

"FEED UNIT FOR FEEDING PAPER OR OTHER RECORD MEDIUM"

The present invention relates to a paper feed unit and, although the invention is not so restricted, it relates more particularly to a feed unit which is detachably mounted on a body of a record producing apparatus, such as a printer, copier, or facsimile system, the feed unit acting to feed sheets of paper or other record medium into the body of the said apparatus.

A paper feed unit has been suggested which may be set, for example, on a printer and which is provided with a lock lever to prevent the unit from being easily detached from the printer due to vibration or inclination, or for other cause. The lever has a detent which engages a pole or shaft secured to the body of the printer to connect the paper feed unit to the said body. A lock release button is disposed in a handle of the paper feed unit. When the button is depressed, the detent of the lever is disengaged.

When, however, such a paper feed unit is detached from the body of the printer or is mounted on the body, it is necessary to operate the handle or recess of the unit manually so as to move the unit upwardly or downwardly while the lock release button is kept depressed. This makes it difficult to mount or detach the paper feed unit. When the feed unit is withdrawn from the body of the printer, if the operator inadvertently fails to depress the lock release button, the

unit cannot be detached from the body. In addition, the detent or the engaged pole or shaft may be partially deformed or damaged.

5 It is an object of the present invention to provide a feed unit which may be easily mounted on and detached from the record producing apparatus without the need to push the lock release button.

10 According to the present invention, there is provided a feed unit for feeding paper or other record medium to a record producing apparatus mounted beneath it, the feed unit having a vertically extending hole which is open at its bottom and which is adapted to receive an anchoring shaft of the record producing apparatus when the feed unit is mounted on the latter; the feed unit
15 also having a rotatably mounted lock lever provided with a detent, the lock lever being movable between an operative position in which the detent extends transversely of the hole so as to prevent withdrawal of the anchoring shaft therefrom when the feed unit
20 is so mounted and an inoperative position

in which such withdrawal may be effected; and a lock release arm which extends from the lock lever and which has a manually engageable portion which is engageable to move the lock lever into its inoperative position, the manually engageable portion being manually engageable from the exterior of the feed unit; the feed unit being provided with at least one recess into which the fingers of an operator may be inserted, the arrangement being such that, by inserting his fingers into the or each said recess, the operator may raise the feed unit and may simultaneously raise the manually engageable portion so as to move the lock lever into its inoperative position.

An opening is preferably formed in the wall of the or each recess, the manually engageable portion protruding into the or each recess through its opening.

Means are preferably provided for urging the lock lever towards its operative position.

The feed unit preferably has a groove into which may be inserted a second anchoring shaft of the record producing apparatus.

The invention also comprises a record producing apparatus on which is detachably mounted a feed unit as set forth above.

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

Figure 1 is a right side elevation of a paper feed unit according to the present invention and a record producing apparatus, the feed unit being shown as having been detached from the body of the record producing apparatus; and

Figure 2 is a right side elevation of the feed unit and the record producing apparatus shown in Figure 1, the feed unit being shown as having been set on the body of the record producing apparatus.

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

Referring to Figures 1 and 2, there is shown a paper feed unit 1 that can be detachably mounted on a body 2 of a record producing apparatus, such as a printer. It is to be noted that only those portions of the unit 1 and the body 2 which are related to the present invention are described below.

As shown in Figure 1, the paper feed unit 1 has a side plate 3 on the right hand side thereof. A support plate 5, which is secured to the side plate 3 with three screws 4, has an engagement hole 6 that is open on its lower side.

The plate 3 has a groove 3a and a cover 9 is mounted on and secured to the plate 3 by means of screws 7, 8. The support plate 5 is spaced a given distance from the side plate 3. Mounted between the side plate 3 and the support plate 5 is a lock lever 10 which is rockable about its centre of rotation on a screw 7, the latter being disposed at the upper end of the lever 10. The lever 10 has a detent 11 at its lower end. The detent 11 can be disposed in a position in which it extends across the hole 6 as viewed from the side.

A lock release arm 12 extends substantially horizontally from a portion (in this case, the centre of rotation) of the lever 10. The right hand end of the arm 12 is bent to form a hook portion 13. The cover 9 is provided with an angled handling recess 14 that has a depth and a length sufficient to allow fingertips to be inserted into it. An opening or through hole 15 is formed in the wall of the recess 14, and thus in the side plate 3, and the hook portion 13 protrudes into the recess 14 through the opening 15. The lever 10 is biased in a clockwise direction by a return spring (not shown). The clockwise rotation of the lever 10 is restricted by a stopper (not shown). The left hand side of the feed unit 1 has a configuration which is the same as that of the right hand side as described above.

