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(71) Applicant: **TOKYO ELECTRIC CO., LTD.**
6-13, 2-chome, Nakameguro
Meguro-ku Tokyo(JP)

(72) Inventor: **Koike, Seiji**
761-13, Shuzenji, Shuzenji-cho
Tagata-gun, Shizuoka-ken(JP)

(74) Representative: **Schmidt-Evers, Jürgen,**
Dipl.-Ing. et al
Patentanwälte Mitscherlich, Gunschmann
Dr. Körber, Schmidt-Evers, Melzer, Dr. Schulz
Steinsdorfstrasse 10
W-8000 München 22(DE)

(54) Label separator apparatus.

(57) A label separator apparatus has a label separating member (20) for separating labels (32) one by one from a long and narrow label carrying paper (12), on which the labels are adhered, by acutely turning the carrying paper toward no-label-adhered side thereof while the carrying paper is moved in its longitudinal direction, and further has a label-rising suppressor (34) located above the label being separated form the paper. The suppressor contacts a rear end portion of the label which being separated while the label rises together with the paper from the separating member, so that the label is prevented from being perfectly separated from the paper.

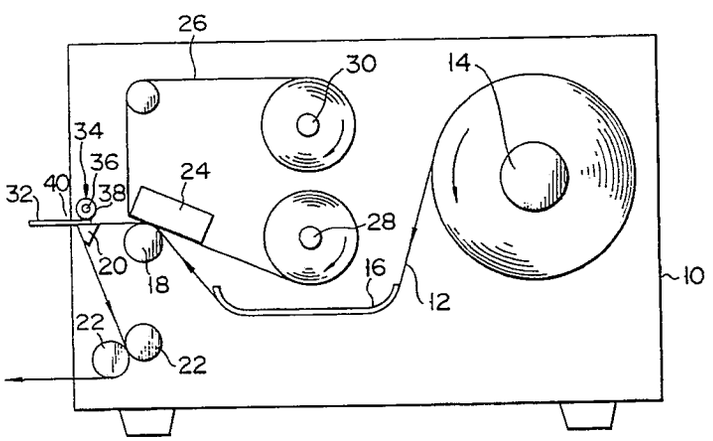

FIG. 1

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This invention relates to a label separator apparatus for separating labels from a label carrying paper on which the labels are adhered, and more particularly it relates to a label separator apparatus of the type that separates labels one by one from a long and narrow label carrying paper on which a plural labels are adhered, by acutely turning the carrying paper toward its back side (no label adhering side) by means of a label separating member while the carrying paper is moved in its longitudinal direction by means of a label carrying paper moving means.

A thermal transfer printer provided with a label separator apparatus of the above described type is disclosed in Published and unexamined Japanese Patent Application No. 61-266277. With this known thermal transfer printer, ink is transferred for printing from an ink ribbon onto labels adhered on a long and narrow label carrying paper by means of a thermal head in accordance with given printing signals while the label carrying paper is being moved in a longitudinal direction. The carrying paper is moved further forward and eventually turned acutely toward the back side (no label adhering side), and the labels that have been printed are separated from the carrying paper one by one at the acutely turned position.

Printed label sensing means using such as a light transmission type optical sensor or a light reflection type optical sensor is mounted at a printed label discharge opening of the printer, and the movement of the carrying paper is stopped when the printed label sensing means senses the rear end of the printed label while the printed label is separating. When the movement of the carrying paper is stopped, the printed label has been separated from the carrying paper except the rear end portion thereof, and the most region in the separated part of the printed label projects out from the printed label discharge opening.

Therefore, since the printed label projected out side of the printer is adhered only at its rear end portion on the carrying paper located on the label separating member, an user of the printer can perfectly separate the projected and printed label from the carrying paper by pinching the outer end of the separated portion of the printed label, which is projected out from the printed label discharge opening, and lightly pulling the outer end.

In the conventional label separator apparatus constructed as described above, the printed label projected out from the printed label discharge opening tends to perfectly separate from the carrying paper by losing its weight balance owing to the weight of the separated portion thereof, by being winded on the separated portion, or by being applied on the label separator with a vibration, because the printed label projected out from the printed label discharge opening is adhered only at its rear end portion on the carrying paper. And, such tendency is particularly large in the labels which are elongate in the moving direction of the carrying paper.

