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Hano et al.

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[45] **Reissued Date of Patent: Feb. 23, 1999**

[54] **ELECTROPHOTOGRAPHIC APPARATUS CAPABLE OF SELECTIVELY USING CUT SHEET AND CONTINUOUS PAPER AND METHOD THEREFOR**

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[73] Assignee: **Toray Industries, Inc.**, Tokyo, Japan

[21] Appl. No.: **619,423**

[22] Filed: **Mar. 21, 1996**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **5,296,906**
Issued: **Mar. 22, 1994**
Appl. No.: **929,523**
Filed: **Aug. 14, 1992**

[51] **Int. Cl.**[6] **G03G 15/00**

[52] **U.S. Cl.** **399/385**; 83/211

[58] **Field of Search** 399/384, 385, 399/316, 317; 83/209–211, 272, 280, 370; 226/110

[56] **References Cited**

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Primary Examiner—William J. Royer

[57] **ABSTRACT**

An electrophotographic apparatus of this invention includes a stacking section for cut sheet; a stacking section for fanfold paper; a feed section for supplying printing paper which is cut sheet or fanfold paper from one of the stacking sections via one of different supplying paths; an exposure unit for forming an electrostatic latent image on a photosesitive drum; a developing unit for developing the latent image into a toner image; a belt conveyer for conveying the printing paper received from the feed section along common feeding path, a transferring unit for transferring the toner image on the photosensitive drum onto the printing paper; a fixing unit for fixing the transferred toner image on the printing paper; an ejecting section for receiving the printed printing paper from the belt conveyer; and a cutting device for cutting apart the printed fanfold paper at the perforation line thereof. The fanfold paper left behind on the common feeding path after the cutting operation is set back to a position which does not obstruct supply of cut paper in the feed section.

59 Claims, 22 Drawing Sheets

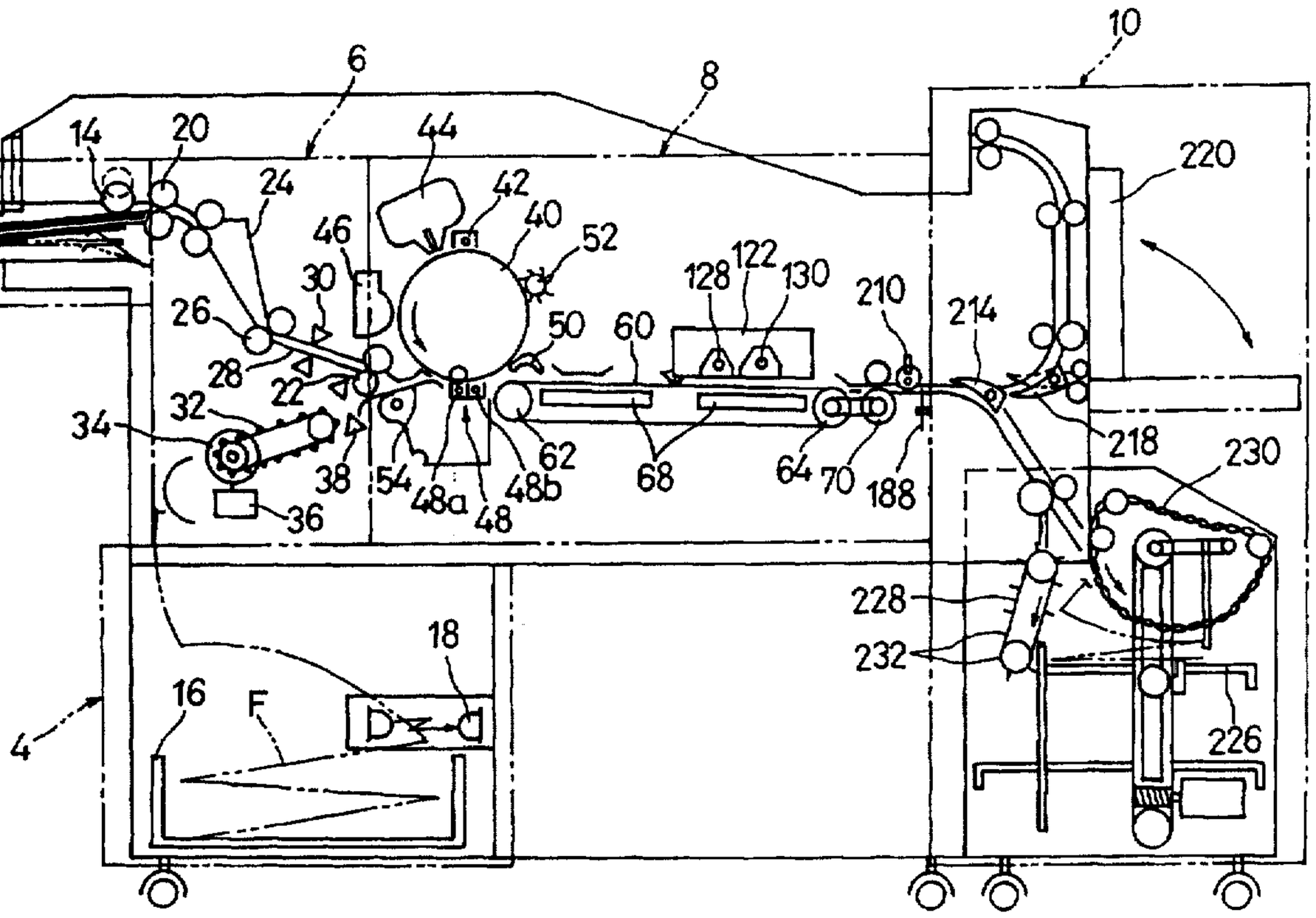

FIG. 1

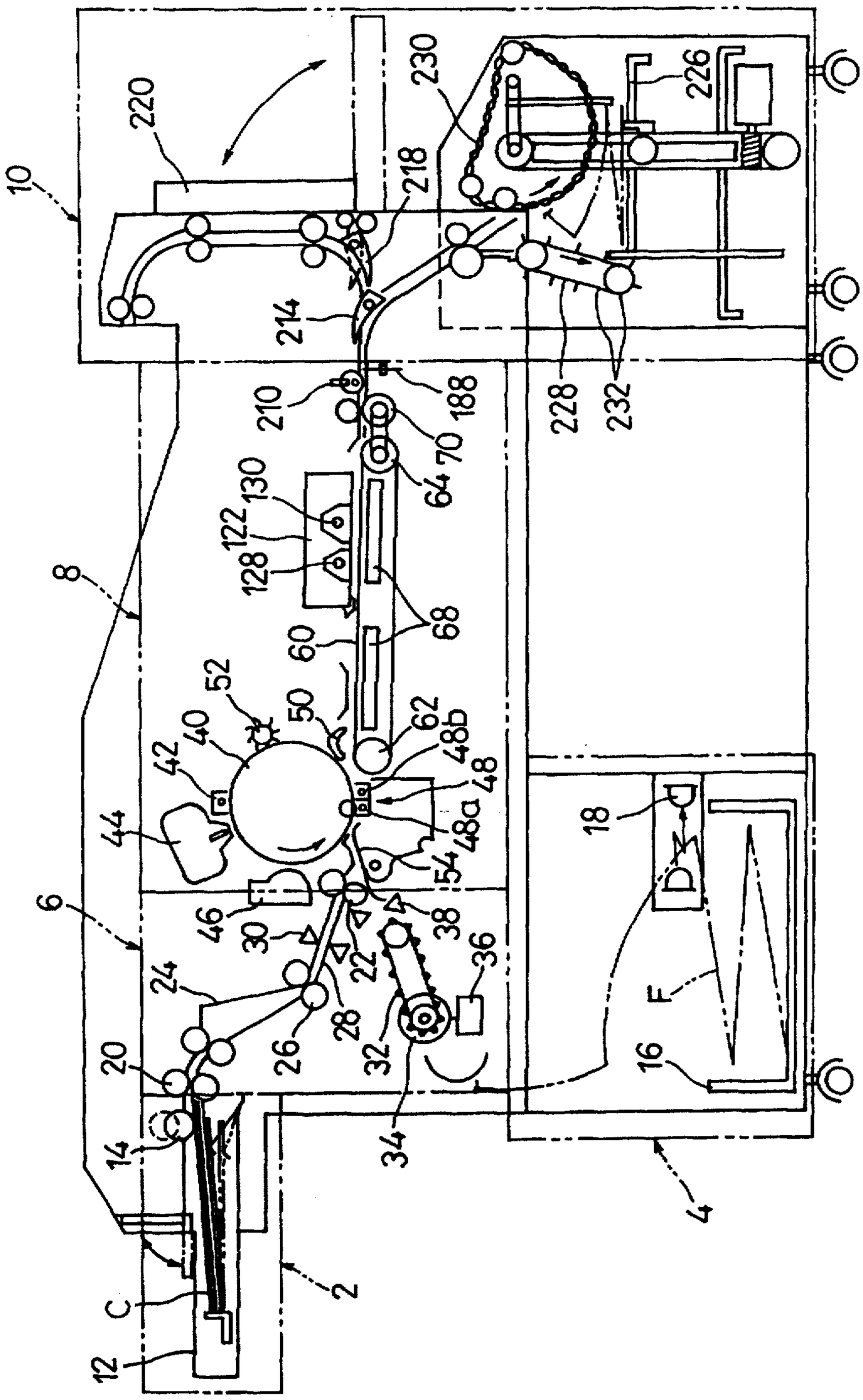
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FIG. 2