The body 2 of the record producing apparatus comprises a casing 16 in which a printer mechanism is housed. The mechanism has a frame 17 having anchoring shafts 18 and 19 which are adapted to enter into the hole 6 and the groove 3a, respectively, in the feed unit 1 so as to connect the feed unit 1 to the body 2 of the record producing apparatus. When the paper feed unit 1 is mounted on the body 2 of the record producing apparatus in the position shown in Figure 2, the anchoring shaft 18 is located at and extends through the upper end of the hole 6 and is locked therein by the detent 11 which at this time extends across the hole 6 so as to prevent removal of the anchoring shaft 18 therefrom. When, however, the lever 10 is moved counter-clockwise as described below, the detent 11 is moved to a position in which it no longer extends across the hole 6, whereby the anchoring shaft 18 is no longer locked in the latter.

The body 2 has a knob 20 to enable the user to feed paper or other record medium manually.

In order to mount the paper feed unit 1 on the body 2 of the record producing apparatus or to detach the unit 1 from the body 2, the fingers of both hands are first inserted into the recesses 14 on the opposite sides of the unit 1. As a result, the fingertips necessarily come into contact with the hook portion 13 of the lock release

arm 12. Then, if the feed unit 1 is raised, a counter-clockwise rotating force acts on the release arm 12, shifting the lock lever 10 towards the right to an inoperative position illustrated by chain-dotted lines in Figure 1. This causes the detent 11 to be moved away from the position in which it extends across the hole 6. Then, if the feed unit 1 is raised or lowered while the fingers remain in contact with the recesses 14 and the hook portion 13, the feed unit 1 can be detached from, or mounted on, the body 2. That is to say, the lock lever 10 is released simply by raising the feed unit 1 in a normal fashion. When the fingers are withdrawn from the recesses 14, the lock lever 10 is returned to its operative or lock position, i.e. its leftward position, as shown in Figure 1, by the action of the return spring.

It is to be understood that many modifications and variations can be made by those skilled in the art within the scope of the present invention as defined by the appended claims. For example, the shape of the lock release arm 12 or the position at which the arm 12 is connected to the lock lever 10 may be varied at will. The requirement is that when a force that vertically pushes up the hook portion 13 acts on the hook portion 13 at the end of the arm 12, a rotational moment occurs. Consequently, the position at which the

arm 12 is connected to the lock lever 10 should be located off the vertical line passing through the centre of rotation of the lock lever 10.

5 It is also possible to mount the lock lever 10 only on one side of the feed unit 1. Since the anchoring shaft 19 of the body 2 of the record producing apparatus is received in the groove 3a of the feed unit only to ensure that the feed unit 1 may be mounted in a stable position, the casing 16 of the body 2 may be arranged to support
10 a portion of the feed unit 1. Further, the shaft 18 may extend horizontally from an inner surface of the casing 16 or may be formed integrally with the casing 16.

In the paper feed unit described above, the unlocking operation can be automatically performed simply
15 by raising the paper feed unit in a normal manner. Therefore, the feed unit can be mounted and detached quite easily and quickly. Further, since the paper feed unit of the present invention can be made up of a smaller number of components than prior art units, it is more
20 economical and easier to assemble.

C L A I M S

1. A feed unit for feeding paper or other record medium to a record producing apparatus mounted beneath it, the feed unit having a vertically extending hole which is open at its bottom and which is adapted to receive an anchoring shaft
- 5 of the record producing apparatus when the feed unit is mounted on the latter; the feed unit also having a rotatably mounted lock lever provided with a detent, the lock lever being movable between an operative position in which the detent extends transversely of the hole so as to prevent withdrawal
- 10 of the anchoring shaft therefrom when the feed unit is so mounted and an inoperative position in which such withdrawal may be effected; and a lock release arm which extends from the lock lever and which has a manually engageable portion which is engageable to move the lock lever into its inoperative position,
- 15 the manually engageable portion being manually engageable from the exterior of the feed unit; the feed unit being provided with at least one recess into which the fingers of an operator may be inserted; the arrangement being such that, by inserting his fingers into the or each said recess, the
- 20 operator may raise the feed unit and may simultaneously raise the manually engageable portion so as to move the lock lever into its inoperative position.



2. A feed unit as claimed in claim 1 in which an opening is formed in the wall of the or each recess, the manually engageable portion protruding into the or each recess through its opening.
- 5 3. A feed unit as claimed in claim 1 or 2 comprising means for urging the lock lever towards its operative position.
4. A feed unit as claimed in any preceding claim in which the feed unit has a groove into which may be
- 10 inserted a second anchoring shaft of the record producing apparatus.
5. A feed unit substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
6. A record producing apparatus on which is detachably
- 15 mounted a feed unit as claimed in any preceding claim.
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