(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 954 387 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
26.05.2004 Bulletin 2004/22

(21) Application number: **98902706.5**

(22) Date of filing: **23.01.1998**

(51) Int Cl.[7]: **B07C 3/14**

(86) International application number:
PCT/US1998/001366

(87) International publication number:
WO 1998/032545 (30.07.1998 Gazette 1998/30)

(54) **OPTICALLY-GUIDED INDICIA READER SYSTEM**

OPTISCH-GELEITETES ZEICHENABTASTSYSTEM

SYSTEME DE LECTURE D'INSCRIPTIONS A GUIDAGE OPTIQUE

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **23.01.1997 US 787974**
23.01.1997 US 788852

(43) Date of publication of application:
10.11.1999 Bulletin 1999/45

(60) Divisional application:
03020263.4 / 1 371 424

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- **"parcel positioning scanning and sorting system" IBM TECHNICAL DISCLOSURE BULLETIN, vol. 15, no. 4, September 1972, US, pages 1170-1171, XP002065579**

EP 0 954 387 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Technical Field

[0001] The present invention relates to image processing and more particularly relates to over-the-belt optical character recognition (OCR) systems. Specifically, the invention relates to an indicia reader system that includes a projected optical guide to assist the positioning of parcels on a conveyor.

Background of the Invention

[0002] For years, machines have been used to scan parcels as they travel along a conveyor. Over-the-belt optical character recognition (OCR) systems have been recently developed that can read indicia, such as a typed or hand-written destination address on parcels to be shipped. Parcel delivery companies, such as United Parcel Service, ship millions of parcels every day. These parcel delivery companies make extensive use of OCR systems to read the destination address labels on parcels to facilitate sorting and routing the parcels to their proper destinations.

[0003] The fundamental physical components of an OCR system are a scanner and a character recognition system including a central processing unit (CPU), a computer memory, and a sophisticated character recognition program module. The scanner is typically an optical camera, such as a charge-coupled device (CCD) array, that captures an image of the destination address on the parcels as they travel past the scanner on the conveyor. Generally, a continuous video image of the conveyor carrying the parcels is captured by the scanner, which video image is converted into digital format and transmitted to the character recognition system. But only a small part of the video image, such as the portions including the destination addresses of the parcels, needs to be processed by the character recognition system. The OCR system, therefore, must have some way to identify the portions of the video image that need to be processed by the character recognition system.

[0004] One approach is to store the entire video image created by the scanner, and later parse out the portions of the video image that need to be processed by the character recognition system. But a continuously running scanner generates an enormous amount of video data. This data is formatted as a continuous bit map of the conveyor as the conveyor carries parcels past the scanner. This bit map inherently conveys information about the spatial relationship of the pixels of the image. Storing this continuous bit map requires an enormous amount of computer memory. It is therefore advantageous to reduce the memory storage requirement.

[0005] Data compression is one technique for reducing the memory storage requirement. The video data may be compressed for storage using any of a variety of well known data compression methods, such as run length encoding. These data compression techniques, however, alter the bit-map format of the data. This is undesirable because it is advantageous for the character recognition program module to operate on bit maps that allow easy access to information regarding neighborhoods around individual pixels. The compressed data must therefore be uncompressed, typically into a frame buffer, for processing by the character recognition program module. Compressing the video data for storage, and then uncompressing the video data for processing, burdens the CPU and slows the character recognition process.

[0006] Real-time extraction of the desired portions of the video data is another technique for reducing the memory storage requirement. Indeed, real-time data extraction is a very effective technique because most of the video data created by the continuously running scanner is a useless image of the conveyor and the non-indicia bearing areas of the parcels moving along the conveyor; only a small percentage of the data includes the destination addresses of the parcels to be shipped. Therefore, extracting only small portions of the video data, such as relatively small areas covering the destination addresses, greatly reduces the memory storage requirement and speeds up the character recognition process.

[0007] Systems have been developed for triggering a video camera system so as to store only desired video images. For example, *Tonkin*, U.S. Patent No. 4,742,555, describes a mechanical limit switch, optical sensor, or magnetic sensor that triggers a video system to capture and store an image of a parcel as the parcel reaches a predetermined location along a conveyor. But the system described by *Tonkin* would have a significant drawback if applied to a parcel shipping system. This is because the system described by *Tonkin* captures an image of the entire parcel; is not operative for capturing only a specific portion of the image, such as the destination address. In a parcel shipping system, the destination address must be captured for sorting and routing purposes, but other indicia on the parcel, such as the return address, is not needed to route the parcel to its proper destination. It is therefore advantageous to identify the destination address prior to storing the image of the parcel, so that only the portion of the image containing the destination address may be stored in the computer memory.

[0008] Several difficulties are encountered, however, in attempting to identify the destination addresses on various parcels traveling on a conveyor. First, the destination addresses may vary in size, and may be in different locations on different parcels. Second, the parcels themselves may vary in size, shape, and position on the conveyor. Thus, the exact position of a destination address on a parcel cannot be determined by simply detecting the edge of the parcel using a limit switch or sensor, as described by *Tonkin*.