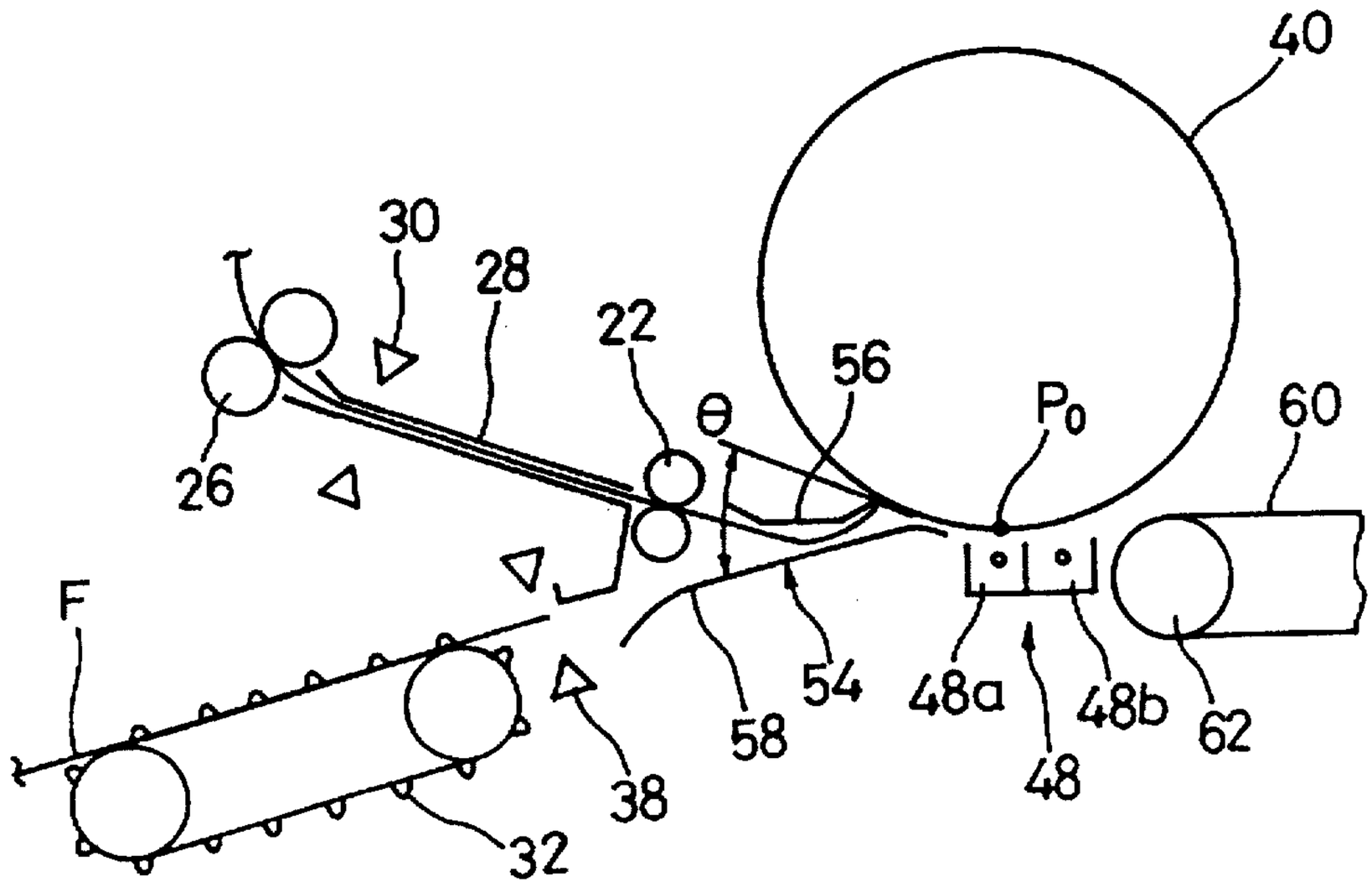
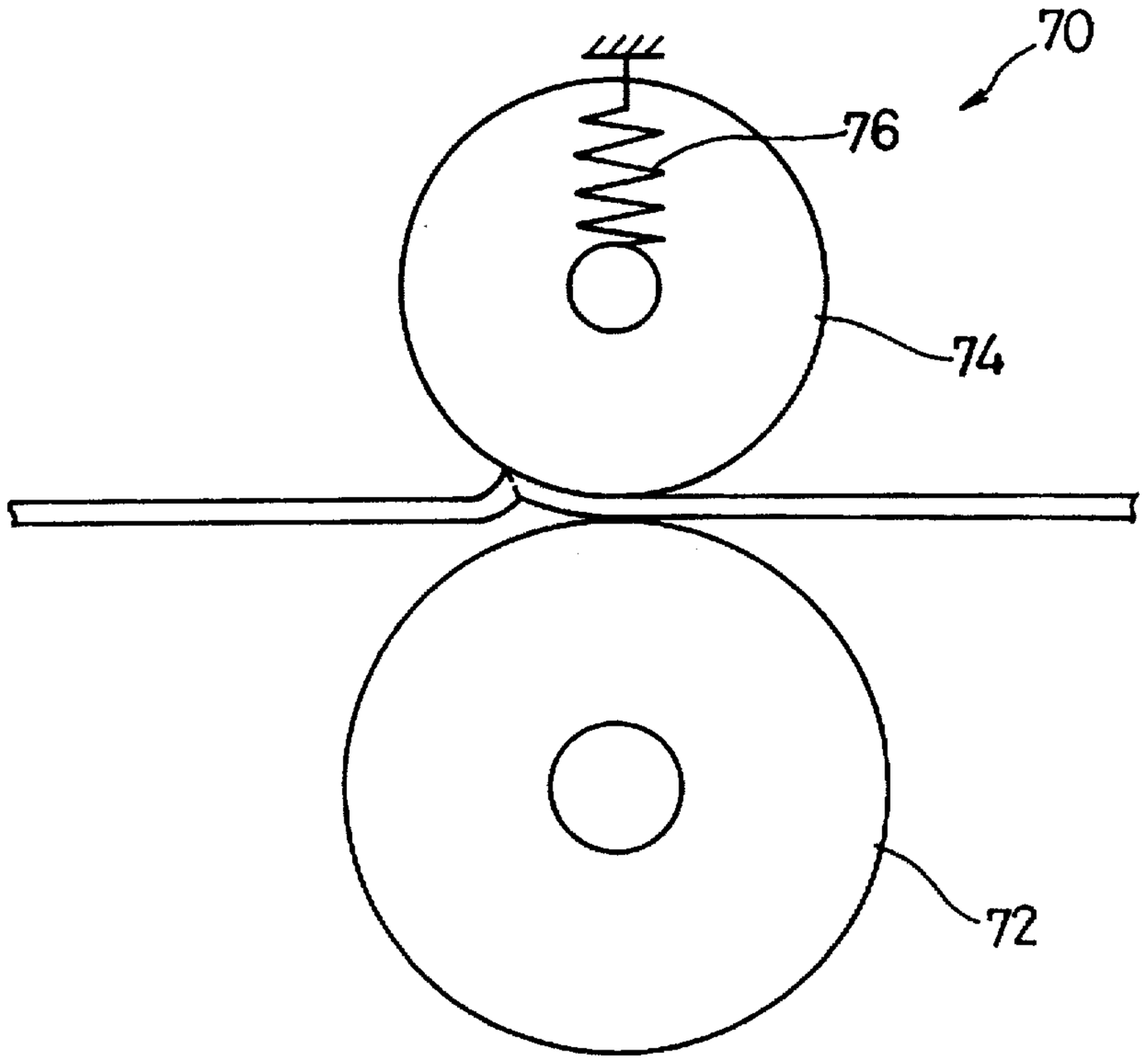


