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Rutishauser

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[45] **Date of Patent: Dec. 1, 1998**

[54] **COVERED FEED UNIT FOR FEEDING RECORDING MEDIA INTO AN OFFICE MACHINE**

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[73] Assignee: **Rutishauser Data AG**, Switzerland

[21] Appl. No.: **686,186**

[22] Filed: **Aug. 1, 1996**

[30] **Foreign Application Priority Data**

Aug. 10, 1995 [CH] Switzerland 02 303/95

[51] **Int. Cl.**[6] **B65H 5/22**

[52] **U.S. Cl.** **271/3.2**; 271/4.1; 271/273; 271/186

[58] **Field of Search** 271/3.2, 3.24, 271/4.1, 186, 273, 274, 225, 162

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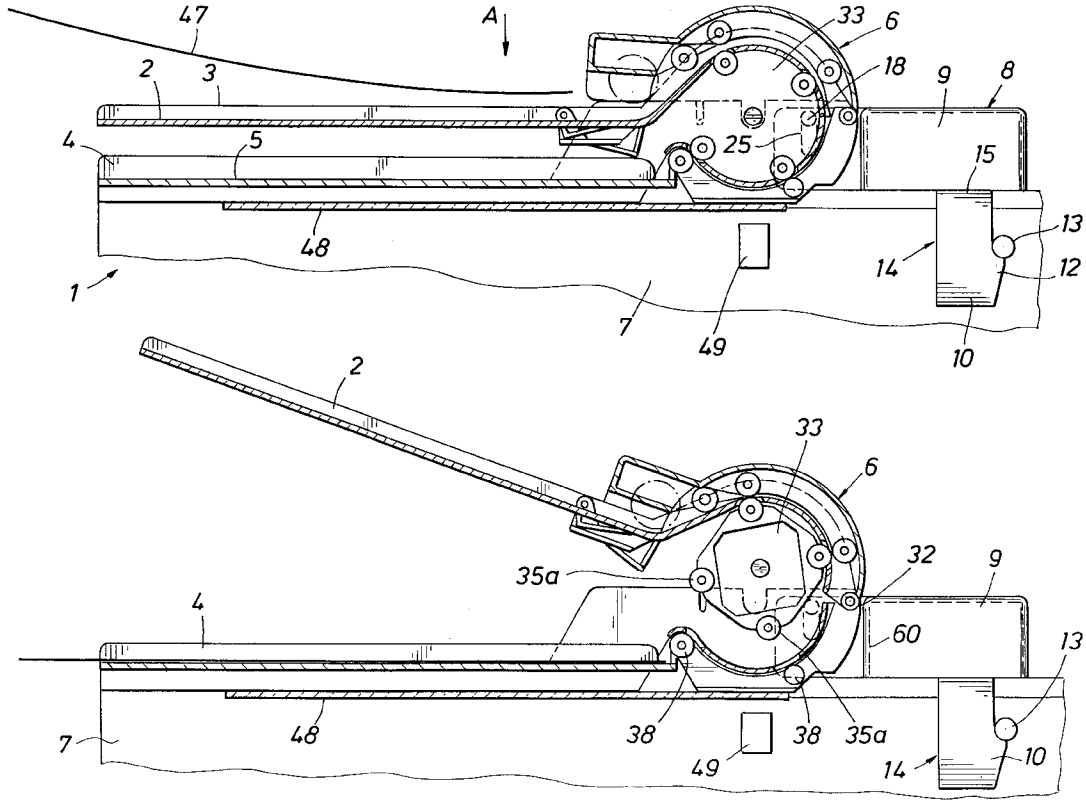
Primary Examiner—Boris Milef

Attorney, Agent, or Firm—Tim Headley; Haynes and Boone, L.L.P.

[57] **ABSTRACT**

A covered feed unit (**1**) fits on the housing of an office machine (**7**), in particular, of a flat-bed scanner, having a feed opening (**47**) for recording media (**46**), and having a discharge opening which is arranged in a plane located beneath the feed opening, and which is intended for the recording media. Between the feed opening and the discharge opening, the covered feed unit (**1**) has a deflecting device (**6**) which has a drive unit (**33**). The covered feed unit transports the recording media (**46**) via a transporting path by means of driven transporting rollers (**35***a*, **35***b*) and idler rollers (**38**), which form a clamping nip with the transporting rollers. The deflecting device (**6**) is enclosed by a covering. An upper cover (**3**) which bounds the feed opening is connected pivotally via a hinge (**32**) to an upper cover (**5**) which bounds the discharge opening. The drive unit (**33**), with its drive-connected transporting rollers (**35***a*, **35***b*), is disposed in that end region of the upper cover (**3**), adjacent to the hinge (**32**). Idler rollers (**38**) are provided in the lower cover (**5**).