The printed label, which is perfectly separated from the carrying paper and falls on a floor, can not be used.

The housing of the above described thermal transfer printer is constructed by upper and lower half housing members, and the upper housing member is pivotally attached at its one side end to the lower housing member. By pivoting upward the upper housing member around the one side end, a new label carrying paper which is wound like a roll can be supplied in a label-carrying-paper receiving hollow mounted in the lower housing member.

In the thermal transfer printer having such an upper and lower two split type housing, a relatively large power is needed to rotate upwardly the upper half housing member because various members are mounted in the upper half housing member similarly to the lower half housing member so that the weight of the upper half housing member is relatively heavy.

Therefore, it is hard to supply a new roll of label carrying paper in the label-carrying-paper receiving hollow of the lower housing member to ladies, old peoples, and children.

In order to easier the supply work of the new roll of label carrying paper, the housing recently is not constructed as the upper and lower two split type but constructed to have a door on one side surface of the housing, the door being used for the supply work of the new roll of label carrying paper.

In view of the above described problem, it is therefore the object of the present invention to provide a label separator apparatus which can prevent a long and narrow printed label elongated in the moving direction of a label carrying paper from perfectly separating from the carrying paper caused by the weight of its self or unexpected cause such as wind, vibration and the like, and from being unusable, when the printed label is adhered only at its rear end portion on the carrying paper located on a label separating member and the most region of the separated part of the printed label is projected out from a printed label discharge opening of a printer, which has a simple construction and its handling is easy, and which is preferable to be used in a label printing apparatus such as a thermal transfer printer, the apparatus being so constructed that it allows a supply of rolled new label carrying paper to a label-carrying-paper receiving hollow of an apparatus housing through one side surface of the housing and provides the above described advantages.

According to the invention, the above object is

achieved by providing a label separator apparatus comprising: a label carrying paper moving means for moving a long and narrow label carrying paper, on which a plurality of labels are adhered, in its longitudinal direction; a label separating member for separating labels one by one from the label carrying paper by acutely turning the label carrying paper toward one surface side thereof on which no labels are adhered as the label carrying paper is being moved by means of the label carrying paper moving means; and a label-rising suppressor, which is mounted at a position located above the label separating member and away from the label being separated from the label carrying paper, and which contacts a rear end portion of the label in the carrying paper moving direction while the label being separated from the label carrying paper if a portion of the label, which has not passed over the acutely turned position of the label carrying paper while the label being separated, rises together with the label carrying paper from the label separating member, thereby the not-passed portion of the label being prevented from being separated from the label carrying paper and the label being prevented from being away from the label carrying paper, a portion of the label-rising suppressor which does not oppose the label above the label separating member being largely away from the label than the other portion of the label-rising suppressor which opposes the label above the label separating member.

The above described label-rising suppressor surely prevents a printed long and narrow label elongated in a label-carrying-paper moving direction from being perfectly separated from the label carrying paper owing to the weight of its self or unexpected cause such as wind, vibration and the like, and from being unusable, when the printed label is adhered only at its rear end portion on the carrying paper located on the label separating member and the most region of the separated part of the printed label is projected out from a printed label discharge opening of a printer, and further the label-rising suppressor is simple in construction and is easily handled.

The above described label-rising suppressor makes the label separator apparatus to be preferably used in a label printing apparatus such as a thermal transfer printer, the apparatus being so constructed that it allows a supply of rolled new label carrying paper to a label-carrying-paper receiving hollow of an apparatus housing through one side surface of the housing, because the label-rising suppressor is so constructed that it contacts a rear end portion of the label in the carrying paper moving direction while the label being separated from the label carrying paper if a portion of the label, which has not passed over the acutely turned position of the label carrying paper while the label being separated, rises together with the label carrying paper from the label separating member, and a portion of the label-rising suppressor which does not oppose the label above the label separating member is larger away from the label than the other portion of the label-rising suppressor which opposes the label above the label separating member.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view schematically illustrating a main portion of a label or ticket issuing machine as a thermal printer provided with a preferred embodiment of a label separator apparatus of the invention;

Fig. 2 is an enlarged front view schematically illustrating a label-rising suppressor and a label separating member of a label separator apparatus provided in the label or ticket issuing machine of Fig. 1;

Fig. 3 is an enlarged front view schematically illustrating the label separating member and a first variation of the label-rising suppressor; and

Fig. 4 is a longitudinal sectional view schematically illustrating a main portion of a label or ticket issuing machine as a thermal printer provided with the preferred embodiment of the label separator apparatus of the invention, the apparatus being provided with a second variation of the label-rising suppressor; and

Fig. 5 is an enlarged perspective view illustrating a second variation of the label-rising suppressor.