[0009] Systems have been developed for storing vid-

eo images of selected portions of parcels traveling of a conveyor. For example, *Kizu et al*., U.S. Patent No. 4,516,265, describes a two-camera system that reads the postal (zip) codes on envelopes traveling on an envelope transport system. The system includes a low resolution prescanner that coarsely scans the surface of the envelope. The position of the destination address block is determined from the coarse scan, and the coordinates of the destination address block with respect to the leading edge of the envelope are then passed to a second, high-resolution camera system. The second camera system stores an image of the destination address block by first detecting the leading edge of the envelope. The second camera system begins storing an image of the destination address block when the block reaches the second camera, and stops storing the image when the block moves past the second camera. A postal code reader subsequently processes the high-resolution scan to read the postal code.

[0010] Another example is disclosed in *Morton et al*., U.S. Patent No. 5,642,442. This patent describes a two-camera system that reads the destination addresses on parcels traveling on a conveyor. A fluorescent ink fiduciary mark is superimposed relative to the destination address on a parcel. A first camera captures an image of the fiduciary mark, the position and orientation of which is ascertained. The position and orientation of the fiduciary mark is then used to extract an image of the destination address from a video data signal created by a second camera, which is positioned downstream from the first camera. The image of the destination address is stored in a computer memory for subsequent processing by a character recognition system.

[0011] The two-camera systems described above are very effective at minimizing the amount of video data that must be stored in an OCR system. They are, however, rather expensive systems that are best suited for very high-speed parcel handling systems. The cost associated with these systems may not be justified for many lower-speed parcel handling systems. The IBM Technical Disclosure Bulletin, Vol. 15 Nr. 4, Pg. 1170-1171 describes a moving-light parcel positioning scanning and sorting system that captures images of addresses on parcels. But this system does not describe further techniques for obtaining sharp image of the addresses, nor does it describe a non-moving-light parcel positioning system. In addition, the IBM disclosure document does not describe a multi-conveyor parcel positioning system.

[0012] There is, therefore, a need for a less expensive and more effective system for minimizing the amount of video data that must be stored in an OCR system. In particular, there is a need for an inexpensive yet effective indicia reader system that is suited to low- to medium-speed parcel handling systems.

Summary of the Invention

[0013] The invention seeks to provide a low-cost system for minimizing the amount of video data that must be stored in an OCR system. In particular, the invention seeks to provide an inexpensive indicia reader system suited to low-to medium-speed parcel handling systems.

[0014] In accordance with the invention, there is provided an indicia reader system according to claim 1. For example the system may have an optical guide including a static elongated strip of light projected toward the conveyor from an illumination source positioned above the conveyor. An operator positions a parcel on the conveyor so that indicia to be imaged, such as the destination address on the parcel, is within static elongated strip of light. The parcel may also be positioned on the conveyor so that other indicia that is not to be imaged, such as the return address on the parcel is not within the static elongated strip of light. Projecting the optical guide onto the parcel avoids parallax-related alignment errors that could otherwise occur with tall parcels in systems using other types of optical guides, such as reference marks placed on the conveyor itself.

[0015] The optically-guided indicia reader system may also include a proximity sensor, such as a photo detector, for detecting the arrival of the parcel at the scanner. In response to a signal from the proximity sensor, the computer memory and the scanner may be operated so as to store an image of a region having a width approximately equal to the width of the area defined by the illumination source, and a length approximately equal to the length of the parcel in the direction of conveyor travel.

[0016] The optically-guided indicia reader system may also include a reflectivity sensor located upstream of the scanner and positioned to determine reflectivity data associated with the parcel. A communication link transmits the reflectivity data from the reflectivity sensor to the scanner, and the gain of the scanner is adjusted in response to the reflectivity data. In addition, an optically-guided indicia reader system may include a height sensor located above the conveyor and upstream of the scanner and positioned to determine height data associated with the parcel at the location of the destination address. A communication link transmits the height data from the height sensor to the scanner, and the scanner is focused in response to the height data.

[0017] That the present invention improves over the drawbacks of the prior art and accomplishes the objects of the invention will become apparent from the following detailed description of the preferred embodiment and the appended drawings and claims.

Brief Description of the Drawings

[0018]

FIG. 1 is a diagram of an optically-guided indicia reader system.

Detailed Description

[0019] FIG 1 is a diagram of an optically-guided indicia reader system **10** that includes a conveyor **12** carrying a parcel **14** from an upstream location **16** to a downstream location **18** of the conveyor **12**. The parcel **14** includes indicia to be read by the optically-guided indicia reader system **10**, such as a destination address **20**. The parcel **14** may include other indicia, such as the return address, that the indicia reader system **10** preferably avoids reading.

[0020] An illumination source **24** is positioned to define a static area **26** to assist in positioning the parcel **14** on the conveyor **12.** The area **26** is static in that it does not travel along with the conveyor **12**, but remains stationary with respect to an operator station that is located along side the conveyor **12**. Thus, the conveyor **12** travels through the area **26**, which is defined by light projected by the illumination source **24**.

[0021] The illumination source **24** may define the area **26** many different ways. For example, illumination source **24** may illuminate the interior of area **26,** or the border of the area **26,** or two spaced-apart parallel lines in the direction of conveyor travel, etc. The illumination source **24** is positioned a sufficient distance above the conveyor **12** so that the parcel **14** may be positioned on the conveyor **12** to pass beneath the illumination source **24.** An operator may therefore view the area **26,** which is defined by light projected by the illumination source **24,** directly on the parcel **14** as the operator positions the parcel **14** on the conveyor **12**. The area **26** thus provides an optical guide to assist the operator in positioning the parcel **14** on the conveyor **12.**

[0022] A sensor assembly **28**, including a height sensor and reflectivity sensor, my be located toward the downstream end of the illumination source **24.** A communication link **30** functionally connects the sensor assembly **28** to a scanner **32** that is located downstream from the sensor assembly **28.** The scanner **32** is focused in response to height data from the height sensor, and the gain of the scanner **32** is adjusted in response to reflectivity data from the reflectivity sensor, so that the scanner **32** generates a clear image of the top of the parcel **14** as the parcel passes beneath the scanner **32.** The scanner **32** is preferably positioned so that the scan line **34** is oriented across a portion of the conveyor **12** that is aligned with the area **26** in the cross-machine direction.