15 Claims, 6 Drawing Sheets



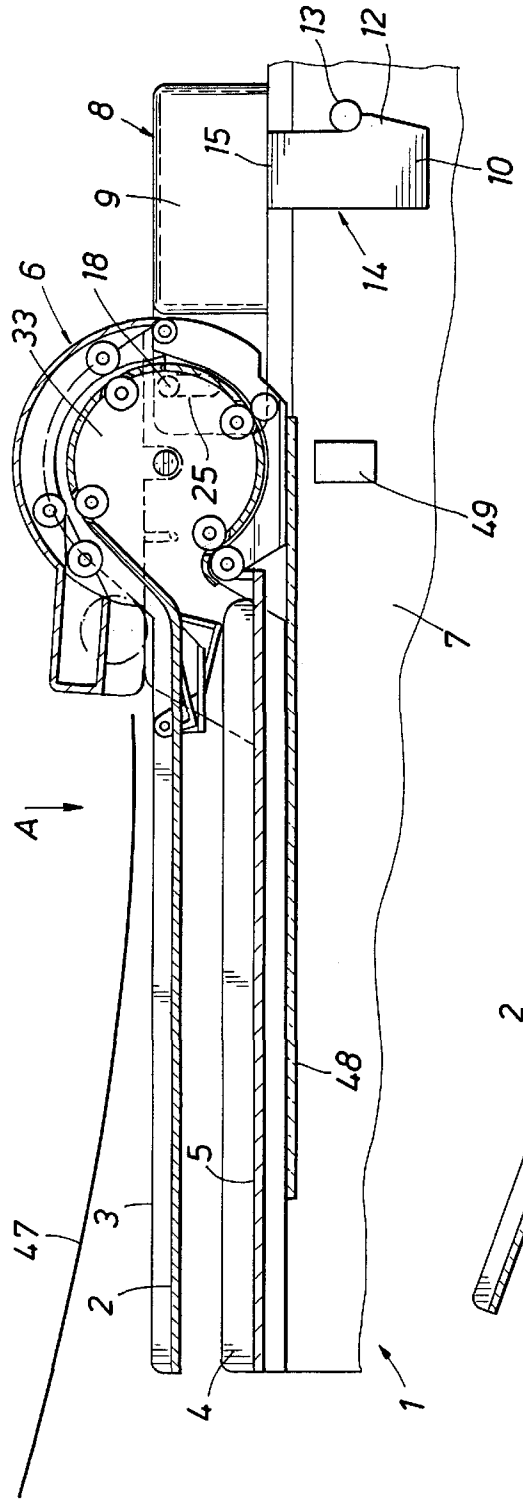

13
12
8
15
10
9
14
6
18
33
25
49
7
A
48
5
47
3
2
4
1

FIG. 1

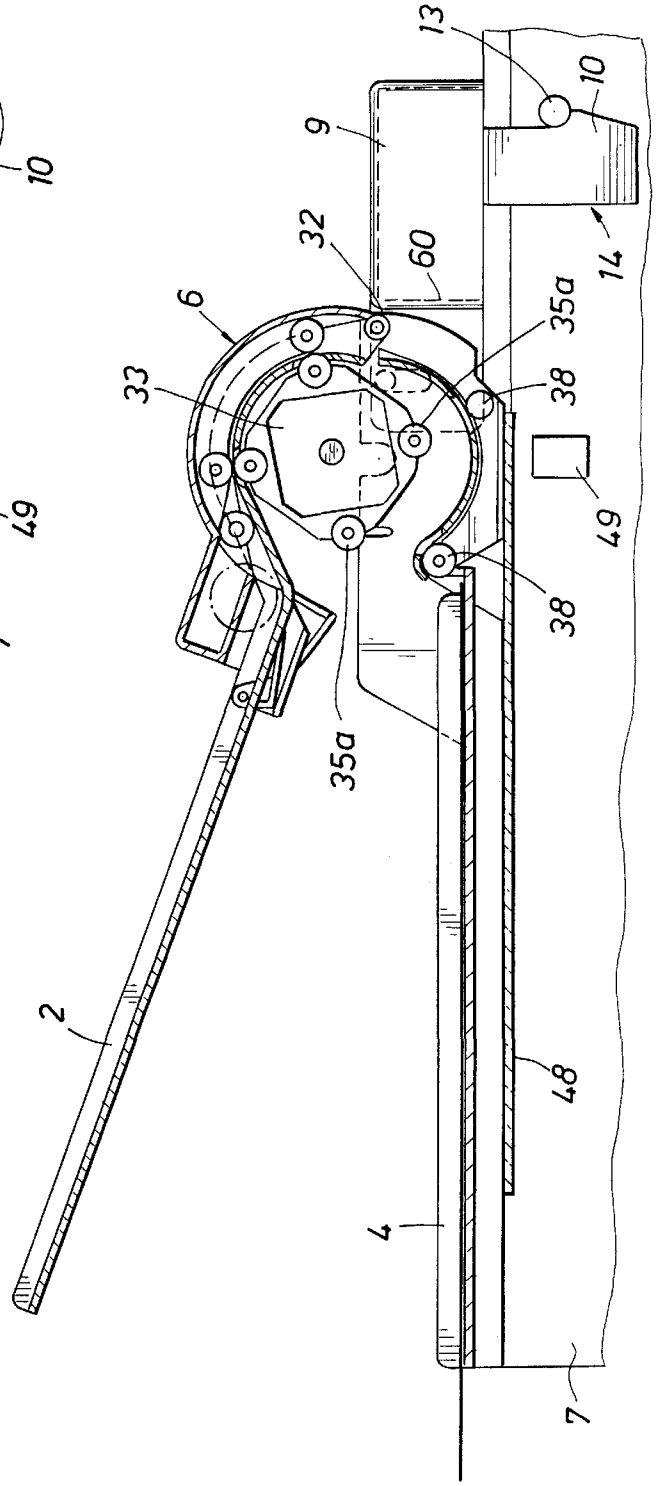
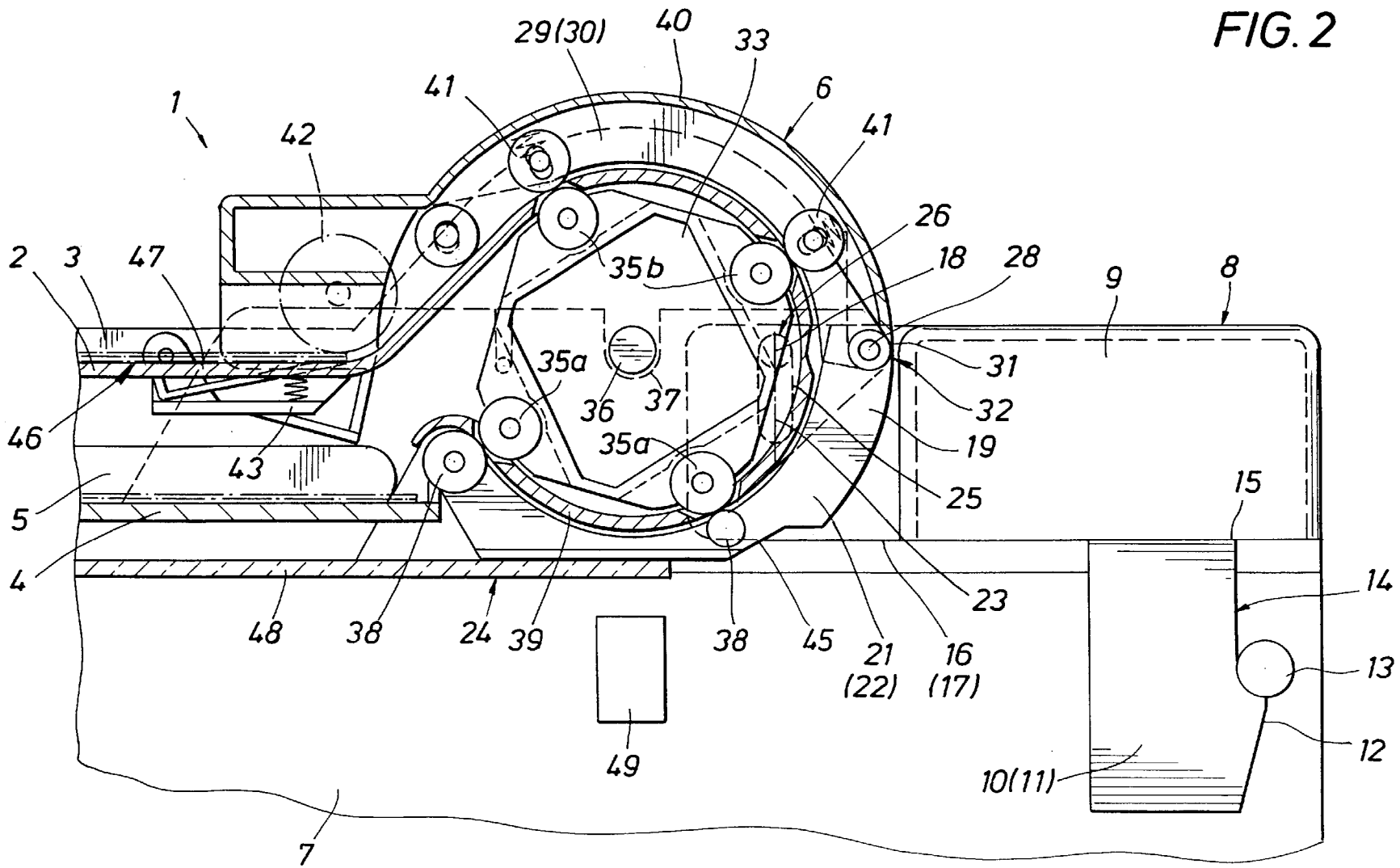