Now the invention will be described in detail by referring to the accompanying drawings that illustrate a preferred embodiment of the invention as well as variations of the label-rising suppressor.

In Fig. 1, a longitudinal section of a main part of a label or ticket issuing machine as a thermal printer provided with a preferred embodiment of the label separator apparatus of the invention is schematically illustrated. A label-carrying-paper receiving section 14 for rotatably receiving a rolled long and narrow label carrying paper 12, on which a large number of labels or thickets (one kind of labels) are adhered along the longitudinal direction of the carrying paper, is mounted at one end portion in the interior of a housing 10 of the issuing machine. The rolled carrying paper 12 is unwound from the receiving section 14 with carrying labels or tickets on its upper surface and is guided by way of a guide panel 16 and a platen roller 18 toward a label or ticket separating member 20 provided at the other end portion in the interior of the housing 10 (A ticket is considered as one kind

of labels, so that the label or ticket separating member will be disclosed only as the label separating member in the following description). Then, the carrying paper 12 is further guided to a pair of carrying paper drive rollers 22 arranged below the label separating member 20 in the housing 10 and, after passing through the paired carrying paper drive rollers 22, the carrying paper 12 is led to the outside of the housing.

The label separating member 20 is shaped as a rod having a triangular cross section, and is arranged to extend in the width direction of the carrying paper 12. The label carrying paper 12 is acutely turned backward, or to the no-label adhering side, by the label separating member 20 so as to be orientated toward the paired carrying paper drive rollers 22.

A drive motor (not shown) is connected to the paired drive rollers 22, and a leading end of the rolled carrying paper 12 is led out from the carrying paper receiving section 14 as the paired carrying paper drive rollers 22 are driven by the drive motor (not shown), so that the carrying paper 12 proceeds by way of the guide panel 16, the platen roller 18 and the paired carrying paper drive rollers 22 and is discharged from the lower end portion of the other end surface of the housing 10.

Within the housing 10, a thermal head 24 is arranged so as to oppose to the carrying paper 12 located on the platen roller 18. The thermal head 24 indirectly contacts the label or ticket on the carrying paper 12 located on the plate roller 18 with an ink ribbon 26 being interposed between the thermal head 24 and the label or ticket on the carrying paper 12.

Both ends of the ink ribbon 26 are fixed and wound around an ink ribbon supply reel 28 and an ink ribbon take-up reel 30. The ink ribbon 26 is moved from the supply reel 28 to the take-up reel 30 in correspond to the movement of the carrying paper 12, and moves in the same direction as the carrying paper 12 moves between the thermal head 24 and the platen roller 18.

While the carrying paper 12 and the ink ribbon 26 move as described above, the thermal head 24 transfers the ink from the ink ribbon 26 to a label or ticket in accordance with the printing signal transmitted from a control means (not shown) to print specific information on the label or ticket.

The printed label or ticket 32 is then separated from the carrying paper 12 as the carrying paper 12 is acutely turned backward (or to the no label adhering surface side) by the label separating member 20, and is projected out from the housing 10 through a label or ticket discharge opening 40 formed on the other side surface of the housing so as to opposite the label separating member 20.

At the label or ticket discharge opening 40 of the housing 10, a printed label sensing means (not shown) which uses such as a light transmission type or light reflection type optical sensor is mounted. By sensing the rear end of the printed label or ticket 32 with the printed label sensing means while the printed label or ticket is separating from the carrying paper 12, the movement of the carrying member 12 is stopped. When the movement of the carrying member 12 is stopped, the printed label or ticket 32 has already separated from the carrying paper 12 except the rear end portion of the label or ticket 32, and the most region of the separated part of the printed label or ticket 32 projects out the housing 10 through the label or ticket discharge opening 40.

Therefore, since the printed label or ticket 32 is adhered only at its rear end portion on the carrying paper 12 located on the label separating member 20, an user of the printer can perfectly separate the printed label or ticket 32 from the carrying paper 12 by pinching the outer end of the separated portion of the printed label or ticket 32 projected out through the printed label or ticket discharge opening 40, and by pulling it.

