

"DETECTOR FOR DETECTING THE PASSAGE OF FIRST AND
SECOND MATERIAL THROUGH RESPECTIVE GUIDE PATHS"

This invention relates to a detector for detecting the passage of first and second material through respective guide paths and, although the invention is not so restricted, it relates more particularly to a
5 detector of a printer provided with two paths for guiding record material such as paper (hereinafter referred to simply as paper) to a position between a printer head and a platen of the printer.

A printer is known having two guide paths for guiding
10 the paper to a position between a printer head and a platen of the printer so as to be printed thereon. The printer had two paper detectors which were provided in the respective guide paths, these detectors being constituted by photo-sensors or micro switches.

15 Consequently, because two detectors had to be provided in the respective guide paths, the construction was complicated, assembly was troublesome, and hence the manufacturing cost was high.

Accordingly, it is an object of the present invention
20 to provide a single detector which is capable of detecting the presence or absence of the paper in either guide path.

According therefore to the present invention, there is provided a detector comprising first and second guide paths for respectively guiding first and second material

therethrough; a reflection type photo-sensor arranged to receive light reflected by the first material when the latter is passed through the first guide path; a displaceable member at least a part of which is disposed within the second guide path so that the displaceable member is displaced on movement of the second material through the second guide path; and a reflector which, as a result of the displacement of the displaceable member, is moved from an inoperative position in which it does not reflect light onto the photo-sensor to an operative position where it does so reflect light.

The reflector may form an integral part of the displaceable member. Preferably, however, the reflector forms at least part of a reflector member which is separate from the displaceable member and is movable by the latter.

The photo-sensor is preferably provided with a light-emitting element arranged to direct light onto the first material when the latter is passed through the first guide path and arranged to direct light onto the reflector when the latter is in its operative position, the photo-sensor also having a light-receiving element arranged to receive light reflected from the first material or from the reflector.

In its preferred form, the detector comprises a reflection type photo-sensor having a light-emitting element for emitting light towards paper which has been inserted into one guide path and a light-receiving element for receiving reflected light from said paper, a detecting lever which is displaced by paper when the latter is inserted into the other guide path, and a reflecting plate which is displaced to a position where it covers the front of the photo-sensor in response to the displacement of the detecting lever. Consequently, the photo-sensor faces one guide path so as to detect whether the paper is inserted into this particular guide path or not, and when the paper is inserted into the other guide path, the reflecting plate is positioned in front of the photo-sensor owing to the displacement of the detecting lever. As a result, the light coming from the photo-sensor is reflected by the reflecting plate, and through the receipt by the photo-sensor of the thus reflected light the presence or absence of the paper in the other guide path is detected.

The invention also comprises a printer provided with a detector as set forth above. Preferably, each of the first and second guide paths guides the respective material to a position between a printer head of the printer and a platen thereof.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is a sectional view of a printer provided with a detector according to the present invention,
5 Figure 1 illustrating the positions of the parts when a first guide path is in use,

Figure 2 is a plan view of a part of the detector showing a detecting lever, etc. with a reflecting plate omitted,

10 Figure 3 is a front view of a part of the detector showing the relationship between the reflecting plate and the detecting lever,

Figure 4 is a left-hand side view of the reflecting plate, and

15 Figure 5 is a sectional view similar to Figure 1 but illustrating the positions of the parts when a second guide path is in use.

Terms such as "left" and "right", as used in the description below, are to be understood to refer to directions
20 as seen in the accompanying drawings.

An embodiment of the present invention will now be described with reference to the accompanying drawings.

Referring to Figure 1, between the side faces of a
25 frame 1 of a printer there is mounted a guide shaft 2, on which

is slidably mounted a carriage 3 for reciprocating movement thereon. A printer head 4 is mounted on the carriage 3 and may thus be reciprocated with respect to a platen 5 which is disposed in front of the printer head 4 and which is rotatably mounted on a shaft 6 carried by the frame 1.

Within the frame 1 there are provided two guide paths for guiding record papers, or other record media P1, P2, namely a first guide path A for the paper P1 which starts from the right-hand side of Figure 1 and passes under the platen 5 and then between the platen 5 and the printer head 4, and a second guide path B for the paper P2 (Figure 5) which starts from a tapered paper insertion inlet 7 in the lower portion of the frame 1, goes upward, is thereafter guided by a paper holding spring 8, and then passes between the platen 5 and the printer head 4.

On the underside of the frame 1 there is integrally formed a support frame 1a to which there is secured a circuit substrate 9. At a predetermined spot on the upper surface of the circuit substrate 9 there is mounted a reflection type photo-sensor 10. The photo-sensor 10 detects the presence/absence of the paper P1 being inserted in the first guide path A formed on the lower side of the platen 5. The photo-sensor 10 has a light emitting element 10a and a light receiving element 10b (Figure 2). When the paper P1 is disposed in the first guide path A, the light emitted by the light emitting

element 10a is reflected by the paper P1 back to the light reviewing element 10b.