13
10
9
32
60
14
6
35a
33
38
49
38
35a
2
48
4
7

FIG. 4

FIG. 2


1
42
29(30)
40
33
41
6
41
26
18
28
9
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2
3
47
35b
31
32
19
25
35a
36
37
35a
46
43
5
4
15
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10(11)
48
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45
21
(22)
16
(17)
23
49
7

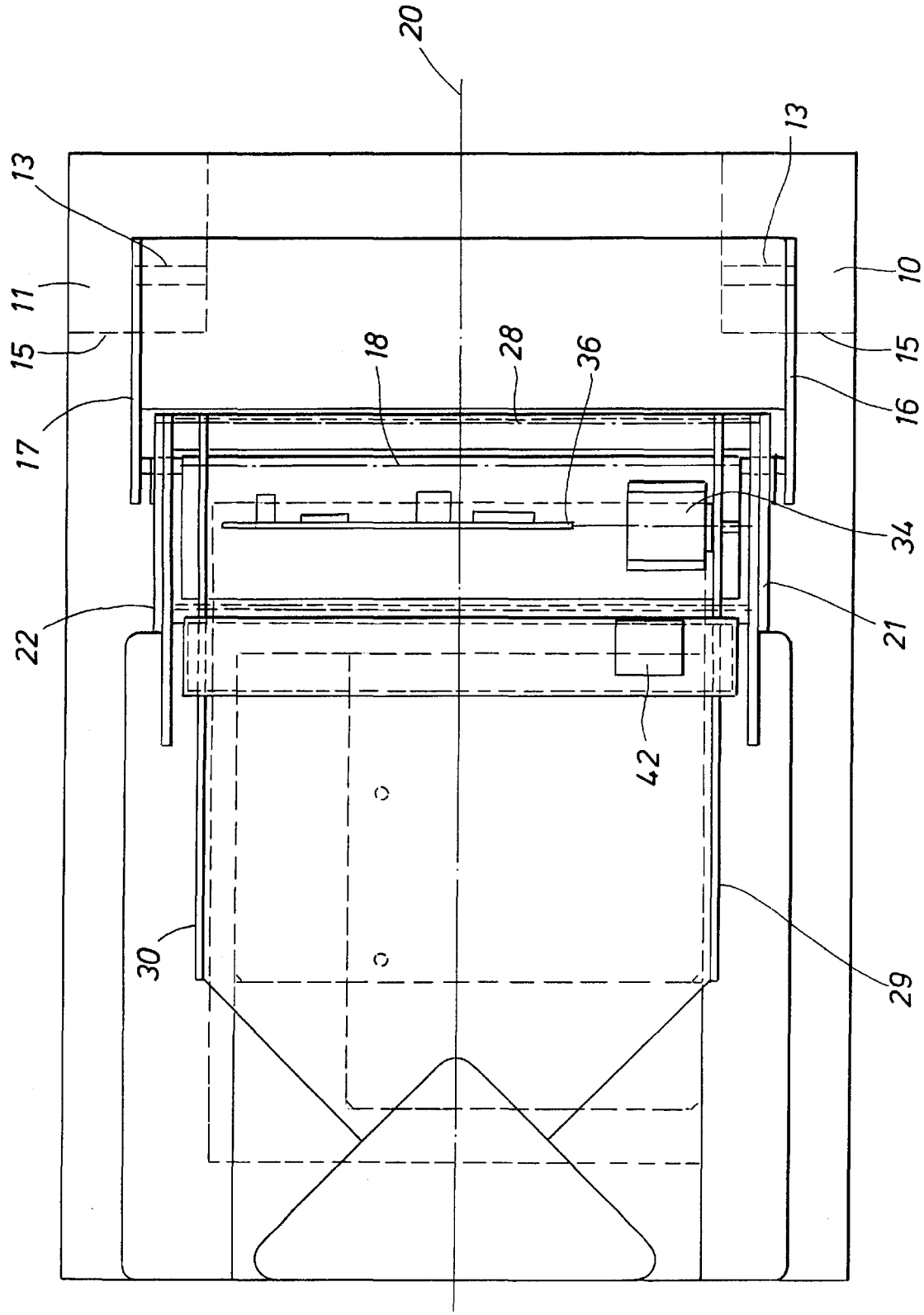


FIG. 3

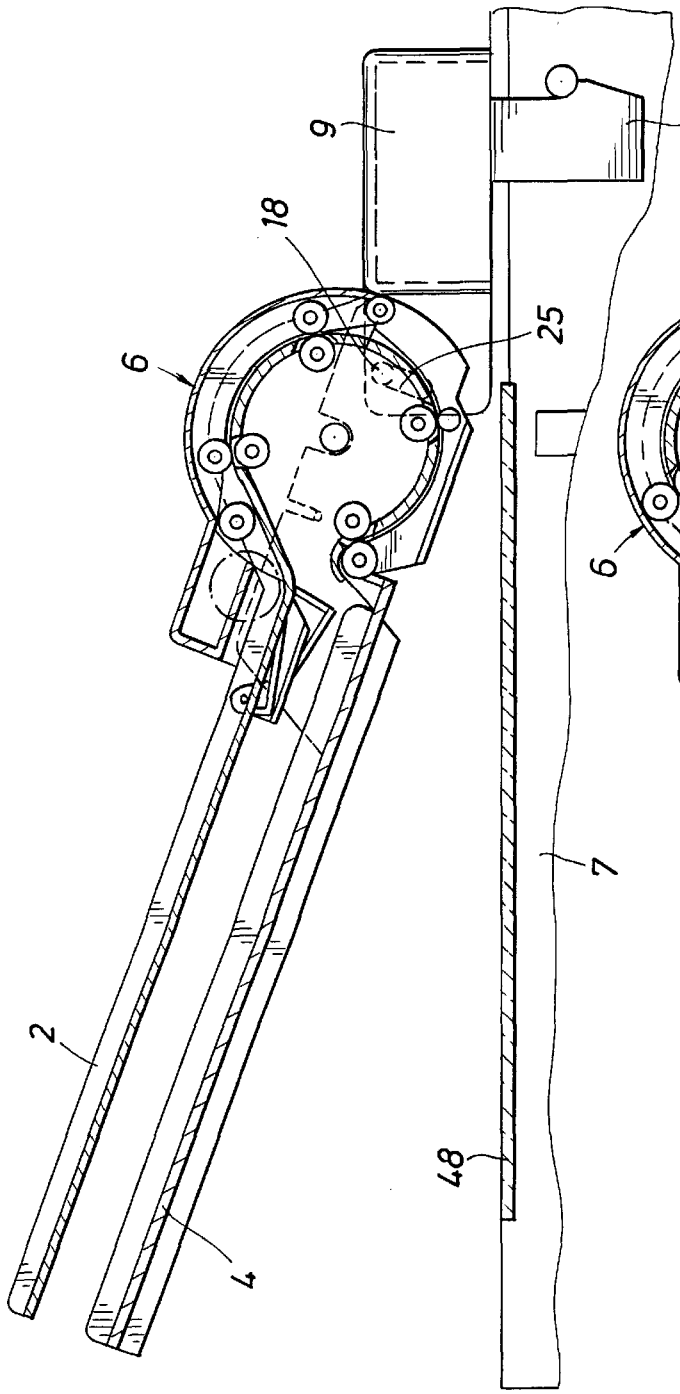


FIG. 5

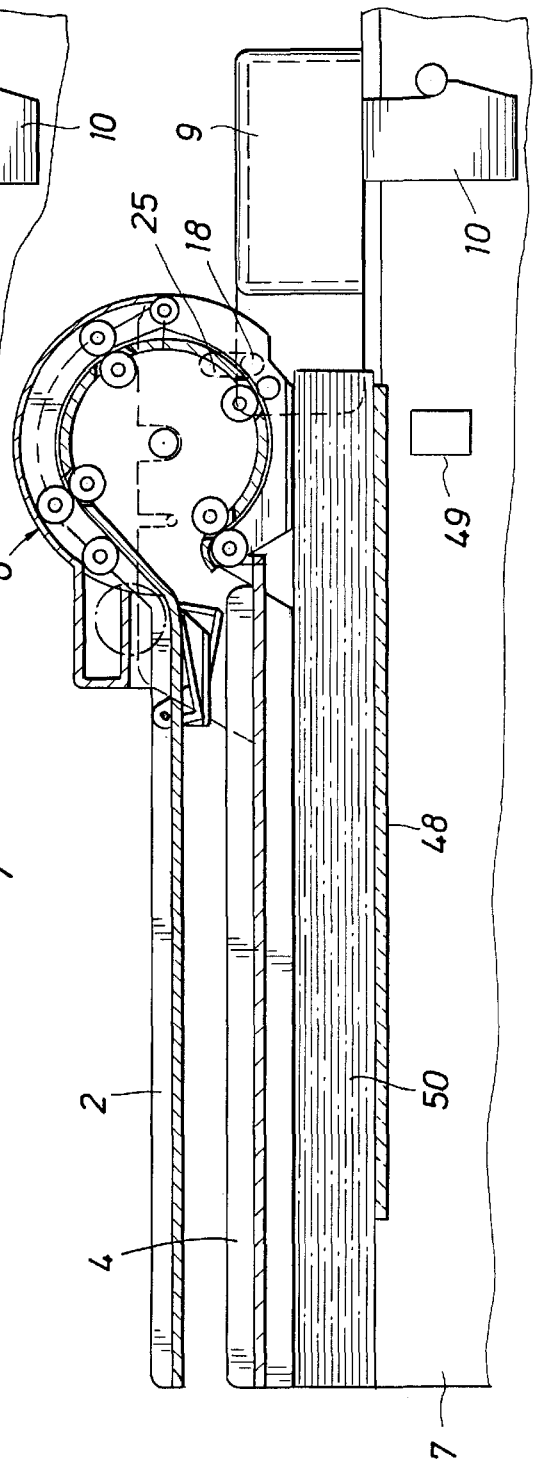
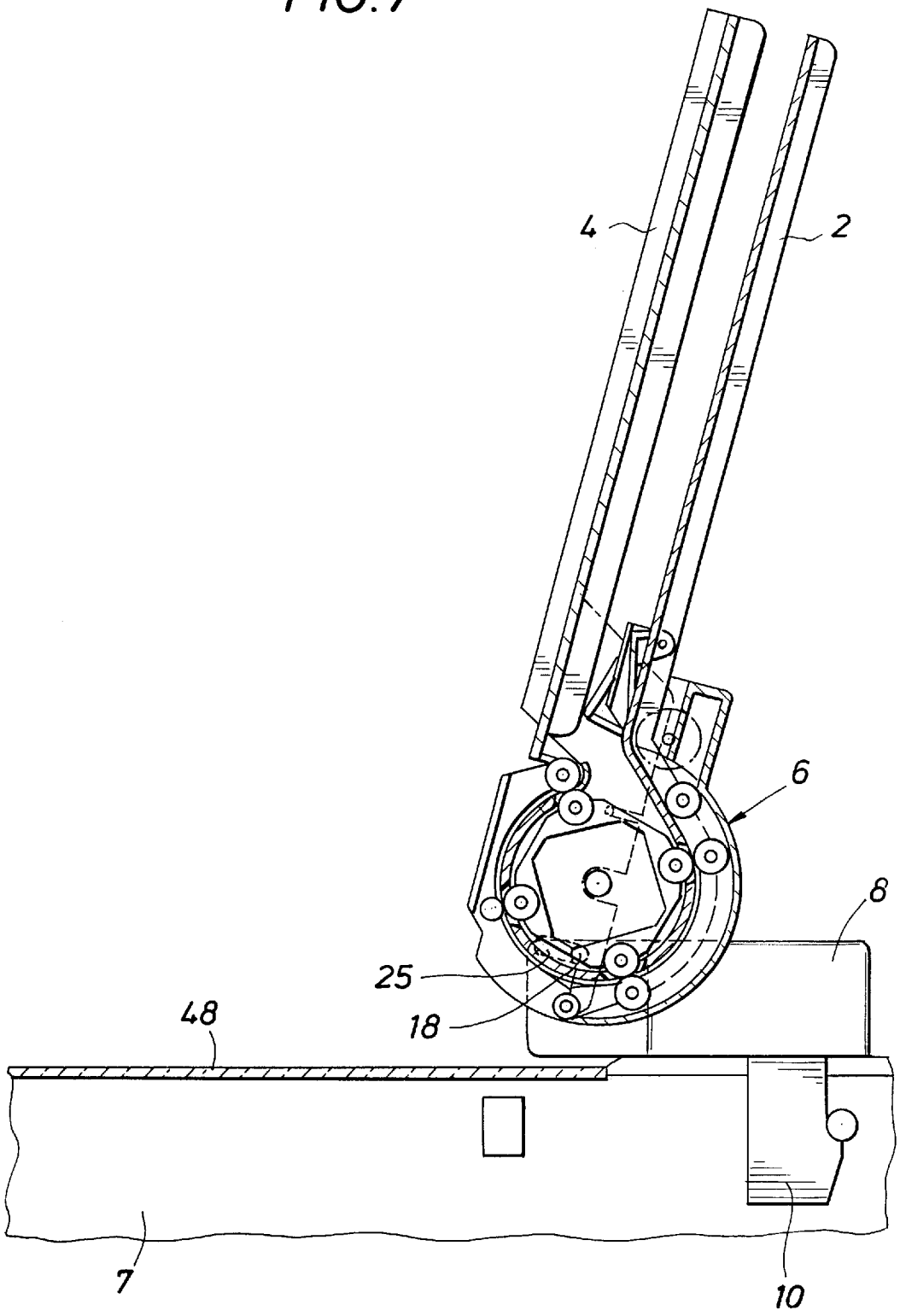