[0023] A belt encoder **36** measures the displacement of the conveyor **12.** A communication link **38** functionally connects the belt encoder **36** to the scanner **32** and to a character recognition system **40** that includes a processing unit **41** and a computer memory **42**. Another communication link **44** functionally connects the character recognition system **40** to the scanner **32.** The height data from the sensor assembly **28** indicates the presence of a parcel **14** on a particular location of the conveyor **12.** Thus, the height data and the signal from the belt encoder **36** may be used to determine when a parcel **14** is present at the scanner **32.**

[0024] Alternatively, a proximity sensor, such as a photo sensor **45,** may be positioned upstream from the scanner **32.** A communication link **48** functionally connects the scanner **32** to the photo sensor **45.** The photo sensor includes a light source **46a** that projects a columnar beam of light **50** toward a photo detector **46b.** The photo sensor **45** detects the presence of the parcel **14** as it passes by the photo sensor **45** because the parcel breaks the beam of light **50.** Many other types of proximity sensors, such as a mechanical or a magnetic sensor, may equivalently be used to detect the location of the parcel **14** on the conveyor **12.**

[0025] The belt encoder **36** is a standard belt-driven, opto-mechanical encoder that provides a signal indicating the linear displacement of the conveyor **12.** The CCD array of the scanner **32** is cycled in response to the signal from the belt encoder **26** to generate a series of analog images of the scan line **34** that are transmitted to an analog-to-digital converter within the scanner **32.** The analog-to-digital converter of the scanner **32** uses a standard thresholding or similar process to convert the analog signal produced by the CCD array of the scanner **32** into an eight-bit digital video signal that is transmitted via the communication link **44** to the character recognition system **40,** which stores the video data in the computer memory **42** for subsequent processing.

[0026] The region to be stored in the computer memory **42** may include all or part of the scan line **34.** This may be accomplished by only storing the output of all or only a portion of the cells of the scanner **32.** The region to be stored in the computer memory **42** is preferably aligned with and has a length that is approximately equal to the width of the area **26** so that the region stored in the computer memory **42** corresponds to, but is downstream from, the area **26** defined by the illumination source **24.** This assists an operator in orienting a parcel **14** so that the destination address **20** can be effectively scanned by the indicia reader system **10** as configured. Alternatively, the operator may determine that the parcel **14** cannot be oriented so that the destination address **20** can be effectively scanned by the indicia reader system **10** as configured. This may happen if the destination address **20** is larger than the region to be stored in the computer memory **42.** In this case, the operator can divert the parcel **14** for hand sorting or imaging using a differently configured indicia reader system.

[0027] The scanner **32** may run continuously, so that region generated by the scanner **32** and stored in the computer memory **42** of the character recognition sys-

tem **40** is a continuous strip having a width approximately equal to the width of the area **26** defined by the illumination source **24.** The size of the region may be further reduced by using the height data from the sensor assembly **28** or the signal from the photo sensor **45** to trigger the storage of video data generated by the scanner **32.** For example, the video data generated by the scanner **32** may be stored in the computer memory **42** only when the beam **50** of the photo sensor **45** is broken. A time delay may be imposed to account for the distance between the beam **50** or the sensor assembly **28** and the scan line **34.** In this manner, an image of a strip of the top of the parcel **14** including the destination address **20** may be stored in the computer memory **42.** That is, an image of a region of the parcel **14** having a width approximately equal to the width of the area **26** defined by the illumination source **24**, and a length approximately equal to the length of the parcel **14** in the direction of conveyor travel, may be stored in the computer memory **42** of the character recognition system **40**.

[0028] Triggering the storage of the image of the region in the computer memory **42** may be accomplished in several different ways. For example, the scanner **32** may be toggled on and off by the signal from the photo sensor **45** or the sensor assembly **28** (with an appropriate time delay). Or the scanner **32** may run continuously, and the signal from the photo sensor **45** or the sensor assembly **28** may be used to latch a control line to an input buffer of the character recognition system **40.** Alternatively, the signal from the photo sensor **25** or the sensor assembly **28** may be used as an input to a software-based algorithm running on the processing unit **41,** which triggers the storage of video data from the scanner **32** in the computer memory **42.** Many other means known to those skilled in the art may equivalently be employed to operate the computer memory **42** and the scanner **32** so as to store an image of a region in the computer memory **42.**

[0029] To use the static-light indicia reader system **10,** an operator positions the parcel **14** on the conveyor **12** so that the destination address **20** is within the area **26** defined by the illumination source **24.** The operator may also position the parcel **14** on the conveyor **12** so that other indicia on the parcel **14,** such as the return address **22**, is not within the area **26** defined by the illumination source **24.** It will be appreciated that many other types of indicia may be placed within, or excluded from, the area **26,** such a barcode, a two-dimensional code, a hologram, etc.