FIG. 4



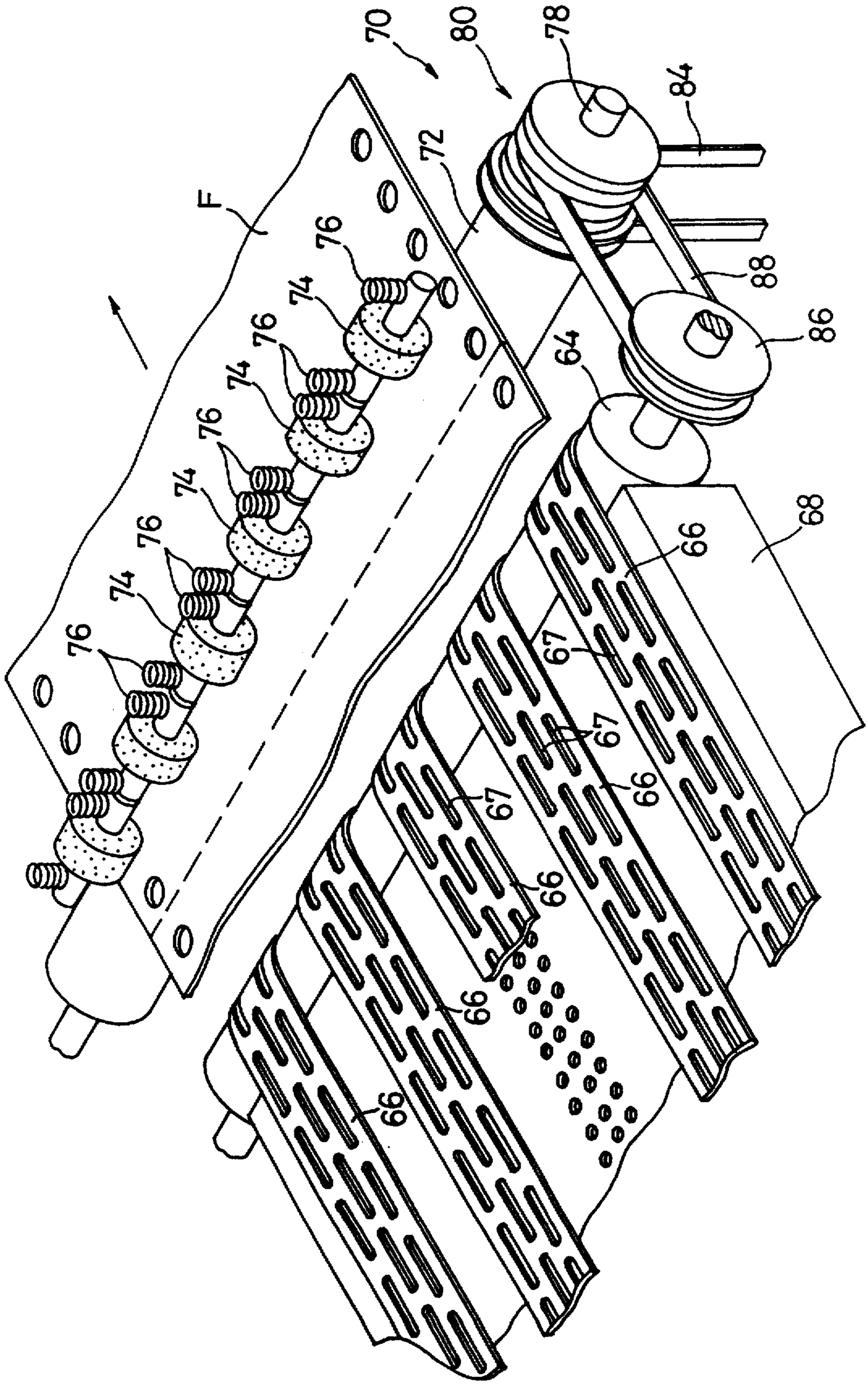


FIG. 3

FIG. 5

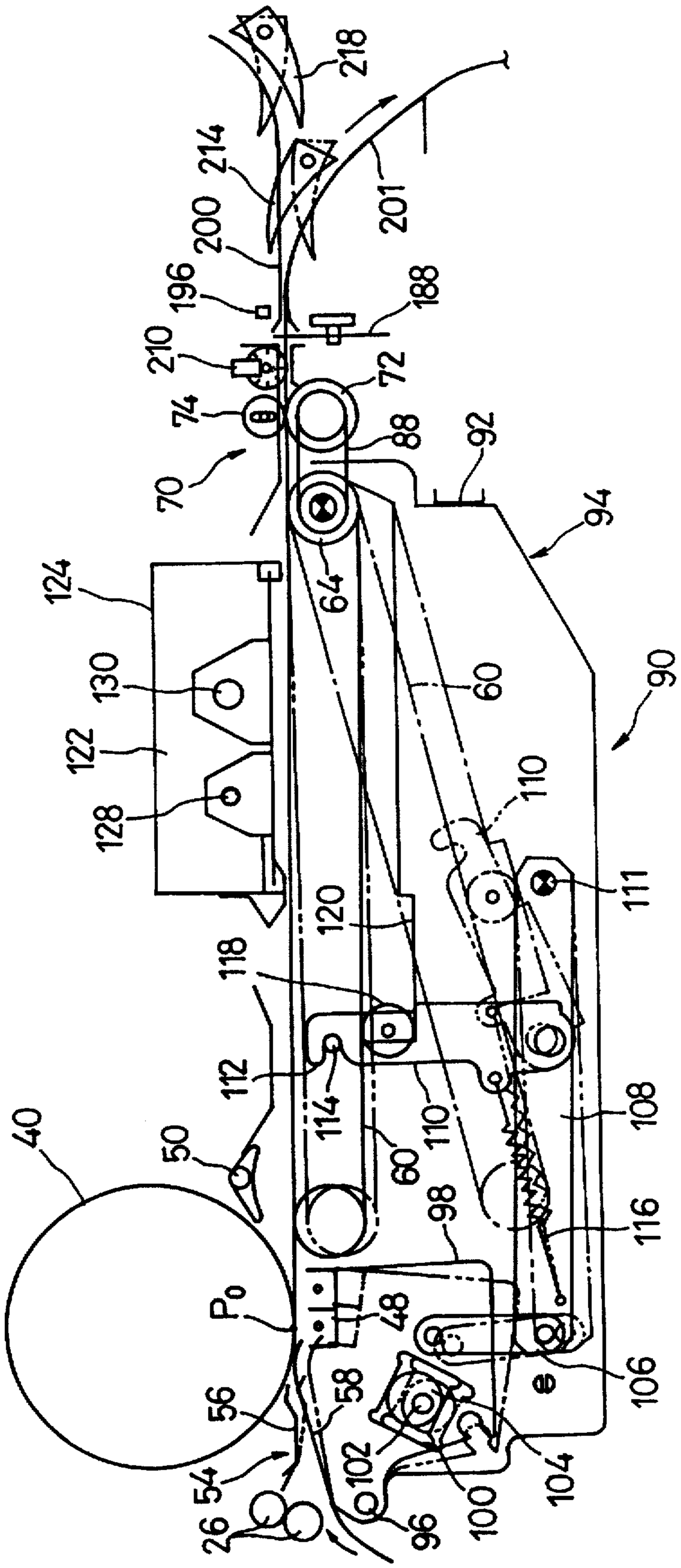

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FIG. 6