FIG. 6

FIG. 7



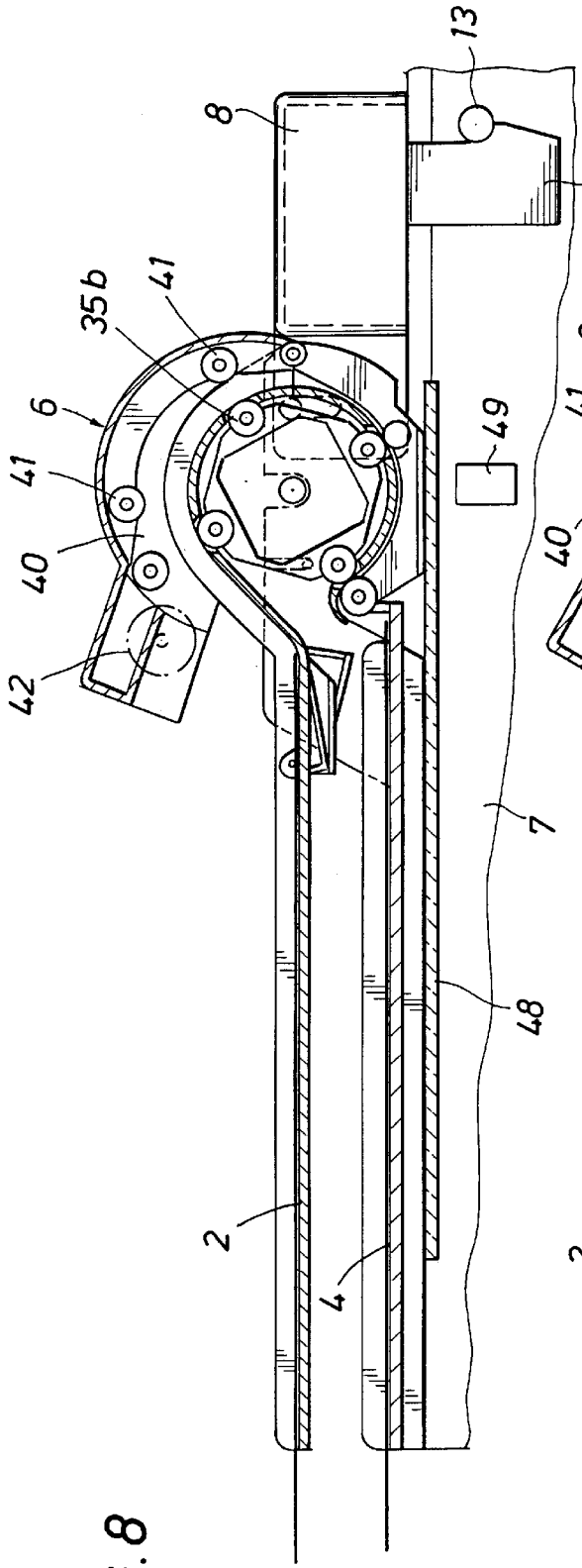
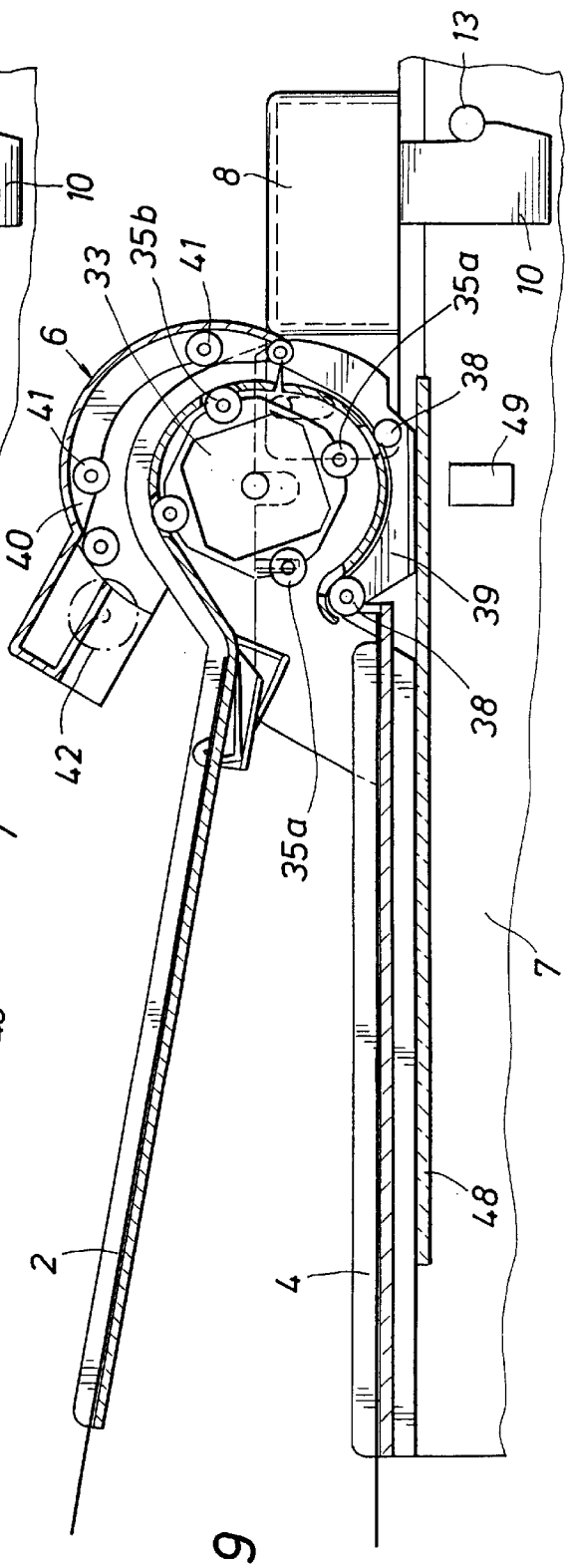

13
8
10
35b
41
6
41
40
42
49
7
48
2
4

FIG. 8


13
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33
35b
41
35a
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FIG. 9

COVERED FEED UNIT FOR FEEDING RECORDING MEDIA INTO AN OFFICE MACHINE

BACKGROUND OF THE INVENTION

The invention relates to a covered feed unit for fitting on the housing of an office machine, in particular of a flat-bed scanner.