In the above described embodiment, a roller-shaped label or ticket-rising suppressor 34 is arranged so as to oppose the printed label or ticket 32 (the label or ticket-rising suppressor 34 will be described only as the label-rising suppressor 34, by the same reason as in the case of the label separating member 20). As illustrated in particularly detail in Fig. 2, the label-rising suppressor 34 includes a center shaft 36 which extends in a direction substantially perpendicular to the moving direction of the carrying paper 12 and is arranged in parallel with the upper surface of the carrying paper 12, and a substantially barrel or spindle shaped label-rising suppressing roller 38 which is coaxially and rotably arranged on the center shaft 36.

The label-rising suppressing roller 38 has a cylindrical label-rising suppressing body 38a located at a substantial center in the longitudinal direction of the center shaft 36 and being approximately 15 to 20 mm long in its axial direction, and a pair of tapered portions 38b located at the longitudinal both ends of the body 38 so as to orient the smaller diameter ends thereof in the opposite direction.

The cylindrical label-rising suppressing body 38a is located above the upper surface of the printed label 32 on the carrying paper 12 laid on the label separating member 20 by approximately 0.5 mm. Therefore, the label-suppressing body 38a usually does not contact the printed label or ticket 32 being separated on the label separating member 20 while the carrying paper 12 is moved, and also usually does not contact the printed label or ticket 32 projected out through the label or ticket

discharge opening 40 with only the rear end portion of the printed label or ticket 32 being adhered on the carrying paper 12 laid on the label separating member 20 while the movement of the carrying paper 12 is stopped.

However, a portion of the printed label or ticket 32, which has been separated from the carrying paper and is projected out from the housing 10, tends to hang by the weight of its self, and this tendency becomes lager as the dimension of the label or ticket 32 on the carrying paper 12 becomes larger in the moving direction of the carrying paper 12.

If a portion of the printed label or ticket 32 laid on the label separating member 20, that portion being located backward from the carrying paper acutely turned position on the label separating member 20, is risen up together with the carrying paper 12 from the label separating member 20 by the above described hanging down caused by the weight of its self, by the wind winded on the outer projected portion of the printed and mostly separated label or ticket 32, or by the vibration applied to the thermal transfer printer, the label-rising suppressing body 38a contacts the little no-separated portion of the printed and risen label or ticket 32.

Since the above described contact is performed in the above described case, the printed label or ticket 32 is prevented from being perfectly separated at the little no-separated portion thereof from the carrying paper 12 while the printed label or ticket 32 is being separated.

That is to say, the printed label or ticket 32, projected out through the label or ticket discharge opening 40 with only the rear end portion of the printed label or ticket 32 being adhered on the carrying paper 12 when the movement of the carrying paper 12 has been stopped, surely keeps the above described state until it is perfectly separated from the carrying paper by the user of the printer.

In the above described embodiment, a door (not shown) is provided on one side surface of the housing 10, so that a new rolled carrying paper 12 can be supplied to the carrying paper receiving section 14 in the housing through the one side surface of the housing 10 by opening the door.

When the rolled new carrying paper 12 is supplied to the carrying paper receiving section 14, a led-out piece of the carrying paper 12 which has been led out from the rolled new carrying paper 12 must be guided sideways to the under surface of the guide panel 16, between the platen roller 18 and the thermal head 24, between the label separating member 20 and the label-rising suppressor 34, and between the paired carrying paper drive rollers 22. However, since the label-rising suppressing roller 38 of the label-rising suppressor 34 is formed as the substantially barrel or spindle shape, it is easy to lead the above described led-out piece of the carrying paper 12 into a clearance between the label-rising suppressor 34 and the label separating member 20.

Fig. 3 schematically illustrates a first variation of the label-rising suppressor 34. In Fig. 3, the components which are similar to those illustrated in Fig. 1 are indicated by the same reference numerals and will not be described any further.

This first variation of the label-rising suppressor 34 has a cylindrical label-rising suppressing roller 42 arranged coaxially on a center shaft 36. Like the cylindrical label-rising suppressing body 38a of the substantially barrel or spindle shaped label-rising suppressor 34 of the above described embodiment, the label-rising suppressing roller 42 has a length of between about 15 mm and about 20 mm and, as shown in Fig. 3 by a solid line, is located above the upper surface of the printed label or ticket 32 on the carrying paper 12 laid on the label separating member 20 with a clearance of approximately 0.5 mm.

