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A HAND HELD SUPPORT ASSEMBLY

The present invention relates to a hand held support assembly for supporting devices or appliances to facilitate a user moving the devices or appliances over an area.

The present invention relates particularly, although by no means exclusively, to a hand held support assembly for supporting a device in the form of a scanner for scanning library books and/or files in shelves and/or cabinets as part of a document management system.

The present invention relates particularly, although by no means exclusively, to a hand held support assembly for supporting a device in the form of a scanner that is based on radio frequency identification ("RFID") technology.

One of the main tasks of document management systems for library books or files, other than loaning or returning, is auditing library books or files actually in the shelves or in cabinets against the systems data bases. The speed of auditing or locating missing or misplaced articles are critical factors to operational efficiency of document management systems.

Barcode technology has been used since the early 1980s for tagging articles in supermarkets, retail stores, libraries, etc. Accordingly, barcode technology is one option for use in management systems.

However, barcode technology requires line-of-site and physical alignment when reading barcodes and is limited to reading one barcode at a time. This is very time consuming and if articles to be read (such as library books or files) are in shelves or cabinets, the articles



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have to be physically removed from shelves or cabinets one at a time and read and thereafter placed back in original positions.

5 It is possible with RFID technology for articles to be physically scanned while on shelves or in cabinets. Accordingly, audit data can be captured without the need to remove articles from shelves or cabinets. RFID technology is not only capable of reading individual
10 library books or files on shelves or in cabinets but is also capable of reading multiple books or files within an effective scanning zone of a RFID scanner. Consequently, document management systems using RFID technology are potentially considerably quicker options than document
15 management systems using barcode technology.

By way of example, typically two weeks work would be required to audit 200,000 library books with barcode technology whereas one day only would be required
20 to audit the same number of books with the same number of staff. Thus, RFID technology has potential to drastically improve operational efficiency by substantially reducing the amount of time that a library would have to be closed to perform the audit and would result in substantial
25 manpower savings.

However, scanning library books on shelves with a RFID scanner, particularly in situations where it is necessary to scan upper and lower shelves, introduces
30 considerable strain and fatigue to library staff operating the scanner.

Typically, the strain and fatigue is due to the need for a user to manipulate the scanner by twisting
35 movement of the arm/hand grasping the scanner and/or by the user bending over or crouching down as required in order to maintain the scanner within a preferred range of

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orientations relative to the library books as the user moves the scanner over an area of shelves.

5 A particular object of the present invention is to provide a hand-held RFID scanner assembly that facilitates a user moving a RFID scanner in an ergonomically effective and user-friendly manner over an area.

10 A more general object of the present invention is to provide a hand-held device/appliance assembly that facilitates a user moving a device/appliance in an ergonomically effective and user-friendly manner over an area

15 According to the present invention there is provided a device or appliance assembly that includes a device or an appliance and a hand held support assembly supporting the device/appliance for movement relative to the support assembly, and the support assembly includes:

- (a) a handle that a user can grasp with a hand;
- (b) an arm extending from the handle;
- 25 (c) a means supporting the device/appliance on the arm so that the device/appliance can move within a range of angles relative to the arm; and
- 30 (d) a means for adjusting the angular relationship of the device/appliance and the arm, the adjustment means being adapted to be actuated by the user by means of the
- 35 hand that is grasping the handle.

According to the present invention there is also

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provided a hand-held support assembly for supporting a device or an appliance, the support assembly including:

- 5 (a) a handle that a user can grasp with a hand;
- (b) an arm extending from the handle;
- 10 (c) a means for supporting the device/appliance on the arm so that the device/appliance can move within a range of angles relative to the arm; and
- 15 (d) a means for adjusting the angular relationship of the device/appliance and the arm, the adjustment means being adapted to be actuated by the user by means of the hand that is grasping the handle.

20 With the above-described arrangement, a user can adjust the position of the device/appliance so that the device/appliance continuously is within an optimum range of orientations relative to an area over which it is necessary to move the device/appliance as the user moves the device/appliance over the area.