[0030] Acceptable performance is experienced when optically-light indicia reader system **10** is configured as follows. The area **26** is typically a rectangular strip that is significantly narrower than the conveyor **12,** sufficiently long to allow an operator to easily position a parcel on the conveyor **12** using the optical guide, and approximately in the center of the conveyor **12.** For example, the area **26** may be approximately 4 inches (10 cm) in the cross-machine direction and approximately 12 (30 cm) to 36 inches (91 cm) in the direction of conveyor travel. The use of projected illumination, rather than an area painted on the conveyor **12**, allows the operator to view the area **26** defined by the illumination source **24** directly on the top of the parcel **14.** Thus, there is no displacement between the area **26** and the top of the parcel **14** that could cause parallax-related alignment errors with tall parcels. The use of a relatively narrow area **26** allows the angle of the field of view of the scanner **32** to be relatively narrow so that the scanner **32** generates a sharp image of the top of the parcel **14.**

[0031] The belt encoder **36** is a standard belt-driven, opto-mechanical encoder that provides a signal indicating the linear displacement of the conveyor **12.** The CCD array of the scanner **32** is cycled in response to the signal from the belt encoder **36** to generate a series of analog images of the scan line **34** that are transmitted to an analog-to-digital converter within the scanner **32.** The analog-to-digital converter of the scanner **32** uses a standard thresholding or similar process to convert the analog signal produced by the CCD array of the scanner **32** into an eight-bit digital video signal that is transmitted via the communication link **44** to the character recognition system **40**, which is operable for storing the video data in the computer memory **42** for subsequent processing.

[0032] The scanner **32** is preferably a monochrome, 4,096 pixel line-scan type CCD array such as one using a Thompson TH7833A CCD chip. As the field of view of the scanner **32** is approximately 16 inches (41 cm) at the conveyor **12,** the resolution of the image created by the scanner **32** is approximately 256 pixels or "dots" per inch (DPI) (101 dots per cm) across the field of view of the scanner **32.** The belt encoder **36** preferably triggers the CCD array of the scanner **32** at a rate of approximately 256 cycles per inch (101 cycles per cm) so that the resolution of the image created by the scanner **32** is approximately 256 pixels or "dots" per inch (DPI) (101 dots per cm) in the direction of conveyor travel. It will therefore be appreciated that a digital image with a correct aspect ratio (i.e., the ratio of the length of the image to the width) may be generated by the scanner **32** and stored in the computer memory **42** of the character recognition system **40** by synchronizing the cycling rate of the scanner **32** with the linear speed of the conveyor **12.** See, for example, *Shah et al.*, U.S. Patent No. 5,291,564, which is incorporated by reference.

[0033] The conveyor **12** may be approximately 24 inches (61 cm) wide and travel at linear speeds up to 20 inches per second or 100 feet per minute (51 cm per second or 30 meters per minute) or more. The illumination source **24,** which may be any of a variety of commercially-available narrow-beam light sources, is preferably positioned approximately 18 inches (46 cm) above conveyor **12** and defines an area **26** that is approximately 4 inches (10 cm) in the cross-machine direction and approximately 12 (30 cm) to 36 inches (91 cm) in the direction of conveyor travel.

[0034] The scanner **32** is preferably mounted to have an optical path of approximately 120 inches (304 cm) to the conveyor **12** with a 16 inch (41 cm) field of view at the conveyor **12.** To save space, the scanner **32** is positioned approximately 30 inches (76 cm) above the center of conveyer **12** and is pointed towards a complex of mirrors (not shown) that increases the optical path from the scanner **32** to the conveyor **12** to approximately 120 inches (305 cm). These parameters may be varied somewhat without unduly affecting the performance of the disclosed embodiment of the present invention. See also, *Smith et al*., U.S. Patent No. 5,308,960, and *Bjorner, et al*., U.S. Patent No. 5,485,263, which are incorporated by reference.

[0035] It should also be understood that the scan line **34** may be longer than the width of the region stored in the computer memory **42.** For example, the scanner **32** may be positioned to have a field of view (i.e. the scan line **34)** equal to approximately 16 inches (41 cm) at the conveyor **12.** The region stored in the computer memory **42,** however, may only be approximately 4 inches (10 cm), which preferably corresponds to the width of the area **26** defined by the illumination source **24.** This may be accomplished by only storing the output of a portion of the cells of the scanner **32** (e.g., the center 1,024 pixels of a 4,096 pixel scanner) in the computer memory **42.**

[0036] In view of the forgoing, it will be appreciated that the optically-guided indicia reader system **10** reduces the amount of video data that must be stored in the computer memory **42** of the character recognition system **40.** The use of projected illumination allows the operator to view the area **30** defined by the illumination source **24** directly on the top of the parcel **14.** Thus, there is no displacement between the area **26** and the top of the parcel **14** that could cause parallax-related alignment errors with tall parcels. In addition, the optically-guided indicia reader system **10** allows the angle of the field of view of the scanner **32** to be relatively narrow so that the scanner **32** generates a sharp image of the top of the parcel **14**.

[0037] It should be understood that the foregoing relates only to specific embodiments of the present invention, and that numerous changes may be made therein without departing from the scope of the invention as defined by the following claims.