This first variation of the label-rising suppressor 34 operates for the printed label or ticket 32 on the carrying paper 12 moving on the label separating member 20 in a similar manner as the substantially barrel or spindle shaped label-rising suppressor 34 of the first embodiment.

However, since this first variation of the label-rising suppressor 34 is arranged on the center shaft 36 with a ring made of such a stainless steel or the like interposed therebetween, it can slide on the center shaft 36 in the longitudinal direction of the shaft 36 as illustrated by two-dot chain line in Fig. 3, and can be maintained at a desired position on the center shaft 36 (for instance, at the center in the width direction of the printed label or ticket 32 on the carrying paper 12 laid on the label separating member 20).

The label-rising suppressing roller 42 which is slidable on the center shaft 36 may be temporarily moved sideways to the outside of the carrying paper laid-on portion on the label separating member 20 when a rolled new carrying paper 12 is supplied sideways to the carrying paper receiving section 14 in the housing 10. This makes the operation of placing sideways the led-out piece of the carrying paper 12 at the predetermined position on the label separating member 20 easy as in the case of the substantially barrel or spindle shaped label-rising suppressor 34 of the above described one embodiment. Once the carrying paper 12 is laid on the predetermined position on the label separating member 20, the label-rising suppressing roller 42 is moved back to the predetermined position shown by a solid line in Fig. 4 so as to oppose the substantially center of the width direction of the label or ticket 32 on the carrying paper 12 laid on

the predetermined position on the separating member.

Now referring to Figs. 4 and 5, a second variation of the label-rising suppressor will be described in detail.

In Figs. 4 and 5, the components which are similar to those illustrated in Fig. 1 are indicated by the same reference numerals and will not be described any further.

Fig. 4 shows a main portion of a label or ticket issuing machine as a thermal transfer printer which is provided with a label separator apparatus according to one embodiment of the invention, in the thermal transfer printer a second variation of the label-rising suppressor being mounted.

The second variation of the label-rising suppressor 34 comprises a support beam 44, which has a square rod shape and is located at a position opposing to the carrying paper 12 on the label separating member 20 so as to extend substantially perpendicularly to the moving direction of the carrying paper 12 and in parallel with the upper surface of the carrying paper 12, and a movable member 46, which is arranged on the support beam 44 in such a manner that can move on the support beam 44 in its longitudinal direction. An opposing member 48, which is projecting downward toward the carrying paper 12 located on the label separating member 20, and which is curved forward toward the label or ticket discharge opening 40 of the housing 10 so as to have a substantially J-shaped cross section, is mounted on the movable member 46.

A plurality of engaging projections 50 are formed on a plurality of positions on the surface of the support beam 44, and the positions are separated from each other with regular intervals in the longitudinal direction. The movable member 46 is provided with an elastic engaging pawl 52 that is selectively engaged with one of the engaging projections 50. In this variation, the elastic engaging pawl 52 may be integrally formed with the movable member 46 by using an elastic material such as plastic or metal so that the engaging pawl 52 has an elasticity.

The opposing member 48 is selectively movable on the support beam 44 in its longitudinal direction and can be selectively fixed at a desired position on the support beam 44 due to the operation of the elastic engaging pawl 52 of the movable member 46 to the engaging projections 50 of the support beam 44.

The lower end of the opposing member 48 is upwardly separated from the upper surface of the printed label or ticket 32 on the carrying paper 12 located on the label separating member 20 by a distance of approximately 0.5 mm.

The above described second variation of the label-rising suppressor 34 operates for the printed label or ticket 32 on the carrying paper 12 located on the label separating member 20 in a similar manner as the substantially barrel or spindle shaped label-rising suppressor 34 of the first embodiment and the short and cylindrical label-rising suppressor 34 of the first variation.