The covered feed units in the prior art include: a feed opening for recording media; a discharge opening which is disposed in a plane located beneath the feed opening and which is intended for the recording media; and a deflecting device. The deflecting device includes a drive unit having a protective cover over it. The drive unit transports recording media along a transporting path from the feed opening to the discharge opening by means of driven transporting rollers and idler rollers which form a clamping nip with the transporting roller. However, the drive units of the prior art are only partially accessible under the protective cover.

Such a covered feed unit is usually provided for the automatic feed of recording media in flat-bed scanners, a recording medium being sent from an upper supply magazine, via a feed opening, to a deflecting device equipped with a drive unit, then scanned by a scanning head and deposited, via a discharge opening, in a delivery magazine located beneath the supply magazine. The deflecting device has pairs of rollers which include driven transporting rollers and idler rollers which form a clamping nip with the transporting rollers. In the case of the covered feed units of the prior art, the deflecting device is arranged in an end region and is pivotally supported in the end region on the housing of the flat-bed scanner. The supply magazine and the delivery magazine are each mounted on the deflecting device via a separate hinge fastening mechanism such that they can be pivoted to a limited extent. Moreover, the deflecting device, which comprises the pairs of rollers and forms the transporting path, is, at best, partially accessible with difficulty, with the result being that it is only by expending substantial effort that it is possible to remove a recording medium which has been fed in a skewed manner or has been jammed due to insufficient separation. The disadvantage with this prior art covered feed unit is that access to the delivery magazine can be gained only with a comparatively high degree of operational downtime.

The object of the present invention is therefore to improve a covered feed unit of the above-mentioned type so as to provide straightforward operation and accessibility along with a compact design.

SUMMARY OF THE INVENTION

This object is achieved by a covered feed unit having: a feed opening for recording media; a discharge opening which is arranged in a plane located beneath the feed opening and which is intended for the recording media; and a deflecting device. The deflecting device includes a drive unit having a protective cover. The drive unit transports recording media along a transporting path from the feed opening to the discharge opening by means of driven transporting rollers and idler rollers which form a clamping nip with the transporting rollers. The covered feed unit includes an upper protective cover which bounds the feed opening, and which is connected pivotally via a hinge to a lower cover. The lower cover bounds the discharge opening, wherein further, the drive unit, with its driven transporting rollers, is disposed in that end region of the upper protective cover which faces the hinge, and idler rollers are provided in the lower cover.

By virtue of the inventive design with a drive unit integrated in the end region of the upper protective cover, the transporting rollers and the idler rollers are lifted away from one another by way of the upper protective cover being lifted or pivoted away; the clamping nip formed by these rollers is consequently opened. As a result, it is possible for the transporting path of the recording media to be released, not just partially, as in the case of the prior art, but entirely along the deflecting device. Consequently, the recording media is accessible without any obstruction over their entire transporting path through the covered feed unit. The inventive arrangement of the drive unit in the upper cover permits a more straightforward design of the covered feed unit having a minimum of components.

By virtue of the inventive design of the covered feed unit, its pivot point, moreover, can be located in the immediate vicinity of its center of gravity, as a result of which, the torque which is exerted on the fastening mechanism on the housing of the office machine is considerably smaller. Because less stress in imparted into the covered feed unit and the housing, this means that the design of the covered feed unit may be simplified further.

A more straightforward design means that it is possible to produce the covered feed unit more easily and, therefore, more cost-effectively.

In a preferred embodiment of the invention, the whole covered feed unit can be pivoted away in its entirety via a second hinge, as a result of which, the office-machine bearing plane, which is designed as a glass plate in the case of a flat-bed scanner, is accessible in the region of the scanning head by means of a single manipulation.

Further advantages follow from the dependent patent claims and from the following description, in which the invention is explained in more detail with reference to an exemplary embodiment represented in the schematic drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows, partly in cross-section and partly in side view, a covered feed unit in the normal operating state, fastened on a flat-bed scanner.

FIG. **2** shows, on an enlarged scale, part of the same covered feed unit as in FIG. **1**.

FIG. **3** shows the same covered feed unit as in FIG. **1** in plan view in accordance with the arrow A in FIG. **1**.

FIGS. **4** to **9** show different positions of the covered feed unit according to FIG. **1**, in order to explain the operating functions.

In the figures, in each case the same designations have been used for the same elements, and the initial explanations apply to all the figures unless expressly stated otherwise.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As depicted in FIGS. **1** to **3**, a three-part covered feed unit **1** includes an upper cover **3** which has a supply magazine **2**, a lower cover **5**, which has a delivery magazine **4**, and a deflecting device **6**. The upper cover **3** forms a feed opening for recording media, together with the deflecting device **6**, and, together with this, the lower cover **5** forms a discharge opening for recording media. Furthermore, the covered feed unit **1** has a plug-in fastening mechanism **8** with which it is fastened on an office machine **7**, in this case, a flat-bed scanner. The plug-in fastening mechanism **8** has a cuboidal hinge strip **9** which extends over the entire width of the

flat-bed scanner **7** and has two pegs **10** and **11** arranged in the side region (cf. FIG. **2**). The pegs **10** and **11** are each provided with a latching lug **12** which engages behind a resiliently mounted transverse pin **13** in a corresponding receiving mechanism **14** in a housing, namely, opening **15** of the flat-bed scanner **7**. It can further be seen from FIGS. **1** and **2** that the hinge strip **9** is provided with two side walls **16** and **17**, which project beyond a side wall **60** and between which a hinge pin **18** is fastened. Provided in the end region **19** of the lower cover **5**, the end region facing the hinge strip **9**, are two side parts **21** and **22** which are parallel to the side walls **16** and **17**, are directed along the longitudinal center axis **20** (cf. FIG. **3**) of the flat-bed scanner **7**, and are offset inward toward the longitudinal center axis **20** with respect to the side walls **16** and **17**. Each sidewall **16** and **17** has a slot **25** which has its longitudinal axis **23** directed toward the bearing plane **24** of the flat-bed scanner **7**. When the covered feed unit **1** has been swung down on the flat-bed scanner **7**, the longitudinal axis **23** forms an angle of approximately 90° with the bearing plane **24**. These slots **25** thus form a first hinge **26** with the hinge pin **18** received by them.