Claims

1. An optically-guided indicia reader system (10) comprising a conveyor (12) for transporting a parcel (14) from an upstream location (16) of the conveyor to a downstream location (18) of the conveyor, an illumination source (24), a scanner (32) located downstream of the illumination source, and a computer memory (42) for storing images captured by the scanner, **CHARACTERISED BY**;

the illumination source (24) positioned to define a static elongate strip (26) having a width that is narrower than the conveyor (14) to assist in positioning the parcel (14) on the conveyor (12);

the scanner (24) configured to capture an image of a region (34) that is aligned in the direction of conveyor travel with the static elongate strip (26) and has a width that is approximately equal to the width of the static elongate strip (26); and

means (41) for operating the scanner (32) and the computer memory (42) so as to capture an image of the region (34) as a parcel positioned on the conveyor travels through the region.

2. The optically-guided indicia reader system (10) of Claim 1, further comprising:

a height sensor (28) located upstream of the scanner (32) and positioned to determine height data associated with the parcel (14);
a communication link (30) for transmitting the height data from the height sensor (28) to the scanner (32); and
means (33) for focusing the scanner (32) in response to the height data.

3. The optically-guided indicia reader system (10) of Claim 1 or Claim 2, further comprising:

a reflectivity sensor (28) located upstream of the scanner (32) and positioned to determine reflectivity data associated with the parcel (14);
a communication link (30) for transmitting the reflectivity data from the reflectivity sensor (28) to the scanner (32); and
means (33) for adjusting the gain of the scanner (32) in response to the reflectivity data.

4. The optically-guided indicia reader system (10) of any preceding claim, further comprising means (41) for operating the computer memory (42) and the scanner (32) so as to store an image of a region having a width approximately equal to the width of the area (26).

5. The optically-guided indicia reader system (10) of any preceding claim, further comprising:

a proximity sensor (46) for detecting proximity data indicating the presence of the parcel (14) at a predefined position (50) along the conveyor (12); and
a communication link (48) between the proximity sensor (46) and the scanner (32); and
means (36, 41) for, in response to the proximity data, operating the computer memory (42) and the scanner (32) so as to store an image of a region having a width approximately equal to the width of the area (26) and a length approx-

imately equal to the length of the parcel (14) in the direction of conveyor travel.

6. A method for obtaining an image of indicia (20) on a parcel (14) using an optically-guided indicia reader system (10) comprising a conveyor (12) for transporting a parcel (14) from an upstream location (16) of the conveyor to a downstream location (18) of the conveyor, an illumination source (24), a scanner (32) located downstream of the illumination source, and a computer memory (42) for storing images captured by the scanner, **CHARACTERISED BY** THE STEPS OF;

positioning the illumination source (24) to define a static elongate strip (26) having a width that is narrower than the conveyor (14) to assist in positioning the parcel (14) on the conveyor (12);

positioning the parcel (14) on the conveyor so that the indicia (20) is located within the static elongate strip (26);

positioning the scanner (24) to capture an image of a region (34) that is aligned in the direction of conveyor travel with the static elongate strip (26) and has a width that is approximately equal to the width of the static elongate strip (26); and

operating the scanner (32) and the computer memory (42) so as to capture an image of the indicia (20) as the parcel travels through the region (34).

7. The method of Claim 6, further comprising the steps of:

positioning a height sensor (28) upstream of the scanner (32);
determining height data associated with the parcel (14) with the height sensor (28);
transmitting the height data from the height sensor (28) to the scanner (32); and
focusing the scanner (32) in response to the height data.

8. The method of Claim 6 or Claim 7, further comprising the steps of:

positioning a reflectivity sensor (28) upstream of the scanner (32);
determining reflectivity data associated with the parcel (14) with the reflectivity sensor;
transmitting the reflectivity data from the reflectivity sensor (28) to the scanner (32); and
adjusting the gain of the scanner (32) in response to the reflectivity data.

9. The method of any of Claims 6-8, further comprising the step of operating the computer memory (42) and the scanner (32) so as to store an image of a region having a width approximately equal to the width of the area (26).

10. The method of any of claims 6-9, further comprising the steps of:

positioning a proximity sensor (46) for detecting proximity data indicating the presence of the parcel (14) at a predefined position (50) along the conveyor (12); and
transmitting the proximity data from the proximity sensor (46) to the scanner (32); and
in response to the proximity data, operating the computer memory (42) and the scanner (32) so as to store an image of a region having a width approximately equal to the width of the area (26) and a length approximately equal to the length of the parcel (14) in the direction of conveyor travel.

Patentansprüche

1. Optischgeführtes Angabenlesesystem (10) mit einem Förderer (12) zum Transportieren eines Pakets (14) von einer vorgeschalteten Stelle (16) des Förderers zu einer nachgeschalteten Stelle (18) des Förderers, einer Beleuchtungsquelle (24), einem hinter der Beleuchtungsquelle angeordneten Scanner (32) und einem Computerspeicher (42) zum Speichern von vom Scanner erfaßten Bildern, **gekennzeichnet durch**:

die Beleuchtungsquelle (24), die so positioniert ist, daß sie einen statischen länglichen Streifen (26) mit einer Breite definiert, die schmaler ist als der Förderer (12), um das Positionieren des Pakets (14) auf dem Förderer (12) zu unterstützen;
den Scanner (32), der so konfiguriert ist, daß er ein Bild eines Gebiets (34) erfaßt, das in Richtung des Fördererwegs auf den statischen länglichen Streifen (26) ausgerichtet ist und eine Breite aufweist, die etwa gleich der Breite des statischen länglichen Streifens (26) ist; und
Mitteln (41) zum Betreiben des Scanners (32) und des Computerspeichers (42), um ein Bild des Gebiets (34) zu erfassen, während sich ein auf dem Förderer positioniertes Paket **durch** das Gebiet bewegt.