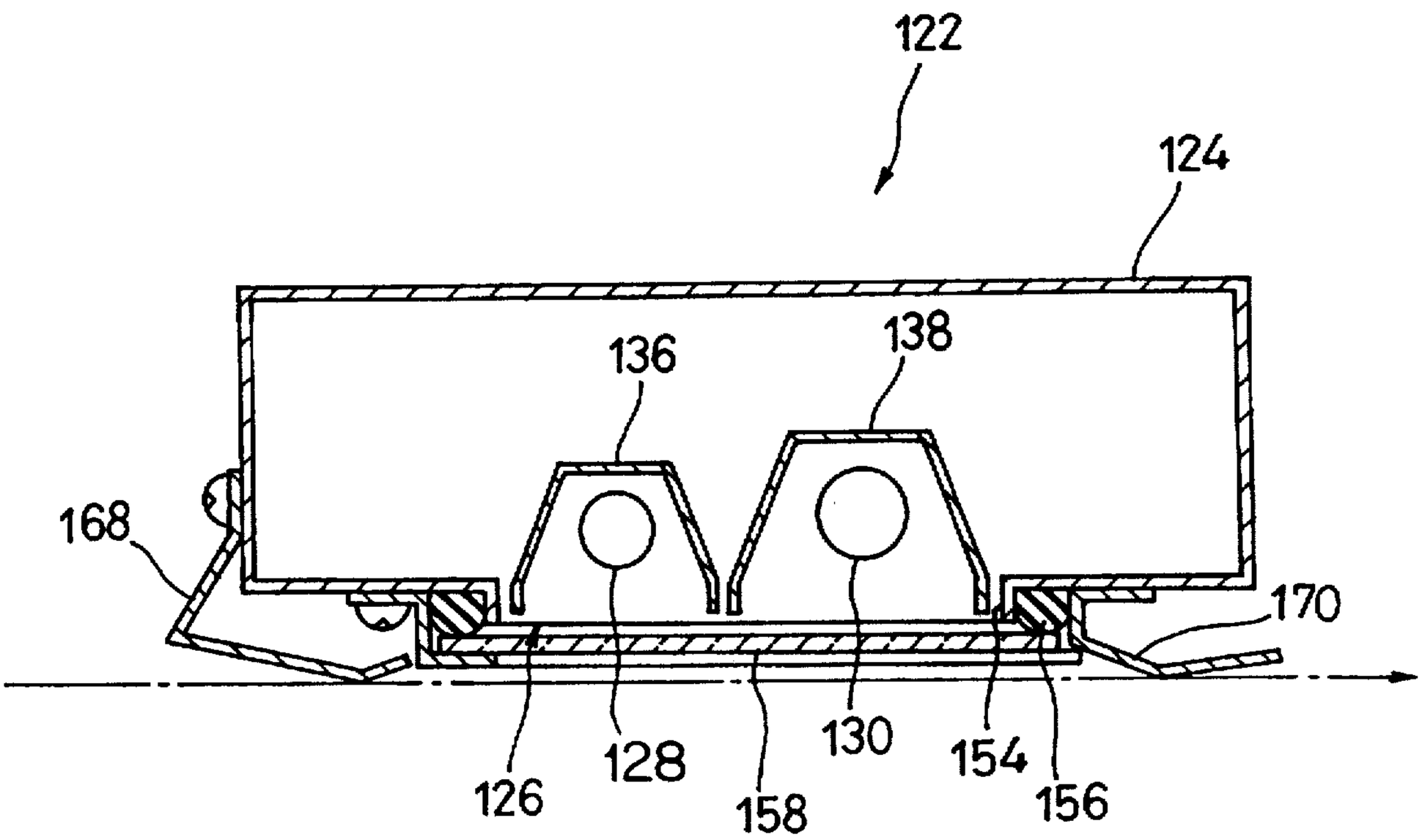

FIG. 7

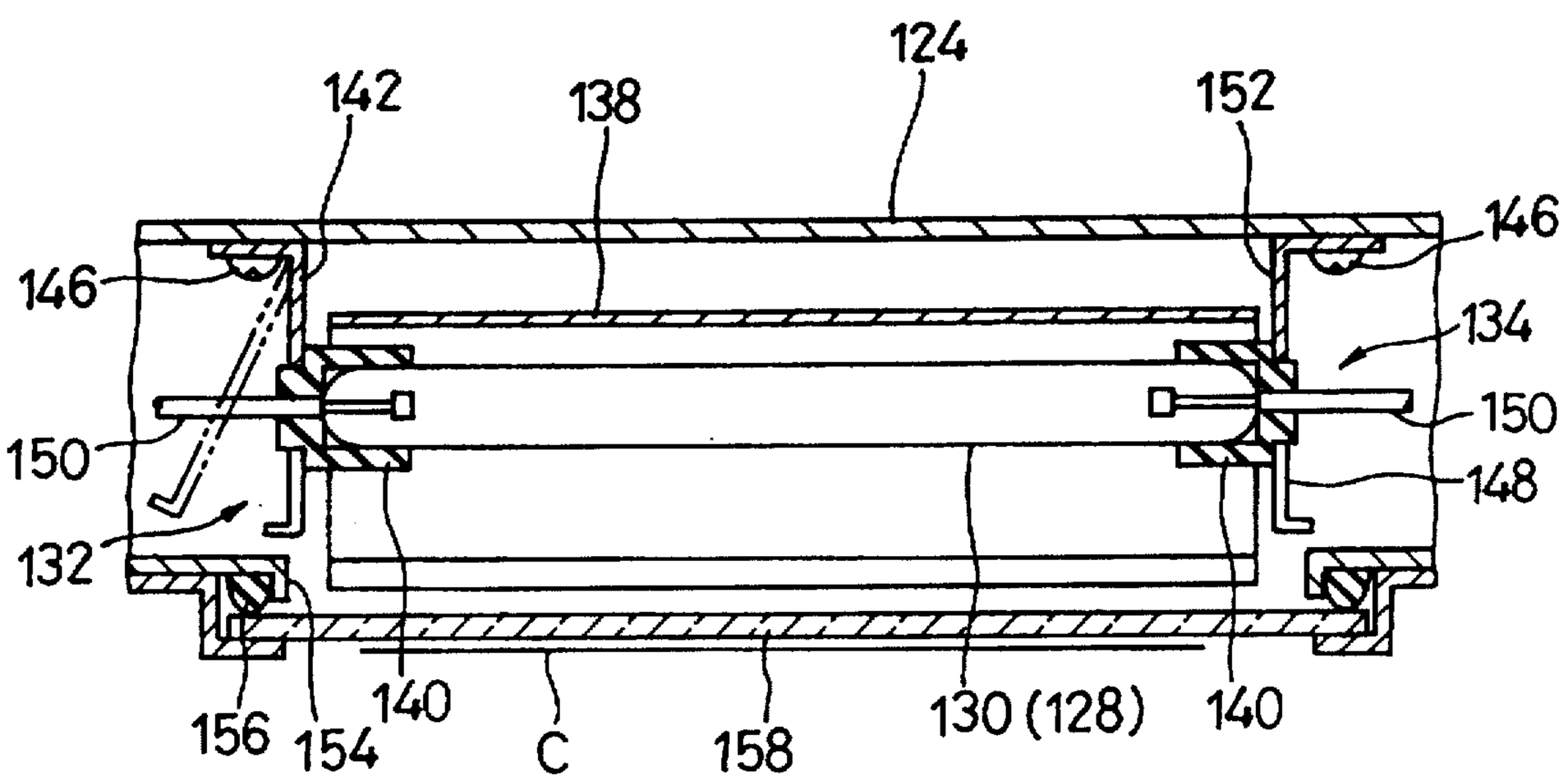
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FIG. 8