25 More specifically, with the above-described arrangement, a user can adjust the position of the device/appliance with minimal twisting movement of the arm/hand of the user that would result in considerable strain or fatigue over a period of time.

30 Preferably the means supporting the device/appliance on the arm ("the device/appliance support means") is a pivot connection between the device/appliance and the arm.

Preferably the means for adjusting the angular

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relationship of the device/assembly and the arm (" the adjustment means") includes a hand-grip lever that is pivotally mounted to the handle and a series of mechanical interconnections that interconnect the lever and the device/assembly, whereby depressing and releasing the lever by applying and releasing finger pressure to the lever moves the device/assembly through the range of angles relative to the arm.

10 Preferably the mechanical interconnections include a cam assembly connected to the lever, a wire connected at one end to the cam assembly and at the other end to a biasing means connected to the arm or the handle, and the wire being arranged to extend from the cam assembly along the length of the arm and around a pulley that forms part of the device/appliance support means on the arm and back along at least part of the length of the arm to the biasing means, whereby in use pivotal movement of the lever in response to finger pressure applied or released by the user actuates the cam assembly and the cam assembly causes movement of the wire along the arm, and the movement of the wire causes rotational movement of the pulley, and the rotational movement of the pulley causes movement of the device/assembly through the range of angles relative to the arm.

The device/appliance may be any device/appliance.

30 By way of example, the device/appliance may be a scanner for scanning library books and/or files and/or other articles in shelves and/or cabinets.

35 Preferably the scanner is an intelligent radio frequency ("RFID") scanner.

Preferably the RFID scanner includes an antenna

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plate.

Preferably the RFID scanner can be mounted to the arm so that scanner can move within a range of angles of 35-180° relative to the arm, with the angles being defined by an included angle between the plane of the antenna plate and an axis of the arm.

The handle may be adapted to be grasped by one hand.

Alternatively, the handle may be adapted to be grasped by both hands.

The arm may be a fixed length.

Alternatively, the arm may be an adjustable length.

By way of example, the arm may be a telescopic arm.

The present invention is described further by way of example with reference to the accompanying drawings of which:

Figures 1 and 2 are front and side views respectively of a preferred embodiment of a scanner assembly that includes a RFID scanner and a hand held support assembly supporting the scanner in accordance with the present invention;

Figures 3 and 4 are cross-sections through the scanner assembly which illustrate the mechanical interconnections between the hand grip trigger of the support assembly and the scanner and the operation of the support assembly to adjust the position of the scanner

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between the positions shown in Figures 3 and 4; and

Figures 5 to 8 illustrate a range of different operational positions of the scanner assembly in relation to shelves holding library books.

The preferred embodiment of the scanner assembly shown in the figures includes:

- 10 (a) a RFID scanner 7 for scanning library books and/or files in shelves and/or cabinets; and
- 15 (b) a hand held support assembly supporting the scanner 7.

In Figure 1 the scanner 7 is positioned relative to the arm 5 so that the scanner 7 and the arm 5 describe an included angle α of 35° .

The position of the scanner 7 can be adjusted from that shown in Figure 1 to a position in which the scanner 7 and the arm 5 describe an included angle of approximately 180° .

The support assembly includes:

- 25 (a) a handle 3 that is adapted to be grasped by a single hand of a user;
- 30 (b) an arm 5 extending from the handle 3, the arm 5 and the handle 3 describing an included angle of approximately 150° ; and
- 35 (c) a means supporting the scanner 7 on the arm 5 in the form of a pivot connection 11 that pivotally mounts the scanner 7 to the arm 5

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so that the scanner 7 can be moved relative to the arm 5 thereby to change the angular relationship between the scanner 7 and the arm 5.

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The support assembly further includes a means for adjusting the angular relationship of the scanner 7 and the arm 5.

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The adjustment means includes a trigger-type lever member 9 located in the handle 3 and a series of mechanical interconnections between the lever member 9 and the scanner 7 that make it possible for a user to adjust the position of the scanner 7 relative to the arm 5 by applying and releasing finger pressure to the lever member 9.