Provided in the side parts **21** and **22** of the lower cover **5**, in the end region **19**, between the first hinge **26** and the hinge strip **9**, is a hinge pin **28** which is articulatably connected to side parts **29** and **30**, the side parts projecting beyond the upper cover **3** toward the hinge strip **9**, via circular openings **31** provided in the side parts (cf. FIGS. **2** and **3**). The hinge pin **28** thus forms a second hinge **32** with the openings **31** provided in the side parts **29** and **30**. As a result, the upper cover **3**, with its supply magazine **2**, is mounted pivotally with respect to the lower cover **5**, with its delivery magazine **3**. Alternatively, this arrangement can be pivoted in its entirety about the hinge pin **18** of the first hinge **26** with respect to the hinge strip **9** of the plug-in fastening mechanism **8**.

A drive unit **33**, with a drive motor **34** and four transporting rollers **35***a* and **35**, is fastened on the upper cover **3**, between the side parts **29** and **30**. The drive shaft **36** of the drive motor **34** which projects beyond the side parts **29** and **30**, is pivotally mounted such that it can be pivoted away upward, in two cradles **37**, in the side parts **21** and **22**, which are part of the lower cover **5**. Disposed on spindles between the side parts **21** and **22** are idler rollers **38** which form a clamping nip with the lower transporting rollers **35***a* of the upper cover **3**. The cradles **37** thus form a fixed stop for the drive unit **33** after the transporting rollers **35***a* and the idler rollers **38** have been engaged for transporting purposes. Furthermore, a curved guide **39**, is attached to the idler rollers **38**, and includes the side parts **21** and **22** integrally formed thereto.

The first hinge **26** and the second hinge **32** are both provided in the end region **19** of the lower cover **5**, the end region being adjacent the hinge strip **9**, but are located as near as possible to the drive shaft **36** of the drive motor **34**. This is because the drive shaft **36** itself is located very near to the center of gravity of the pivotable part of the covered feed unit **1**. In a variant of the above covered feed unit **1**, it is also possible for the two hinge pins **18** and **28** to be coaxial.

Articulated on the hinge pin **28** is a semi-circular covering **40**, which encloses the upper transporting rollers **35***b*. Two idler rollers **41** are provided on the covering **40** and form a clamping nip with the upper transporting rollers **35***b*. Furthermore, the covering **40** has provided on it, on the side adjacent the supply magazine **2**, a draw-off roller **42** which is arranged, for example, on one side of the longitudinal center axis **20**. A pressing element **43** is provided in the supply magazine and interacts with the draw-off roller **42**.

As can further be seen in FIG. **2**, the end region **19**, which is formed, inter alia, by the side parts **21** and **22**, is approximately the same height as the hinge strip **9** and is rounded in the form of an arc of a circle in order to make it possible to swing up the covered feed unit **1** to different levels. This end region **19** includes a step relief on the side facing the flat-bed scanner **7** and is provided with a chamfer **45** on the lower end of the side facing the hinge strip **9**.

By virtue of the above-described design, the covered feed unit **1** can be pivoted upward in its entirety by means of a single manipulation. Alternatively, it is possible to pivot the upper cover **3**, together with its supply magazine **2**, away from the lower cover **5**, together with its delivery magazine **4**, the lower transporting rollers **35***a* simultaneously being lifted away from the idler rollers **38** on the lower cover **5**. As a result of which, the transporting path of the recording media **47** is also exposed in the lower region. Consequently, recording media **47**, which may have jammed or have been fed askew, can be removed without difficulty over the entire transporting path. If, in the upper region of the covered feed unit **1**, a recording medium **47** has been jammed between the covering **40** and the drive unit **33** with the transporting rollers **35***b*, or has been fed askew, it can likewise be removed in a simple manner by pivoting the covering **40** away, as is further illustrated in FIGS. **8** and **9**.

The covers **3** and **5** are configured in a manner known in the prior art in the region of the bearing plane **24** for a stack **46** of recording media **47**. Therefore, details relating to this will not be discussed here any further. As can also be seen from FIG. **1**, the flat-bed scanner **7** is provided with a glass plate **48** which forms the bearing plane **24**, and on which the recording medium **47** to be scanned can be positioned, the flat-bed scanner **7** scanning the recording medium, line-by-line, by means of a scanning head **49**. That position of the scanning head **49** which is represented in FIG. **1** constitutes the parked position, in which the scanning head **49** is located prior to a subsequent scanning operation. However, by virtue of the covered feed unit **1** presented here, it is also possible for the recording medium **47** to be guided past the scanning head **49** by means of the deflecting device **6**, with the result that scanning takes place in the parked position of the scanning head **49**. For this purpose, the curved guide **39** has provided in it a longitudinal slot (not visible here) which has a transparent covering window and extends at least over the width of the recording medium **47**.

The normal operation of the flat-bed scanner **7** represented here is thus given in FIG. **1** and takes place in the above-mentioned manner, i.e., the recording media **47** to be scanned are guided individually, one after the other, past the scanning head **49** until the entire stack **46** of recording media **47** has been scanned and deposited in the delivery magazine **4**.

It can be readily understood from the mode of functioning of the covered feed unit **1** that the latter may also be used to scan recording media **47** of a larger format than the conventional A4 format, for example, the A3 format, as is indicated in FIG. **1**, the only critical feature being the width of the scanning head **49** (and of the parts adapted to this, such as, inter alia, the supply magazine **2** together with the upper cover **3**, and the delivery magazine **4** together with the lower cover **5**).

FIG. **4** shows the supply magazine **2** in a state in which it has been lifted away from the delivery magazine **4**, in order to be able to remove the scanned recording medium **47** again.

It is also possible for the covered feed unit **1** to be swung upward in its entirety according to FIG. **5**, in order to

position the recording medium **47** on the glass plate **48** and to bring the flat-bed scanner **7** into scanning mode.

In this mode of operation, it is also possible to scan pages of books **50** with the scanning head **49**, as is represented in FIG. **6**. In this process, the slots **25** of the lower cover are automatically displaced upward, with the result that the hinge pin **18** is displaced downward in the slots **25**. The maximum thickness of the book **50** positioned on the glass plate **48** is thus determined by the length of the slots **25**. Depending on the inclination and curvature of the uneven surface of the opened book **50**, the hinge pin **18** rotates about an imaginary axis running at right angles thereto, thus resulting in surface contact between the upper cover **3** and the book covers to the greatest extent possible. Within the limits determined by the dimensions of the slot **25**, it is thus also possible to scan pages in the front or rear part of a book **50** using the scanning head **49** when the covered feed unit **1** is closed. In this arrangement, the dead weight of the covered feed unit **1** is usually sufficient to exert sufficient pressure on the book **50** to be scanned, and it is not necessary to exert manual pressure on the book. As can be seen from FIG. **6**, the chamfer **45**, in the form of a step relief, is used in order to be able to roll the covered feed unit **1** along a book edge, with the result that the book **50** is not damaged when it is positioned on the scanner or removed therefrom.