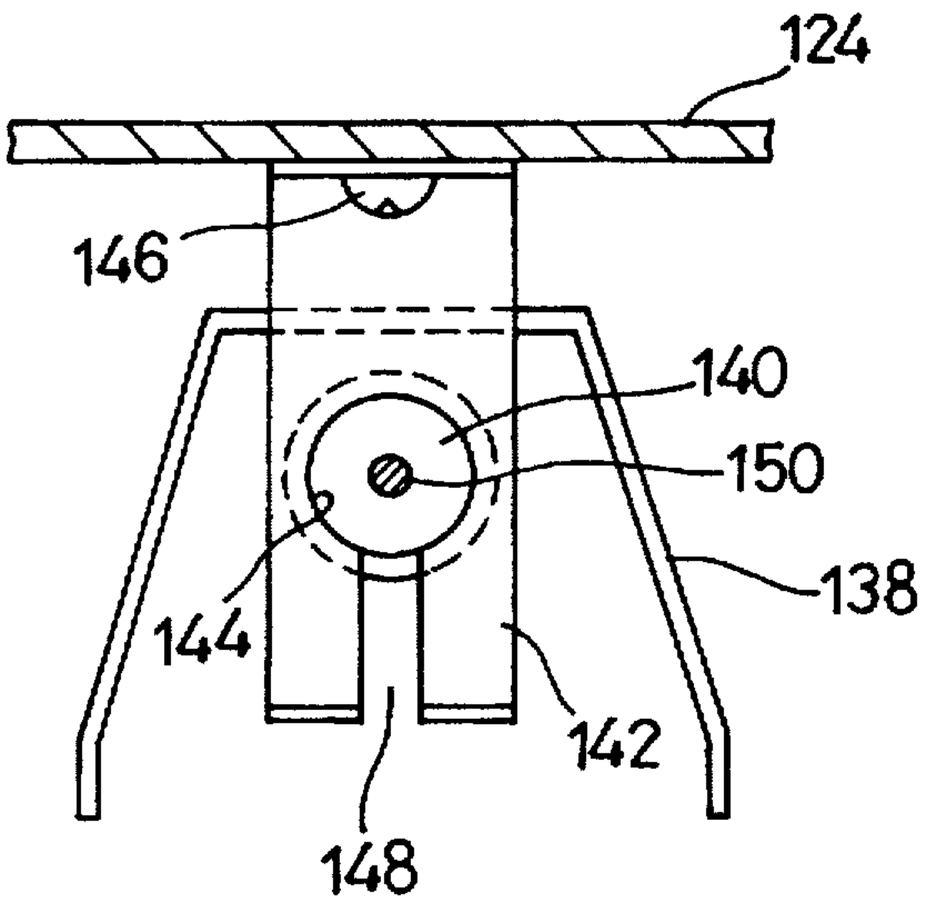
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FIG. 9

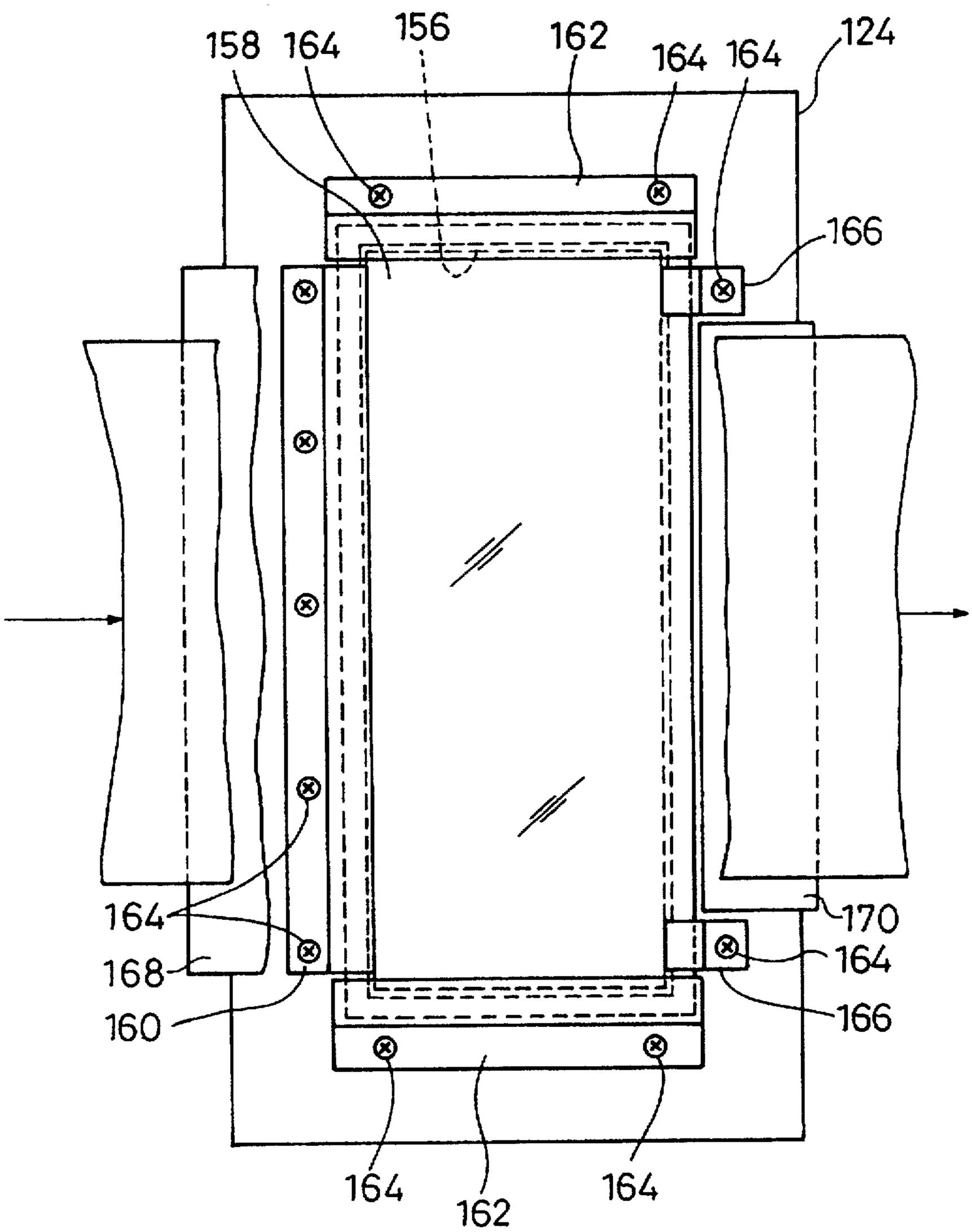
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FIG. 10