However, since this second variation of the label-rising suppressor 34 is movable on the support beam 44 in its longitudinal direction, it may be temporarily moved sideways to the outside of the carrying paper laid-on portion on the label separating member 20 when a rolled new carrying paper 12 is supplied sideways to the carrying paper receiving section 14 in the housing 10 as in the case of the label-rising suppressing roller 42 of the first variation. This makes the operation of placing sideways the led-out piece of the carrying paper 12 at the predetermined position on the label separating member 20 easy as in the case of the label-rising suppressor 34 of the first embodiment or that of the first variation. Once the led-out piece 12b is placed at the predetermined position on the label separating member 20, the movable member 46 is moved on the support beam 44 so that the opposing member 48 is moved to the predetermined position at which the member 48 opposes the center of the width direction of the label or ticket on the carrying paper 12 placed at the predetermined position on the separating member 20.

It may be needless to say that the above described embodiment and variations are presented here to make the present invention easy to understood and they are not by any means intended to limit the scope of the invention. Therefore, various variations and modifications may be made to the present invention without departing the scope and the spirit of the invention.

For instance, the printing unit of the label or ticket issuing machine provided with a label separator apparatus of the one embodiment of the invention, the separation apparatus having a level-rising suppressor, may be replaced by a dot impact type printing unit.

Claims

1. A label separator apparatus, comprising a label carrying paper moving means (22) for moving a long and narrow label carrying paper (12), on which a plurality of labels (32) are adhered, in its longitudinal direction, and a label separating member (20) for separating labels one by one from the label carrying paper by acutely turning the label carrying paper toward one surface side thereof on which no labels are adhered as the label carrying paper is moved by means of the label carrying paper moving means, char-

acterized by further comprising:

a label-rising suppressor (34), which is mounted at a position located above the label separating member (20) and away from the label (32) being separated from the label carrying paper (12), and which contacts a rear end portion of the label in the carrying paper moving direction while the label being separated from the label carrying paper if a portion of the label, which has not passed over the acutely turned position of the label carrying paper while the label being separated, rises together with the label carrying paper form the label separation member, thereby the not-passed portion of the label being prevented from being separated from the label carrying paper and the label being prevented from being away from the label carrying paper, a portion of the label-rising suppressor which does not oppose the label above the label separating member being largely away from the label than other portion of the label-rising suppressor which opposes the label above the label separating member.

2. A label separator apparatus according to claim 1, characterized in that said label-rising suppressor (34) has a substantially barrel or spindle shape and a longitudinal axis thereof extends in a direction substantially perpendicularly to the moving direction of said carrying paper (12).

3. A label separator apparatus according to claim 2, characterized in that said label-rising suppressor (34) includes a cylindrical portion (38a) located at the center in the longitudinal direction and a pair of tapered portions (38b) located at the longitudinal both ends of the cylindrical portion so as to orient the smaller diameter ends thereof in the opposite direction.

4. A label separator apparatus according to claim 2, characterized in that said label-rising suppressor (34) is freely rotatable around a rotational center line extending in the longitudinally direction.

5. A label separator apparatus according to claim 1, characterized in that said label-rising suppressor (34) includes a support beam (36, 44) the longitudinal axis of which is arranged in a direction perpendicularly to the moving direction of the carrying paper (12), and a label-rising suppressing body (42, 44 and 46) mounted on the support beam so as to be selectively movable in the longitudinal direction of the support beam, said label-rising suppressing body having dimension in the width direction of said carrying paper (12) smaller than that of the labels (32) on said carrying paper.

6. A label separator apparatus according to claim 5, characterized in that said support beam (36) and said label-rising suppressing body (42) are circular in section, and said label-rising suppressing body is coaxially arranged on said support beam.

7. A label separator apparatus according to claim 6, characterized in that said label-rising suppressing body (42) which is circular in section is rotatable on said support beam (36) which is also circular in section.

8. A label separator apparatus according to claim 5, characterized in that said support beam (44) is polygonal in section with three or more corners, and said label-rising suppressing body (46 and 48) includes a movable member (46) which is mounted on said support beam so as to be selectively movable in the longitudinal direction of said support beam, and an opposing member (48) which projects from the movable member toward the carrying paper (12) and opposes the rear end portion of the printed label (32) in the moving direction of the carrying paper.

9. A label separator apparatus according to claim 8, characterized in that said support beam (44) is provided on its surface with either a plurality of engaging projections (50) or a plurality of engaging indents, and said movable member (46) is provided with an elastic engaging means (52) for selectively engaging the plurality of engaging projections or the plurality of engaging indents on the surface of said support beam.