5 In the case of the second guide path B, a detecting lever 11 is provided a little above the paper insertion inlet 7, the detecting lever 11 having a part which projects into the second guidepath B as shown in Figure 1 so that the detecting lever 11 can be displaced by the paper P2 when the latter is inserted into the second guide path B. As shown in Figure 2, the detecting lever 11 has
10 bearing portions 11a, 11a which are pivotally supported by a bearing frame 1b formed in the support frame 1a. The bearing portions 11a, 11a have pushing segments 11b, 11b formed integrally at their respective edges.

15 A reflecting plate 12, which is pivotable by the pushing segments 11b, 11b to a position in which it covers the front of the photo-sensor 10, will now be described.

As shown in Figure 2, the frame 1 has shaft portions 1c, 1c which are aligned with each other on opposite sides
20 of the photo sensor 10. Although this is not shown in Figure 2, the reflecting plate 12 is pivotally supported within a hole 1d by the shaft portions 1c, 1c. The configuration of the reflecting plate 12 is, as shown in Figures 3 and 4, substantially U-shaped as a whole and has
25 bearing holes 12a (only one shown) bored in its central

portion (Figure 3), the shaft portions 1c, 1c being disposed in the bearing holes 12a. The side segments of the reflecting plate 12 which extend parallel to each other have tongue pieces 12b, 12b formed integrally therewith which project outwardly, and these tongue pieces 12b, 12b are in contact with the pushing segments 11b, 11b of the detecting lever 11. The inner surface of the head section (upper section) of the reflecting plate 12 which is orthogonal to its side surfaces forms a reflecting surface 12c. The left hand side segment of the reflecting plate 12 is longer than the right hand side segment thereof, the lower end of the longer side segment having a lock hole 12d to which one end of a spring 13 is attached. The reflecting plate 12 is thus always subjected to a weak spring force which urges it counter-clockwise about the shaft portions 1c, 1c.

Accordingly, when the paper P1 travels through the first guide path A so that it is fed between the printer head 4 and the platen 5, as shown in Figure 1, the presence/absence of the paper P1 being inserted below the platen 5 is detected by the reflection type photo-sensor 10.

On the contrary, when the paper P2 is inserted into the second guide path B, as shown in Figure 5, and as this paper is fed upwardly through the insertion inlet 7, the

detecting lever 11 swings counter-clockwise about its bearing

portions 11a, 11a and, as a result, the pushing segments

11b, 11b of the detecting lever 11 push the tongue pieces

12b, 12b of the reflecting plate 12. Hence the reflecting

5 plate 12 is rotated counter-clockwise about the shaft

portions 1c, 1c in opposition to the spring force of the

spring 13. Consequently, the reflecting surface 12c of

the reflecting plate 12 is displaced to a position where it

covers the front of the photo-sensor 10, so that the light

10 coming from the light emitting element 10a of the photo-sensor

10 is reflected by the reflecting surface 12c and detected

by the light receiving element 10b, whereby the presence/absence

of the paper P2 can be detected by the photo-sensor 10.

Of course, when the paper P2 is not inserted through

15 the insertion inlet 7, the reflecting plate 12 is

returned to its original position owing to the spring

force of the spring 13, and hence the photo-sensor 10 is

adapted to detect the paper P1 being inserted into the

first guide path A.

20 If desired, the reflecting plate 12 may be made so
that it can alternatively or additionally returned to its
original position under its own weight.

In the printer described above, it is thus possible
to detect record paper in either guide path by one single

25 detecting means thus simplifying the construction and
reducing its manufacturing cost.



C L A I M S

1. A detector comprising first and second guide paths
for respectively guiding first and second material therethrough;
a reflection type photo-sensor arranged to receive light
reflected by the first material when the latter is passed
5 through the first guide path; a displaceable member at least
a part of which is disposed within the second guide path
so that the displaceable member is displaced on movement
of the second material through the second guide path;
and a reflector which, as a result of the displacement
10 of the displaceable member, is moved from an inoperative
position in which it does not reflect light onto the
photo-sensor to an operative position where it does
so reflect light.
2. A detector as claimed in claim 1 in which the
15 reflector forms an integral part of the displaceable
member.
3. A detector as claimed in claim 1 in which the
reflector forms at least part of a reflector member which
is separate from the displaceable member and is
20 movable by the latter.



4. A detector as claimed in any preceding claim in which the photo-sensor is provided with a light-emitting element arranged to direct light onto the first material when the latter is passed through the first guide path and arranged to direct light onto the reflector when the latter is in its operative position, the photo-sensor also having a light-receiving element arranged to receive light reflected from the first material or from the reflector.

5. A detector substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

6. A printer provided with a detector as claimed in any preceding claim.

7. A printer as claimed in claim 6 in which each of the first and second guide paths guides the respective material to a position between a printer head of the printer and a platen thereof.

8. A paper detector of a printer having two guide paths for guiding recording paper to between a printer head and a platen, which comprises a reflection type photo-sensor for detecting the presence/absence of the recording paper being inserted in one of said guide paths, a detecting lever to be displaced by the recording paper when it is inserted in the other of said guide paths, and a reflecting plate capable of being displaced to a position to cover the front of said photo-sensor in response to the displacement of said detecting lever.