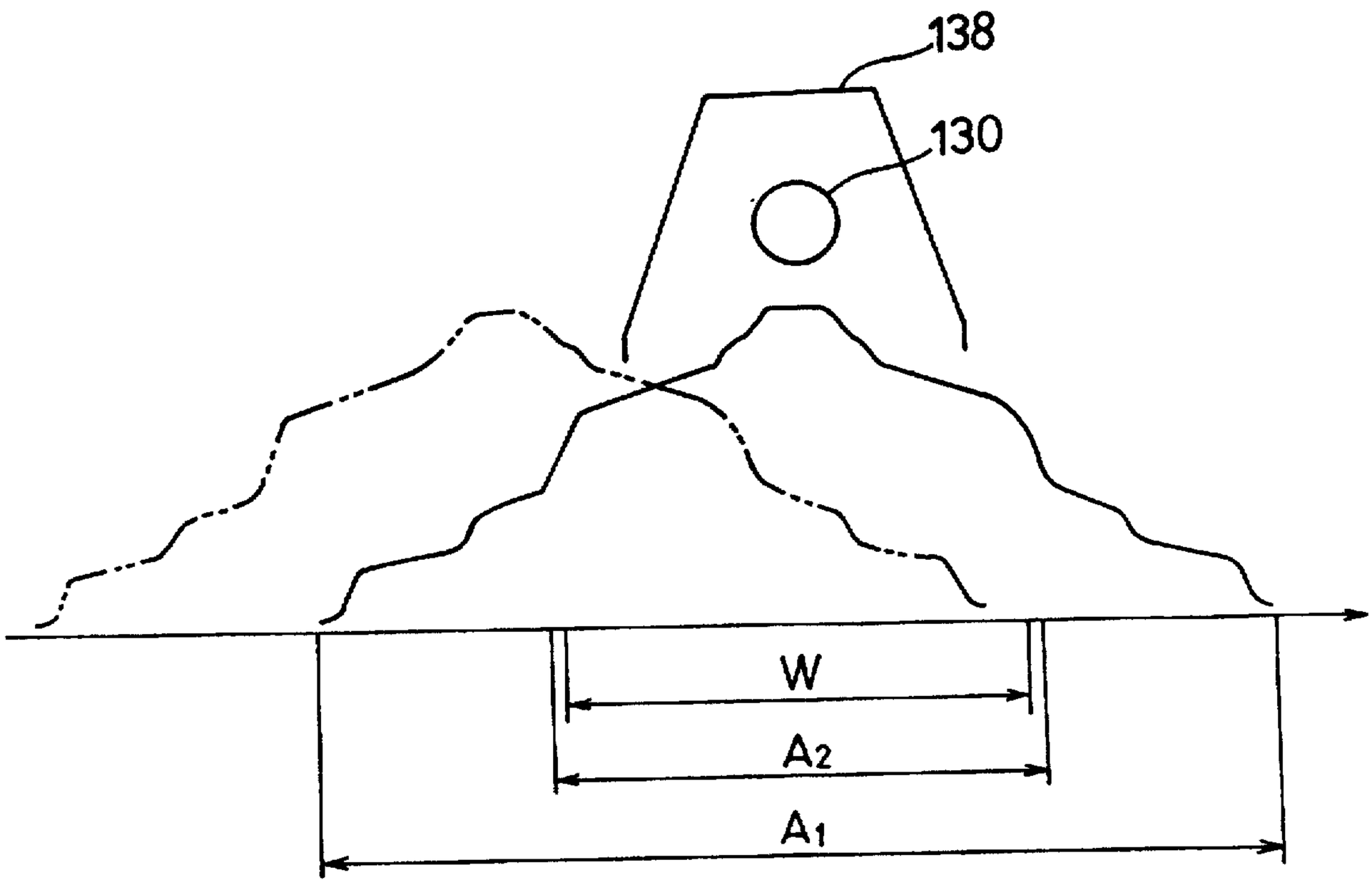

FIG. 11

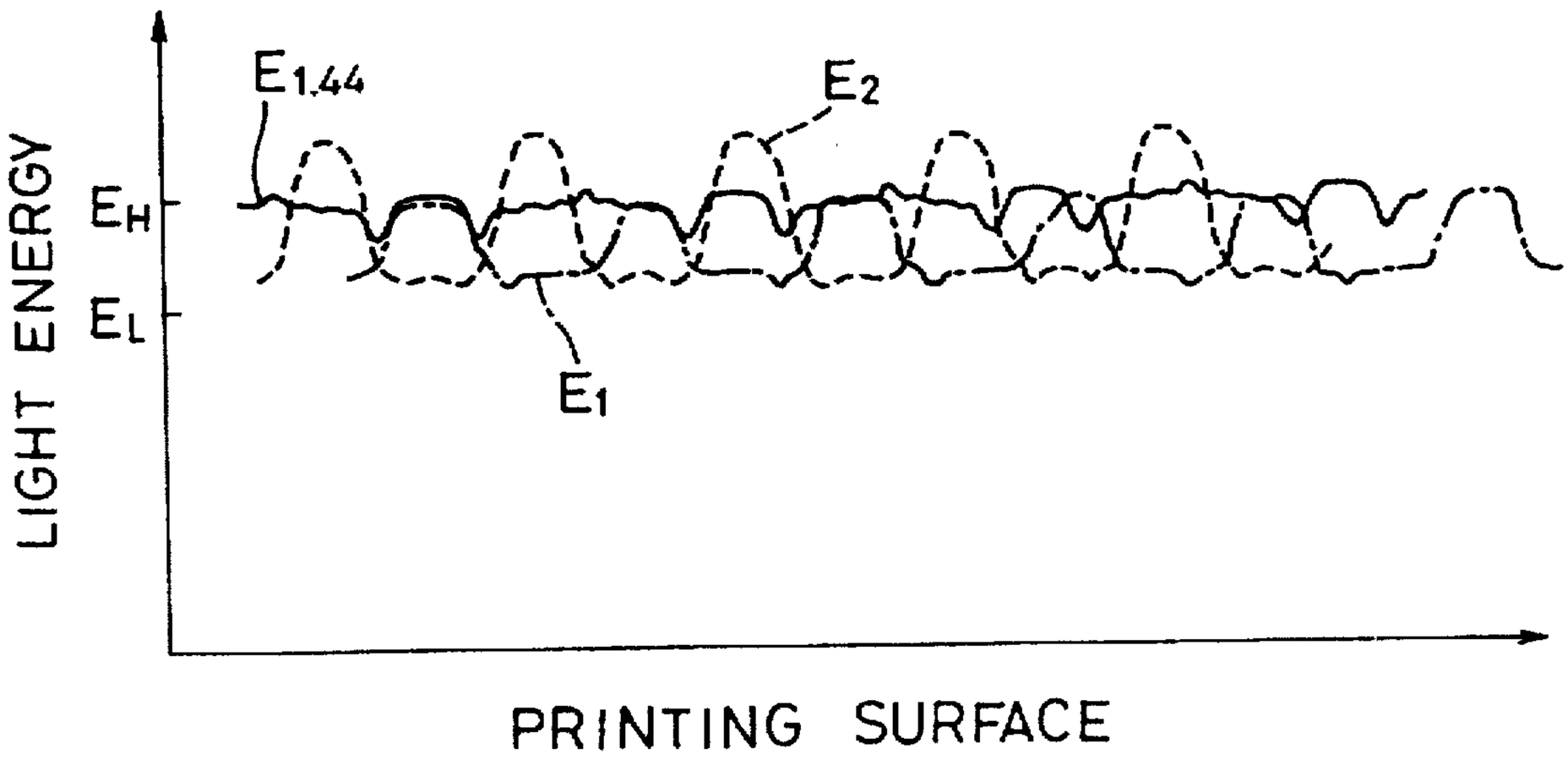

FIG. 12

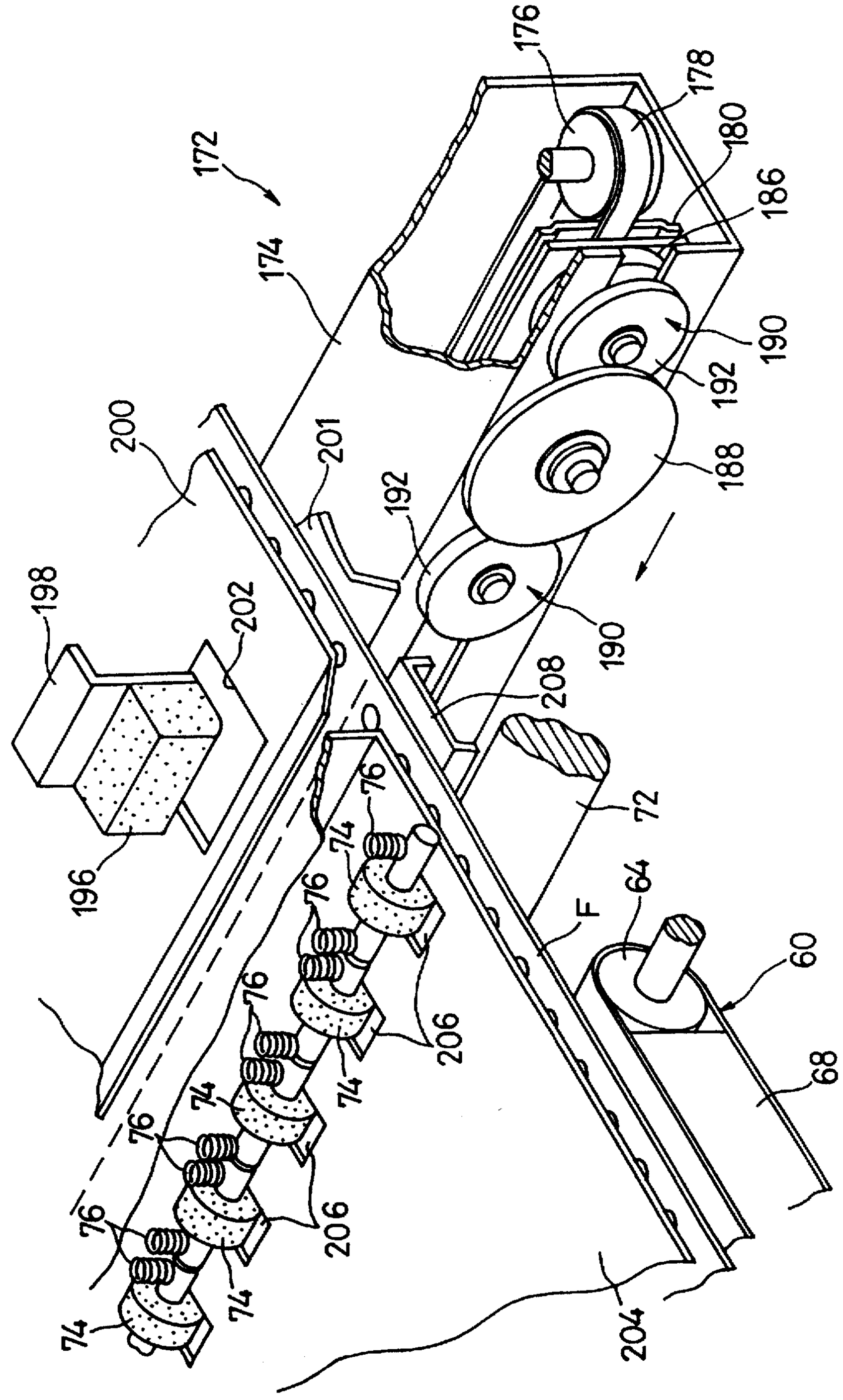
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FIG. 13