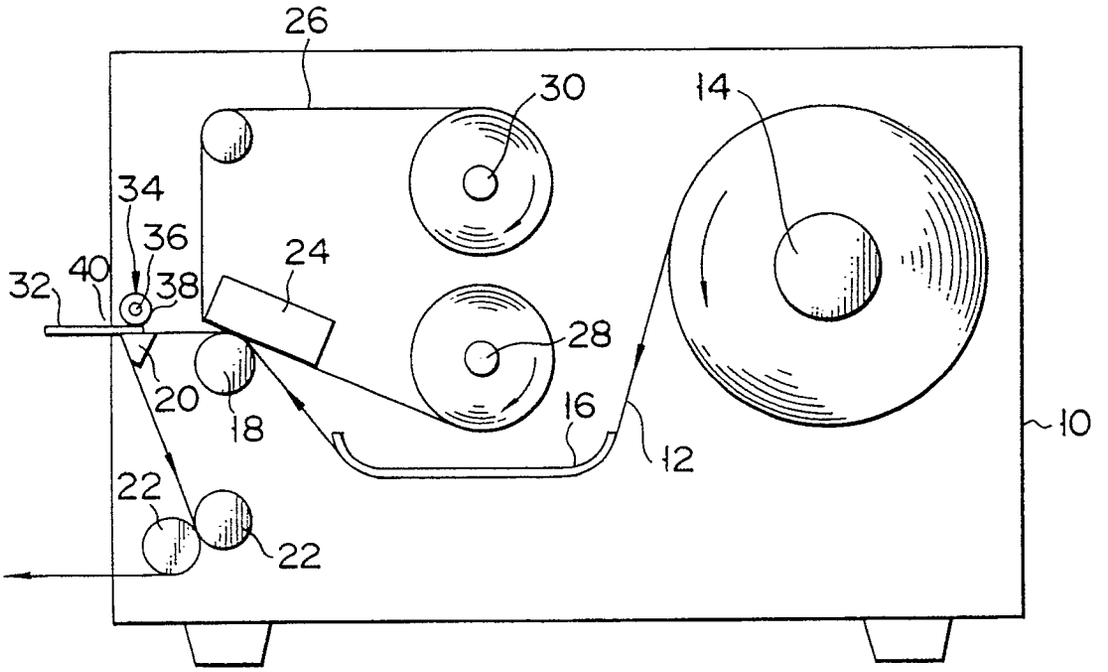
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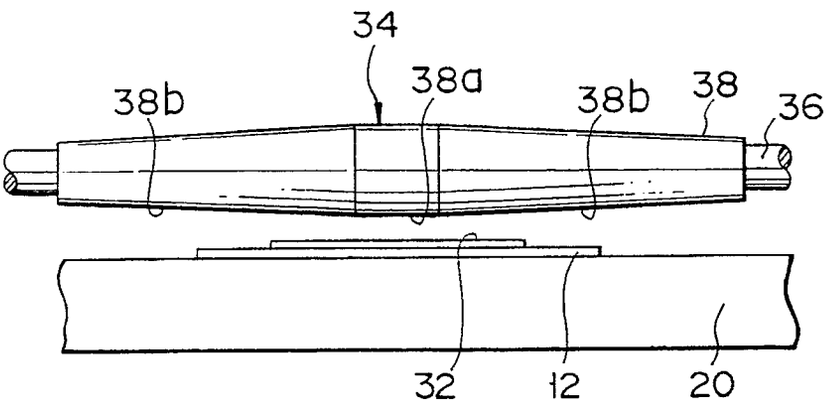
FIG. 1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38b
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FIG. 2