2. Optischgeführtes Angabenlesesystem (10) nach Anspruch 1, das weiterhin folgendes umfaßt:

einen Höhensensor (28), der vor dem Scanner (32) angeordnet und so positioniert ist, daß er mit dem Paket (14) verbundene Höhendaten bestimmt;
eine Kommunikationsstrecke (30) zum Übertragen der Höhendaten von dem Höhensensor (28) zu dem Scanner (32); und

Mittel (33) zum Fokussieren des Scanners (32) als Reaktion auf die Höhendaten.

3. Optischgeführtes Angabenlesesystem (10) nach Anspruch 1 oder 2, das weiterhin folgendes umfaßt:

einen Reflexionsgradsensor (28), der vor dem Scanner (32) angeordnet und so positioniert ist, daß er mit dem Paket (14) verbundene Reflexionsgraddaten bestimmt;
eine Kommunikationsstrecke (30) zum Übertragen der Reflexionsgraddaten vom Reflexionsgradsensor (28) zum Scanner (32); und
Mittel (33) zum Justieren des Verstärkungsfaktors des Scanners (32) als Reaktion auf die Reflexionsgraddaten.

4. Optischgeführtes Angabenlesesystem (10) nach einem der vorhergehenden Ansprüche, weiterhin mit Mitteln (41) zum Betreiben des Computerspeichers (42) und des Scanners (32), um ein Bild eines Gebiets mit einer Breite zu speichern, die etwa gleich der Breite des Bereichs (26) ist.

5. Optischgeführtes Angabenlesesystem (10) nach einem der vorhergehenden Ansprüche, das weiterhin folgendes umfaßt:

einen Abstandssensor (46) zum Erfassen von Abstandsdaten, die die Gegenwart des Pakets (14) an einer vorbestimmten Position (50) entlang des Förderers (12) anzeigen; und
eine Kommunikationsstrecke (48) zwischen dem Abstandssensor (46) und dem Scanner (32); und
Mittel (36, 41), um als Reaktion auf die Abstandsdaten den Computerspeicher (42) und den Scanner (32) so zu betätigen, daß ein Bild eines Gebiets mit einer Breite, die etwa gleich der Breite des Bereichs (26) ist, und einer Länge, die etwa gleich der Länge des Pakets (14) in der Richtung des Fördererwegs ist, gespeichert wird.

6. Verfahren zum Erhalten eines Bilds von Angaben (20) auf einem Paket (14) unter Verwendung eines optischgeführten Angabenlesesystems (10) mit einem Förderer (12) zum Transportieren eines Pakets (14) von einer vorgeschalteten Stelle (16) des Förderers zu einer nachgeschalteten Stelle (18) des Förderers, einer Beleuchtungsquelle (24), einem hinter der Beleuchtungsquelle angeordneten Scanner (32) und einem Computerspeicher (42) zum Speichern von vom Scanner erfaßten Bildern, **gekennzeichnet durch** die folgenden Schritte:

Positionieren der Beleuchtungsquelle (24), um einen statischen länglichen Streifen (26) mit einer Breite zu definieren, die schmaler ist als der Förderer (12), um das Positionieren des Pakets (14) auf dem Förderer (12) zu unterstützen;
Positionieren des Pakets (14) auf dem Förderer, so daß sich die Angaben (20) innerhalb des statischen länglichen Streifens (26) befinden;
Positionieren des Scanners (24), um ein Bild eines Gebiets (34) zu erfassen, daß in Richtung des Fördererwegs auf den statischen länglichen Streifen (26) ausgerichtet ist und eine Breite aufweist, die etwa gleich der Breite des statischen länglichen Streifens (26) ist; und
Betreiben des Scanners (32) und des Computerspeichers (42) um ein Bild der Angaben (20) zu erfassen, während sich das Paket **durch** das Gebiet (34) bewegt.

7. Verfahren nach Anspruch 6, weiterhin mit den folgenden Schritten:

Positionieren eines Höhensensors (28) vor dem Scanner (32);
Bestimmen von mit dem Paket (14) verbundenen Höhendaten mit dem Höhensensor (28);
Übertragen der Höhendaten vom Höhensensor (28) zum Scanner (32); und
Fokussieren des Scanners (32) als Reaktion auf die Höhendaten.

8. Verfahren nach Anspruch 6 oder 7, weiterhin mit den folgenden Schritten:

Positionieren eines Reflexionsgradsensors (28) vor dem Scanner (32);
Bestimmen von mit dem Paket (14) verbundenen Reflexionsgraddaten mit dem Reflexionsgradsensor;
Übertragen der Reflexionsgraddaten vom Reflexionsgradsensor (28) zum Scanner (32); und
Justieren des Verstärkungsfaktors des Scanners (32) als Reaktion auf die Reflexionsgraddaten.

9. Verfahren nach einem der Ansprüche 6-8, weiterhin mit dem Schritt des Betreibens des Computerspeichers (42) und des Scanners (32), um ein Bild eines Gebiets mit einer Breite zu speichern, die etwa gleich der Breite des Bereichs (26) ist.