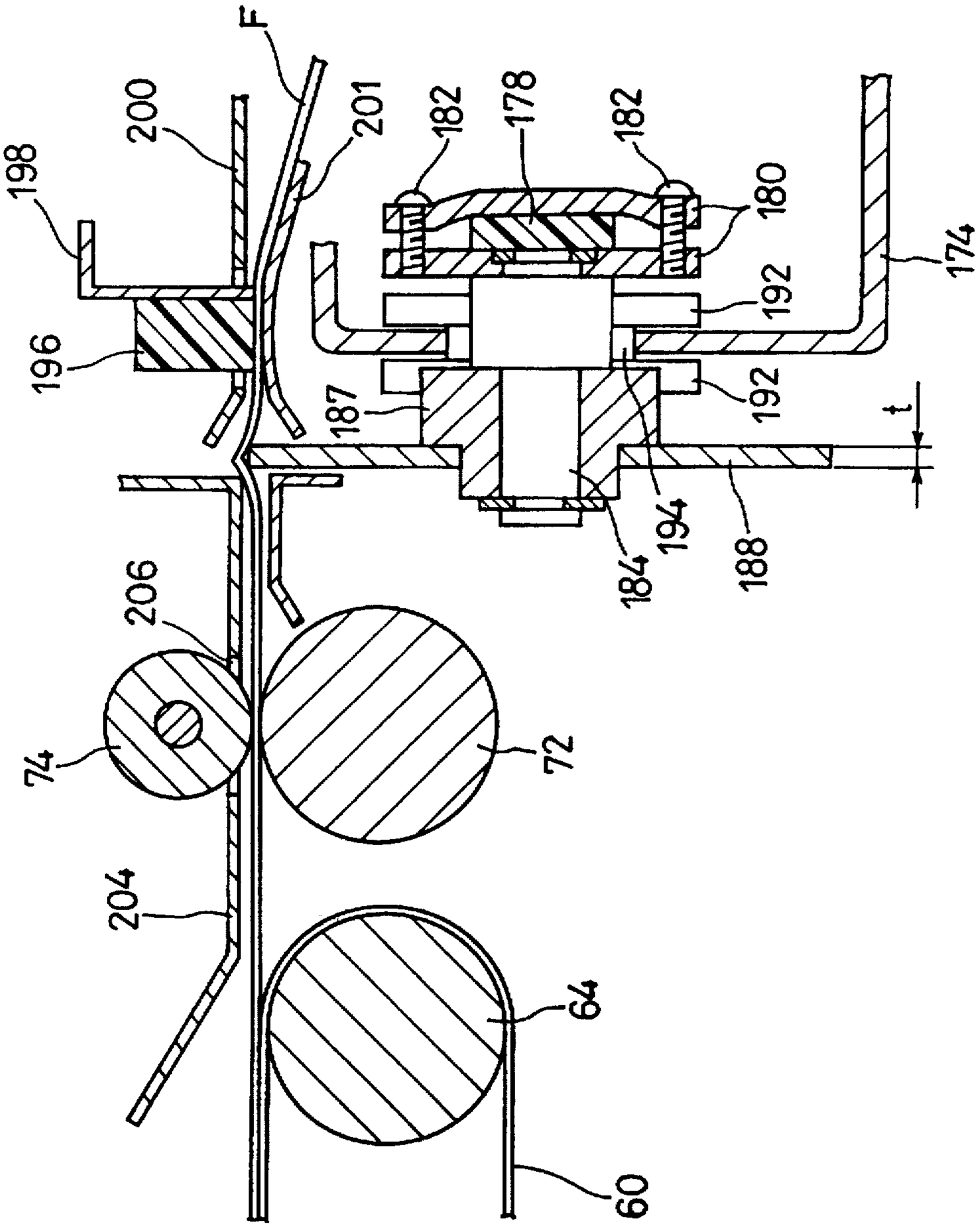
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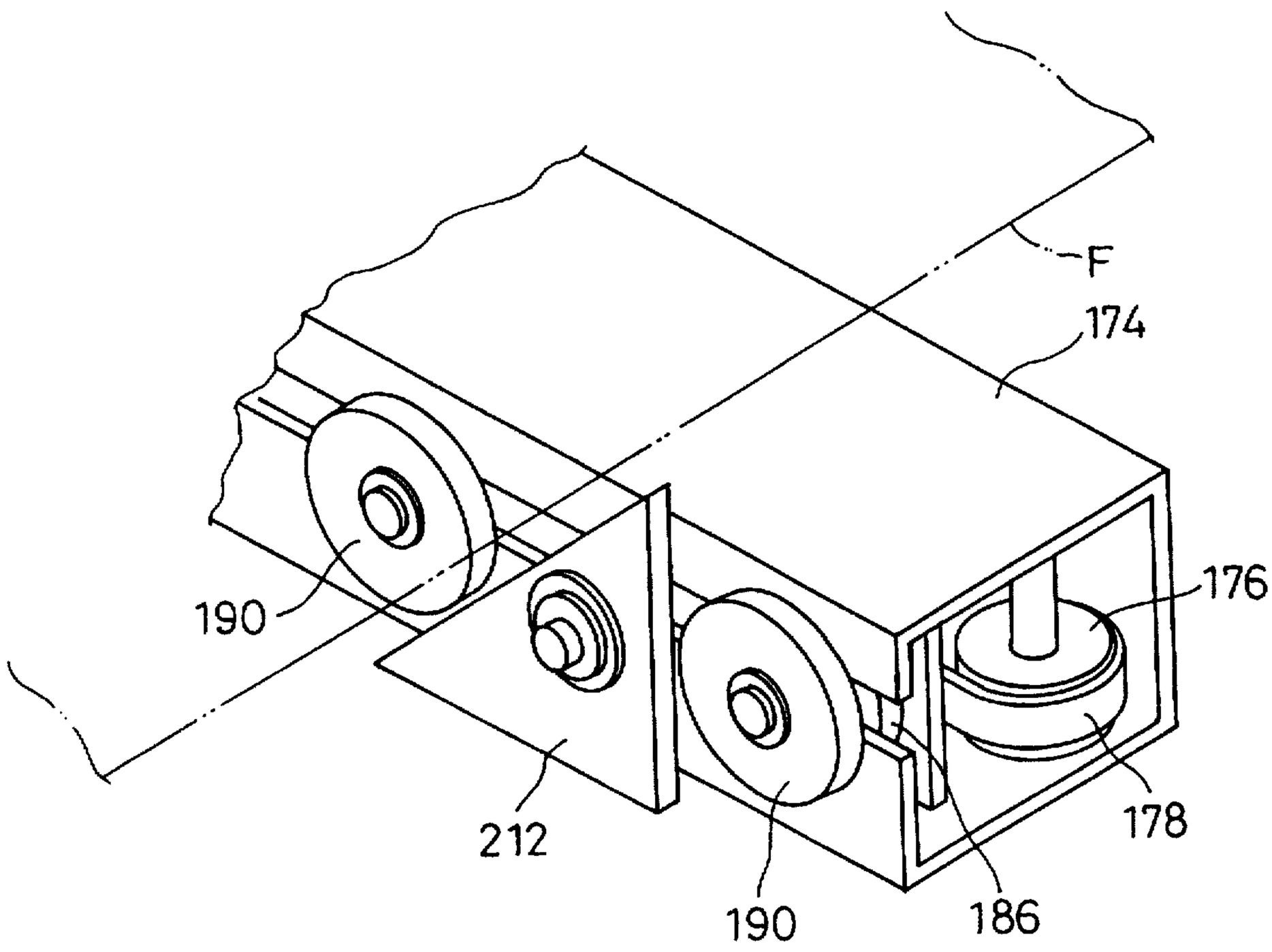
FIG. 14