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The mechanical interconnections between the lever member 9 and the scanner 7 are shown in detail in Figures 3 and 4.

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With reference to these figures, the lever member 9 is pivotally mounted to the handle 3 via a pivot connection 13 for rotation about the axis of the pivot connection. The lever member 9 includes a trigger 39 that can be depressed by finger contact of a user. The lever member 9 also includes an arm 15 that is connected to a cam assembly.

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The cam assembly includes a pulley 23 that is mounted to the handle 3 via a pivot connection 25 for rotation about the axis of the pivot connection. The pulley 23 includes a radial slot 19. A forward end of the arm 15 of the lever member 9 includes a pin 17 that extends into the slot 19. The pin/slot arrangement couples together the lever member 9 and the pulley 23.

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A wire 27 is connected at one end to the pulley 23 and at the other end to one end of a compression spring 29. The other end of the compression spring 29 is mounted to the arm 5.

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The wire 27 is arranged to extend from the pulley 23 along the length of the arm 5 to a forward end of the arm and around a pulley 31 located at that end and then back along the arm to the compression spring 29. The pulley 31 forms part of the pivot connection 11 that pivotally mounts the scanner 7 to the arm 5.

With the above-described arrangement, depressing the lever member 9 inwardly from the position shown in Figure 3 to that shown in Figure 4 causes the pin 17 of the lever member 7 to travel in the slot 19 in the pulley 23. This movement of the pin 17 causes clockwise movement of the pulley 23, as viewed in the figures. The clockwise movement of the pulley 23 moves the wire 27 in the direction of the arrows in Figure 3 against the restoring force of the compression spring 29 and wraps a section of the wire 27 in the vicinity of the pulley 23 around the pulley 23. The contact of the wire 27 with the pulley 31 of the pivot connection 11 causes the pulley 31 to rotate counterclockwise, as viewed in the figures, as the wire 27 moves in the directions of the arrows. This movement pivots the scanner 7 between the positions shown in Figures 3 and 4.

The scanner 7 remains in the position shown in Figure 4 while the lever member 7 remains depressed.

The restoring force exerted by the compression spring 29 on the wire 27 causes the wire 29 to return to the position shown in Figure 3 when finger pressure on the lever member 9 is released.

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Figure 5 to 8 illustrate a range of different operational positions of the support assembly and attached scanner 7 in relation to library books on library shelves.

5 In use, with reference to Figures 5 to 8, as a user raises or lowers the scanner 7, the user depresses the lever member 9 and thereby adjusts the angular relationship between the scanner 7 and the arm 5 and maintains the scanner 7 in a preferred orientation or
10 within a range of preferred orientations relative to library books (or other documents) on the shelves.

 It can be appreciated from Figures 5 to 8 that the support assembly, and more particularly the
15 construction of the support assembly so that the angular relationship of the scanner 7 and the arm 5 can be adjusted while the user moves the scanner 7 over an area to be scanned, makes it possible to use the scanner 7 in an ergonomically effective and use-friendly manner.

20 Many modifications may be made to the preferred embodiment of the scanner assembly of the present invention described above without departing from the spirit and scope of the present invention.

25 By way of example, whilst the present invention is described in the context of one particular device, namely a scanner, the present invention is not so limited and extends to any other suitable device/appliance.