10. Verfahren nach einem der Ansprüche 6-9, weiterhin mit den folgenden Schritten:

Positionieren eines Abstandssensors (46) zum Erfassen von Abstandsdaten, die die Gegenwart des Pakets (14) an einer vorbestimmten Position (50) entlang des Förderers (12) anzeigen; und
Übertragen der Abstandsdaten von dem Ab-

standssensor (46) zum Scanner (32); und
Betreiben des Computerspeichers (42) und des Scanners (32) als Reaktion auf die Abstandsdaten, so daß ein Bild eines Gebiets mit einer Breite, die etwa gleich der Breite des Bereichs (26) ist, und einer Länge, die etwa gleich der Länge des Pakets (14) in der Richtung des Fördererwegs ist, gespeichert wird.

Revendications

1. Système (10) à lecteur de signes guidé optiquement, comprenant un transporteur (12) destiné à transporter un paquet (14) d'un emplacement amont (16) du transporteur à un emplacement aval (18) du transporteur, une source d'éclairage (24), un lecteur (32) disposé en aval de la source d'éclairage, et une mémoire (42) d'ordinateur destinée à conserver des images capturées par le lecteur, **caractérisé en ce que** :

   la source d'éclairage (24) est disposée afin qu'elle délimite une bande allongée statique (26) dont la largeur est inférieure à celle du transporteur (14) afin que le positionnement du paquet (14) sur le transporteur (12) soit facile,
   le lecteur (24) a une configuration de capture d'une image d'une région (34) qui est alignée dans la direction de déplacement du transporteur avec la bande allongée statique (26) et a une largeur approximativement égale à la largeur de la bande allongée statique (26), et
   un dispositif (41) est destiné à commander le lecteur (32) et la mémoire (42) d'ordinateur afin qu'une image de la région (34) soit capturée lorsqu'un paquet placé sur le transporteur se déplace dans cette région.

2. Système (10) à lecteur de signes guidé optiquement selon la revendication 1, comprenant en outre :

   un capteur (28) de hauteur placé en amont du lecteur (32) et disposé afin qu'il détermine des données de hauteur associées au paquet (14),
   une liaison de communication (30) destinée à transmettre les données de hauteur du capteur de hauteur (28) au lecteur (32), et
   un dispositif (33) de focalisation du lecteur (32) en fonction des données de hauteur.

3. Système (10) à lecteur de signes guidé optiquement selon la revendication 1 ou 2, comprenant en outre :

   un capteur (28) du pouvoir réflecteur placé en amont du lecteur (32) et disposé afin qu'il détermine des données de pouvoir réflecteur associées au paquet (14),
   une liaison de communication (30) destinée à transmettre les données de pouvoir réflecteur du capteur (28) de pouvoir réflecteur au lecteur (32), et
   un dispositif (33) d'ajustement du gain du lecteur (32) en fonction des données de pouvoir réflecteur.

4. Système (10) à lecteur de signes guidé optiquement selon l'une quelconque des revendications précédentes, comprenant en outre un dispositif (41) destiné à commander la mémoire (42) d'ordinateur et le lecteur (32) afin qu'une image d'une région dont la largeur est approximativement égale à la largeur de la surface de bande (26) soit mémorisée.

5. Système (10) à lecteur de signes guidé optiquement selon l'une quelconque des revendications précédentes, comprenant en outre :

   un capteur (46) de proximité destiné à détecter des données de proximité indiquant la présence du paquet (14) à une position prédéterminée (50) sur le transporteur (12),
   une liaison de communication (48) placée entre le capteur de proximité (46) et le lecteur (32), et
   un dispositif (36, 41) destiné, en fonction des données de proximité, à commander la mémoire (42) d'ordinateur et le lecteur (32) pour la mémorisation d'une image d'une région qui a une largeur approximativement égale à la largeur de la surface de bande (26) et une longueur approximativement égale à la longueur du paquet (14) dans la direction de déplacement du transporteur.

6. Procédé destiné à l'obtention d'une image de signes (20) placés sur un paquet (14) à l'aide d'un système (10) lecteur de signes guidé optiquement et comprenant un transporteur (12) de transport d'un paquet (14) d'un emplacement amont (16) du transporteur à un emplacement aval (18) du transporteur, une source d'éclairage (24), un lecteur (32) placé en aval de la source d'éclairage, et une mémoire (42) d'ordinateur destinée à mémoriser des images capturées par le lecteur,
   caractérisé par les étapes suivantes :

   le positionnement de la source d'éclairage (24) pour la délimitation d'une bande allongée statique (26) ayant une largeur inférieure à celle du transporteur (14) afin que le positionnement du paquet (14) sur le transporteur (12) soit facile,
   le positionnement du paquet (14) sur le transporteur de manière que les signes (20) se trou-

vent dans la bande allongée statique (26),
le positionnement du lecteur (24) afin qu'il capture une image d'une région (34) qui est alignée dans la direction de déplacement du transporteur sur la bande allongée statique (26) et qui a une largeur approximativement égale à la largeur de la bande allongée statique (26), et
la commande du lecteur (32) et de la mémoire (42) d'ordinateur pour la capture d'une image des signes (20) lorsque le paquet se déplace dans la région (34).

7. Procédé selon la revendication 6, comprenant les étapes suivantes :

le positionnement d'un capteur (28) de hauteur en amont du lecteur (32),
la détermination de données de hauteur associées au paquet (14) avec le capteur (28) de hauteur,
la transmission des données de hauteur provenant du capteur (28) de hauteur au lecteur (32), et
la focalisation du lecteur (32) en fonction des données de hauteur.

