous results obtained.

As various changes could be made in the above-described constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A holddown mechanism for a generally flat encoded card comprising housing means for receiving said card and having a sidewall and a bottom wall adapted to be engaged respectively by one major surface and a bottom edge of said card, at least one roller means for alternatively permitting insertion of an encoded card between said roller means and said sidewall and urging an inserted card against said bottom wall and against said sidewall, means defining an axis of rotation for said roller, said axis of rotation being parallel to said sidewall and to said bottom wall and fixed with respect to said housing means, said roller means including a resiliently compressible peripheral member having in its noncompressed state, a periphery which is asymmetric with respect to said axis, said roller being rotatable through a limited arc between a first position wherein said peripheral member is spaced from said side wall a distance to

permit insertion of an encoded card, and a second position wherein said periphery extends closer to said sidewall for engaging an inserted card, and means for rotating said roller means between said first and second positions for engaging the inserted card and urging said card against said bottom wall and said sidewall, said means for rotating said roller means including a coupling element operatively connected to said roller means, solenoid means having a linearly movable plunger, pivotal connection means coupling said element to said plunger to effect rotation of said roller means in response to linear movement of said plunger and means biasing said roller means to said first position when said solenoid is not activated.

2. The holddown mechanism according to claim 8 wherein said peripheral member is generally cylindrical about said axis, and includes a flat surface on the convex surface of the cylindrical peripheral member, said flat surface being a right chordal section of said cylinder, said flat surface facing said card when said roller means is in said first position and said cylindrical surface engaging said card when said roller means is in said second position.

3. The device according to claim 1 wherein said means for rotating said roller means includes electrically operable means for rotating said roller means, electrical circuit means for energizing said electrically operable means, and switch means in said circuit means, said switch means being operable by insertion of said card in said housing means.

4. The device according to claim 3 including means biasing said roller means into said first position when said circuit means is inactivated, for releasing said card from said housing means.

5. The holddown mechanism according to claim 8 including means, independent of said roller means, for biasing said card away from said bottom wall.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,626,159 Dated December 7, 1971

Inventor(s) Calvin L. Chumley

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In Claim 2, line 1, cancel "8" and insert ---1---.

In Claim 5, line 1, cancel "8" and insert ---1---.

Signed and sealed this 26th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334