30 By way of particular example, one other device/appliance is a vacuum cleaner nozzle.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A device or an appliance assembly includes a device or an appliance and a hand held support assembly supporting the device/appliance for movement relative to the support assembly, and the support assembly includes:
- (a) a handle that a user can grasp with a hand;
 - 10 (b) an arm extending from the handle;
 - (c) a means supporting the device/appliance on the arm so that the device/appliance can move within a range of angles relative to the arm; and
 - 15 (d) a means for adjusting the angular relationship of the device/appliance and the arm, the adjustment means being adapted to be actuated by the user by means of the hand that is grasping the handle.
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2. The device/appliance assembly defined in claim 1 wherein the means supporting the device/appliance on the arm ("the device/appliance support means") is a pivot connection between the device/appliance and the arm.
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3. The device/appliance assembly defined in claim 2 or claim 3 wherein the means for adjusting the angular relationship of the device/assembly and the arm ("the adjustment means") includes a hand-grip lever that is pivotally mounted to the handle and a series of mechanical interconnections that interconnect the lever and the device/assembly, whereby depressing and releasing the lever by applying and releasing finger pressure to the lever moves the device/assembly through the range of angles relative to the arm.
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4. The device/appliance assembly defined in claim 3 wherein the mechanical interconnections include a cam assembly connected to the lever, a wire connected at one
5 end to the cam assembly and at the other end to a biasing means connected to the arm or the handle, and the wire being arranged to extend from the cam assembly along the length of the arm and around a pulley that forms part of the device/appliance support means on the arm and back
10 along at least part of the length of the arm to the biasing means, whereby in use pivotal movement of the lever in response to finger pressure applied or released by the user actuates the cam assembly and the cam assembly causes movement of the wire along the arm, and the
15 movement of the wire causes rotational movement of the pulley, and the rotational movement of the pulley causes movement of the device/assembly through the range of angles relative to the arm.

20 5. The device/appliance assembly defined in any one of the preceding claims wherein the device/appliance is a scanner for scanning library books and/or files and/or other articles in shelves and/or cabinets.

25 6. The device/appliance assembly defined in claim 5 wherein the scanner is an intelligent radio frequency ("RFID") scanner.

7. The device/appliance assembly defined in claim 5
30 or claim 6 wherein the scanner is mounted to the arm so that scanner can move within a range of angles of 35-180° relative to the arm, with the angles being defined by an included angle between the plane of the antenna plate and an axis of the arm.

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8. The device/appliance assembly defined in any one of the preceding claims wherein the arm is a fixed length.

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9. The device/appliance assembly defined in any one of claims 1 to 7 wherein the arm is an adjustable length.

5 10. The device/appliance assembly defined in claim 9 wherein the arm is a telescopic arm.

11. A hand held support assembly for supporting a device or an appliance which includes:

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(a) a handle that a user can grasp with a hand;

(b) an arm extending from the handle;

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(c) a means for mounting a device or an appliance to the arm so that the device/appliance can move within a range of angles relative to the arm; and

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(d) a means for adjusting the angular relationship of the device/appliance and the arm when the device/appliance is mounted to the arm, the adjustment means being adapted to be actuated by the user by means of the hand that is grasping the handle.

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12. The support assembly defined in claim 11 wherein the means for supporting the device/appliance on the arm ("the device/appliance support means") is a pivot connection between the device/appliance and the arm.

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13. The support assembly defined in claim 11 or claim 12 wherein the means for adjusting the angular relationship of the device/assembly and the arm ("the adjustment means") includes a hand-grip lever that is pivotally mounted to the handle and a series of mechanical

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interconnections that interconnect the lever and the device/assembly, whereby depressing and releasing the lever by applying and releasing finger pressure to the lever moves the device/assembly through the range of angles relative to the arm.

14. The support assembly defined in claim 13 wherein the mechanical interconnections include a cam assembly connected to the lever, a wire connected at one end to the cam assembly and at the other end to a biasing means connected to the arm or the handle, and the wire being arranged to extend from the cam assembly along the length of the arm and around a pulley that forms part of the device/appliance support means on the arm and back along at least part of the length of the arm to the biasing means, whereby in use pivotal movement of the lever in response to finger pressure applied or released by the user actuates the cam assembly and the cam assembly causes movement of the wire along the arm, and the movement of the wire causes rotational movement of the pulley, and the rotational movement of the pulley causes movement of the device/assembly through the range of angles relative to the arm.

15. The support assembly defined in any one of claims 11 to 14 wherein the arm is a fixed length.

16. The support assembly defined in any one of claims 11 to 14 wherein the arm is an adjustable length.

17. The device/appliance assembly defined in claim 16 wherein the arm is a telescopic arm.