FIG. **7** represents the covered feed unit **1** in a state in which it has been pivoted open to the full extent. This is normally the case when the flat-bed scanner **7** is not in use.

FIG. **8** depicts the ability of removing a recording medium **47** which has become jammed or has been fed askew between the supply magazine **2** and the deflecting device **6** in the region of the covering **40**. FIG. **9** depicts the ability of removing the recording medium **47** which has become jammed between the delivery magazine **4** and the deflecting device **6** in the region of the curved guide **39**. It can easily be seen from this that the idler rollers **41** are lifted away from the transporting rollers **35**b (FIG. **8**) or the transporting rollers **35***a* are lifted away from the idler rollers **38** (FIG. **9**), thus exposing the transporting path of the recording media **47**. Therefore, every critical point of the drive unit **33** is accessible by means of a single manipulation and each recording medium **47** which has been jammed or fed askew can be readily removed. In addition, consequently, the operator can carry out regular and/or straightforward cleaning and maintenance procedures, for example the cleaning of the covering window above the scanning head **49**, which results in reduced effort and thus a further cost saving.

Instead of being in the side walls **16** and **17**, it is also possible for the slots **25** which have been described in conjunction with FIGS. **1** to **3** to be disposed in the lower cover **5**. In this case, the hinge pin **18** is provided on the upper cover **3**, which means that the hinge pin **18** should be located at the bottom of the slot **25** during normal operation. It is also possible for the longitudinal axes **23** of the slots **25** to form, with the bearing plane **24**, an angle which is slightly smaller or greater than 90°, in order to provide for lateral displacement in addition to vertical adjustment of the lower cover **5**. Also, it is not absolutely necessary for the hinge pin **18** to be continuous; alternatively, two short pins and longitudinal slots may be provided in the side walls **21** and **22** of the lower cover **5** and in the hinge strip **9**. It is also possible for a single continuous slot **25** to be provided in the end region **19** of the upper cover **5**.

The above described covered feed unit **1** is of a particularly compact and straightforward design, thus also resulting in more straightforward and cost-effective assembly. Since, in comparison with the conventional solutions, the covered feed unit **1** can be configured and assembled in a particularly straightforward manner using a small number of components, many quality control requirements as regards the end product are more easily fulfilled.

Instead of being used on a flat-bed scanner **7**, it is also possible for the abovementioned covered feed unit **1** to be used for other office machines, such as a copier, fax machine or laser printer.

I claim:

1. A covered feed unit (**1**) for fitting on the housing of an office machine (**7**), the covered feed unit comprising:

a feed opening for receiving recording media (**47**);

a discharge opening which is disposed in a plane located beneath the feed opening for discharging the recording media (**47**); and

a deflecting device (**6**) having a covered drive unit (**33**) which transports the recording media (**47**) along a transporting path from the feed opening to the discharge opening by means of driven transporting rollers (**35***a*, **35***b*), and pressure-exerting idler rollers (**38**) which form a clamping nip with the transporting rollers, wherein:

an upper cover (**3**), which bounds the feed opening, and which upper cover is connected pivotally via a first hinge (**32**) to a lower cover (**5**) which bounds the discharge opening wherein the first hinge (**32**) defines a pivot axis; and wherein

the driven transporting rollers, (**35***a*, **35***b*), are disposed in that end region of the upper cover (**3**) which is adjacent to the hinge (**32**); and the pressure-exerting idler rollers (**38**) are provided in that end region of the lower cover (**5**) which is adjacent to the hinge (**32**); and wherein

the pivot axis defined by the first hinge is transverse to the transporting path.

2. The covered feed unit as claimed in claim **1**, wherein the transporting path runs around the drive unit (**33**), and wherein the upper cover (**3**) is supported on the lower cover (**5**) by means of fixed stops (**37**) when the transporting rollers (**35***a*) rest against the pressure-exerting idler rollers (**38**).

3. The covered feed unit as claimed in claim **2**, wherein a drive shaft (**36**) of the drive unit (**33**) pivotally mounts on the lower cover (**5**).

4. The covered feed unit as claimed in claim **1** wherein the unit further comprises a plug-in fastening mechanism (**8**) sized to be received in an opening (**15**) in the office machine housing which mechanism is pivotally mounted to the lower cover (**5**) via a second hinge (**26**).

5. The covered feed unit as claimed in claim **4** wherein the second hinge (**26**) includes a hinge pin (**18**) which is mounted in at least one slot (**25**), the longitudinal axis (**23**) of which is directed toward a bearing plane (**24**) of the office machine.

6. The covered feed unit as claimed in claim **1**, wherein the lower cover (**5**) has a curved guide (**39**) which interacts with the pressure-exerting idler rollers (**38**).

7. The covered feed unit as claimed in claim **1**, wherein a covering (**40**) is connected pivotally to the upper cover (**3**) via the first hinge and has pressure-exerting idler rollers (**41**) which form a clamping nip with the transporting rollers (**35***b*).

8. The covered feed unit as claimed in claim **7**, wherein, upstream of the pressure-exerting rollers (**41**) of said covering (**40**) alone the transporting direction, the covering (**40**) has a draw-off roller (**42**).

9. A covered feed unit (**1**) as claimed in claim **1** wherein the unit further comprises a plug-in fastening mechanism (**8**)

sized to be received in an opening (**15**) in the office machine housing which mechanism is pivotally mounted to the upper cover (**3**) via a second hinge (**26**).

10. The covered feed unit as claimed in claim **9**, wherein the second hinge comprises a hinge pin (**18**) fastened between side walls (**16**, **17**) of the covered feed unit (**1**).

11. The covered feed unit as claimed in claim **10**, wherein the hinge pin (**18**) is disposed in the plug-in fastening mechanism (**8**) and a slot (**25**) for receiving the hinge pin is disposed in the cover (**3**, **5**).

12. The covered feed unit as claimed in one of claims **9** to **11**, wherein the lower cover (**5**) includes an end region (**19**) which faces the second hinge (**26**), and a portion of the lower cover is in the form of an arc of a circle.

13. The covered feed unit as claimed in claim **12**, wherein the end region (**19**) of the lower cover (**5**) has a flattened side facing a bearing plane (**24**) of the office machine.

14. The covered feed unit of claim **13**, wherein the flattened side of the end region (**19**) is provided with a chamfer (**45**), adjacent the hinge (**26**), in the form of a step relief.

15. The covered feed unit as claimed in claim **9** wherein the second hinge (**26**) includes a hinge pin (**18**) which is mounted in at least one slot (**25**), the longitudinal axis (**23**) of which is directed toward a bearing plane (**24**) of the office machine.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,842,692

DATED : December 1, 1998

INVENTOR(S) : Thomas Rutishauser

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

Col. 5, line 64, "alone" should be --along --.

Signed and Sealed this

Sixteenth Day of May, 2000

Attest:

Q. TODD DICKINSON

Attesting Officer

Director of Patents and Trademarks