8. Procédé selon la revendication 6 ou 7, comprenant en outre les étapes suivantes :

le positionnement d'un capteur (28) de pouvoir réflecteur en amont du lecteur (32),
la détermination de données de pouvoir réflecteur associées au paquet (14) avec le capteur de pouvoir réflecteur,
la transmission des données de pouvoir réflecteur du capteur (28) de pouvoir réflecteur au lecteur (32), et
l'ajustement du gain du lecteur (32) en fonction des données de pouvoir réflecteur.

9. Procédé selon l'une quelconque des revendications 6 à 8, comprenant en outre l'étape de commande de la mémoire (42) d'ordinateur et du lecteur (32) afin qu'une image d'une région ayant une largeur approximativement égale à la largeur de la surface de bande (26) soit mémorisée.

10. Procédé selon l'une quelconque des revendications 6 à 9, comprenant en outre les étapes suivantes :

le positionnement d'un capteur (46) de proximité destiné à détecter les données de proximité indiquant la présence d'un paquet (14) en position prédéterminée (50) le long du transporteur (12), et
la transmission des données de proximité du capteur (46) de proximité au lecteur (32), et
en fonction des données de proximité, la commande de la mémoire (42) d'ordinateur et du lecteur (32) pour la mémorisation d'une image d'une région ayant une largeur approximativement égale à la largeur de la surface de bande (26) et une longueur approximativement égale à la longueur du paquet (14) dans la direction de déplacement du transporteur.

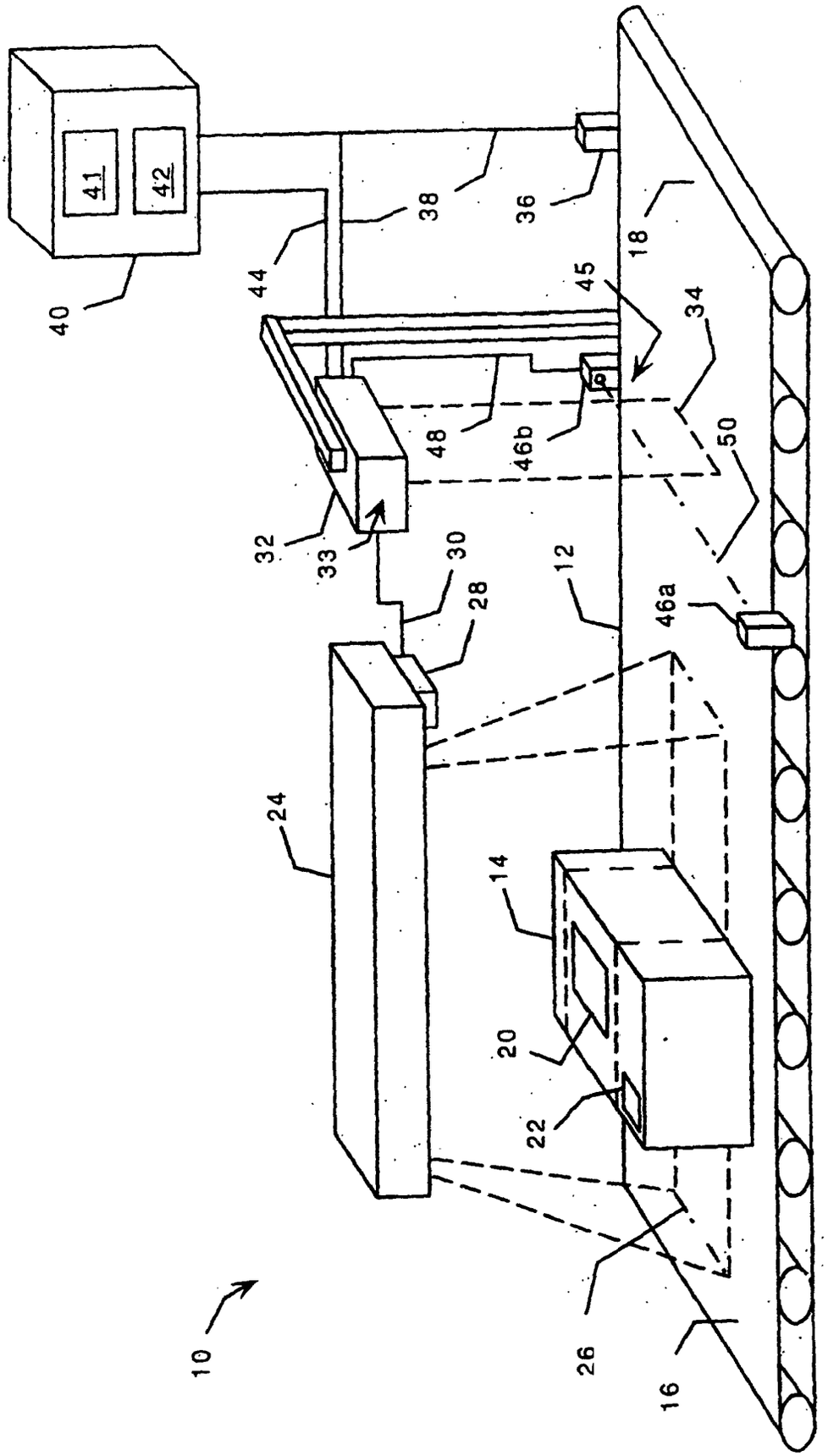
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FIG. 1