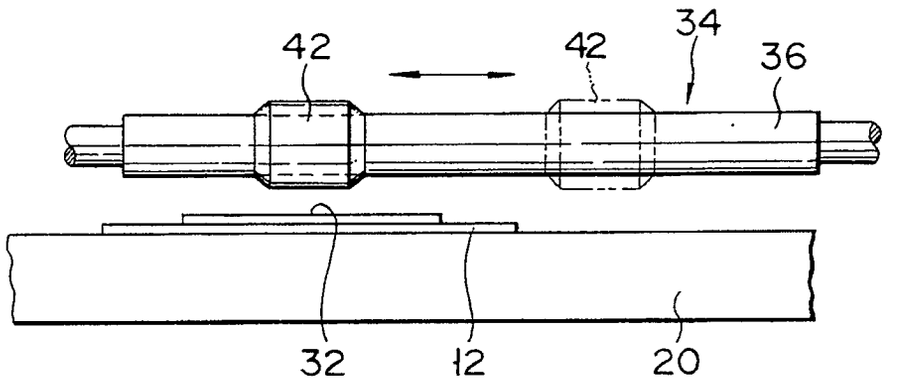

FIG. 3

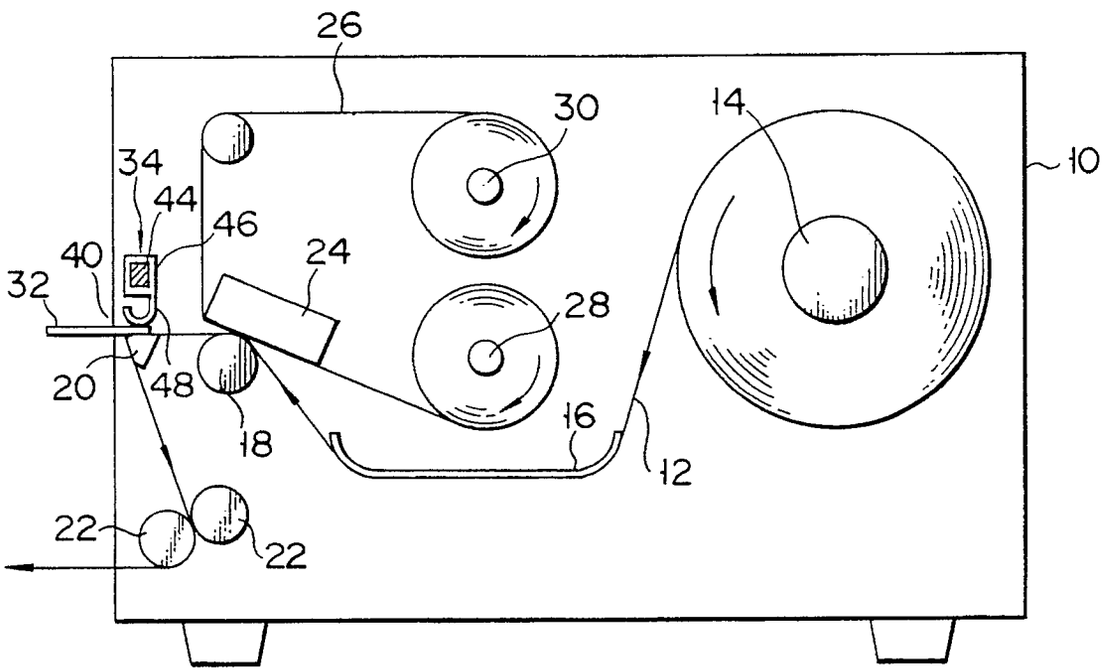

FIG. 4

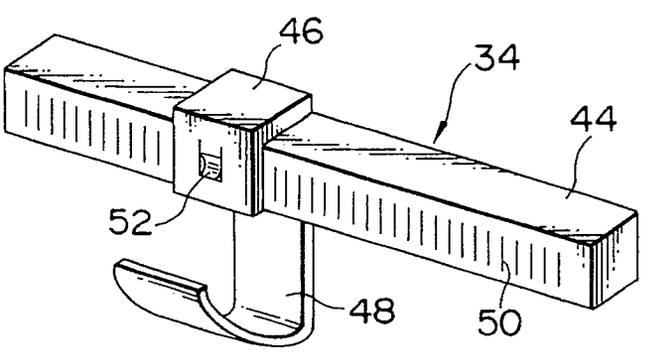

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 10 6923

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-1 491 392 (J. DE VREE & CO.) * Figures 2,5,7; page 2, column 2, lines 40-56; page 5, column 1, lines 13-18 *	1,2,4	B 65 C 9/00
X	US-A-3 696 967 (MOORE et al.) * Figures 1,2; column 5, lines 19-36 *	1	
A	US-A-4 869 775 (QUITTNER)		
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 26, no. 9, February 1984, page 4678, New York, US; J.C. COLSON: "Robotic tool for the application of non-rigid, adhesive-backed parts"		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 C

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	06 November 90	DEUTSCH J.P.M.

CATEGORY OF CITED DOCUMENTS

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