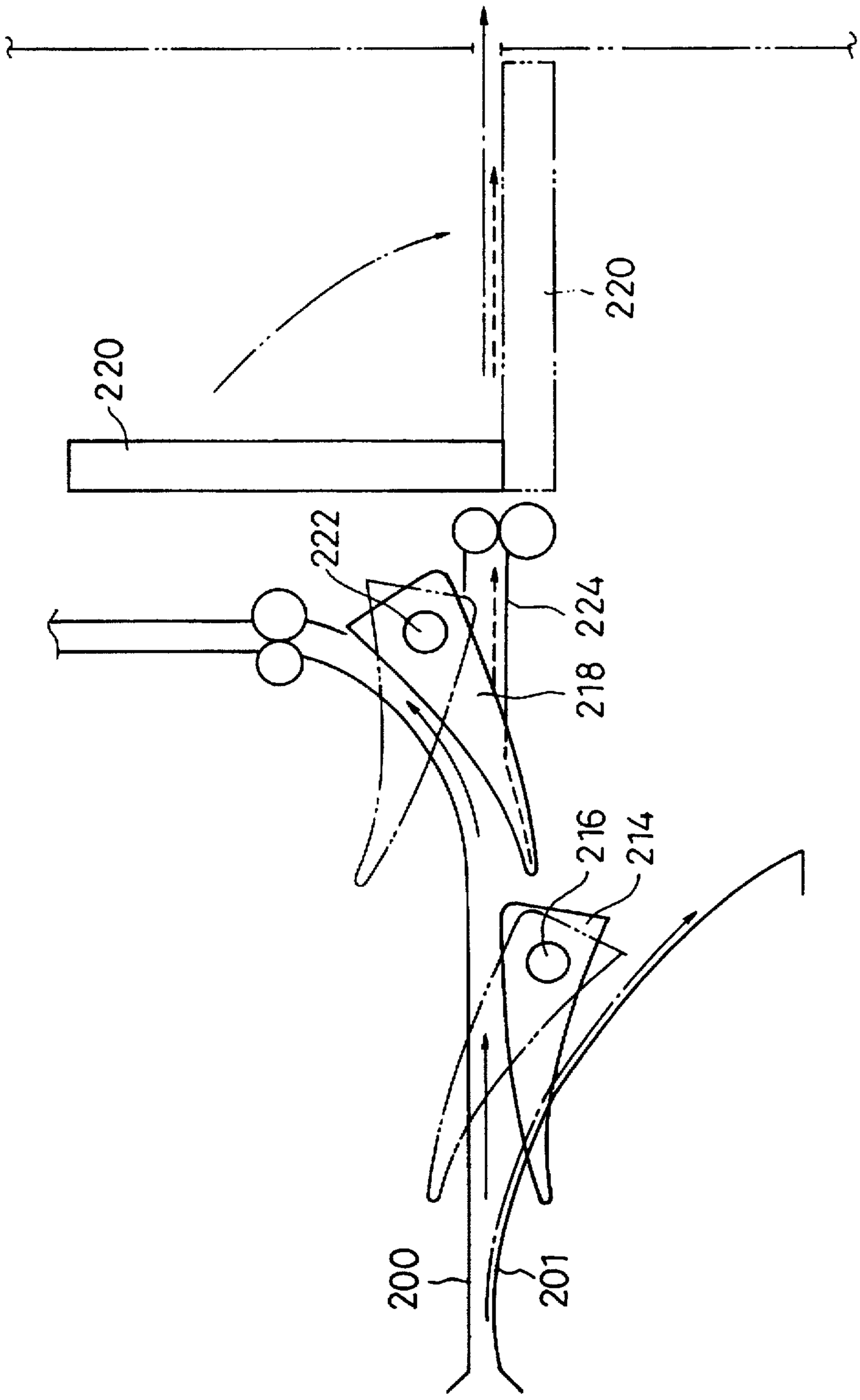
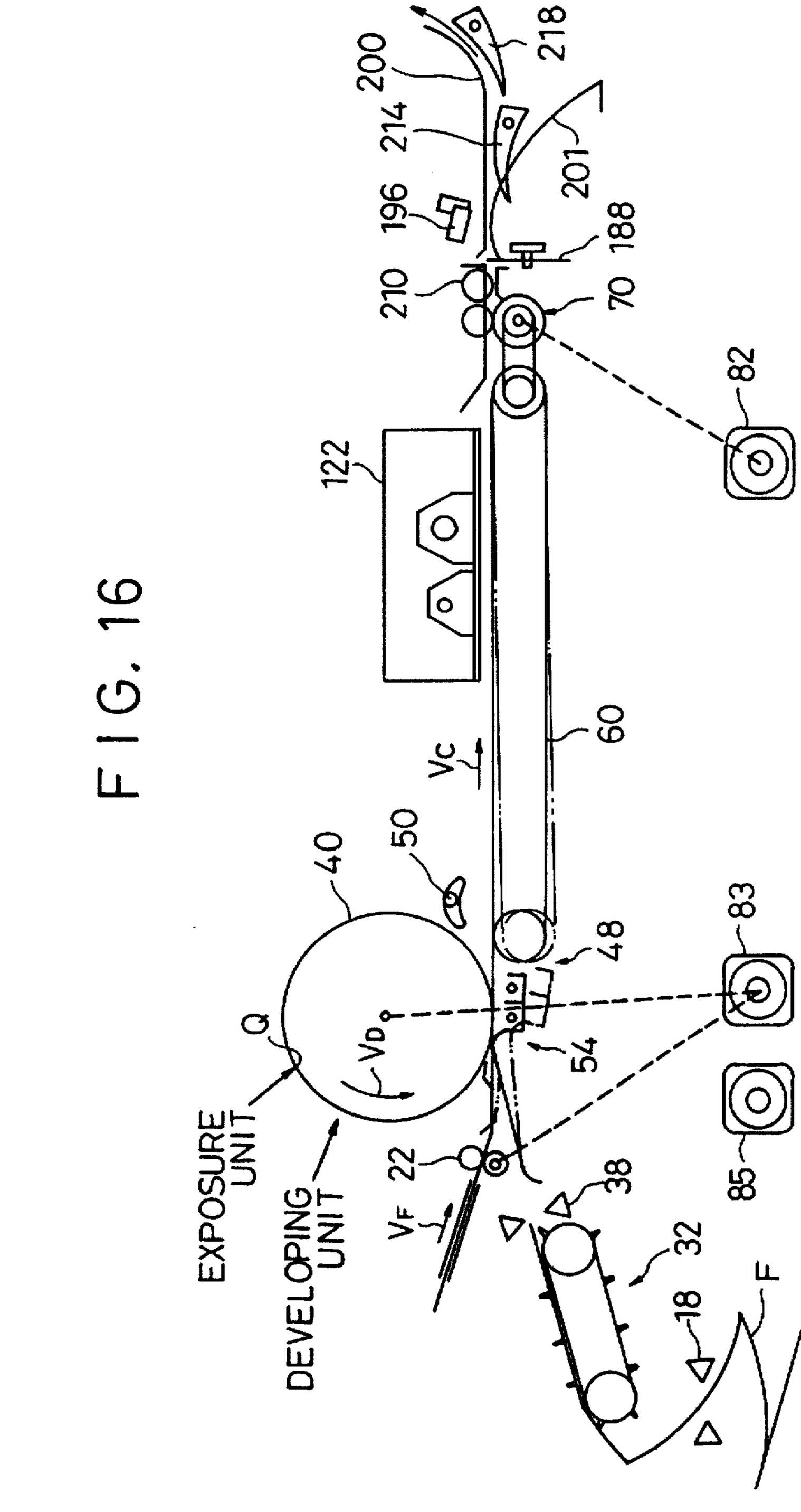


FIG. 15

FIG. 16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82
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Vc
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83
Q
VD
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EXPOSURE UNIT
22
38
85
VF
32
DEVELOPING UNIT
18
F

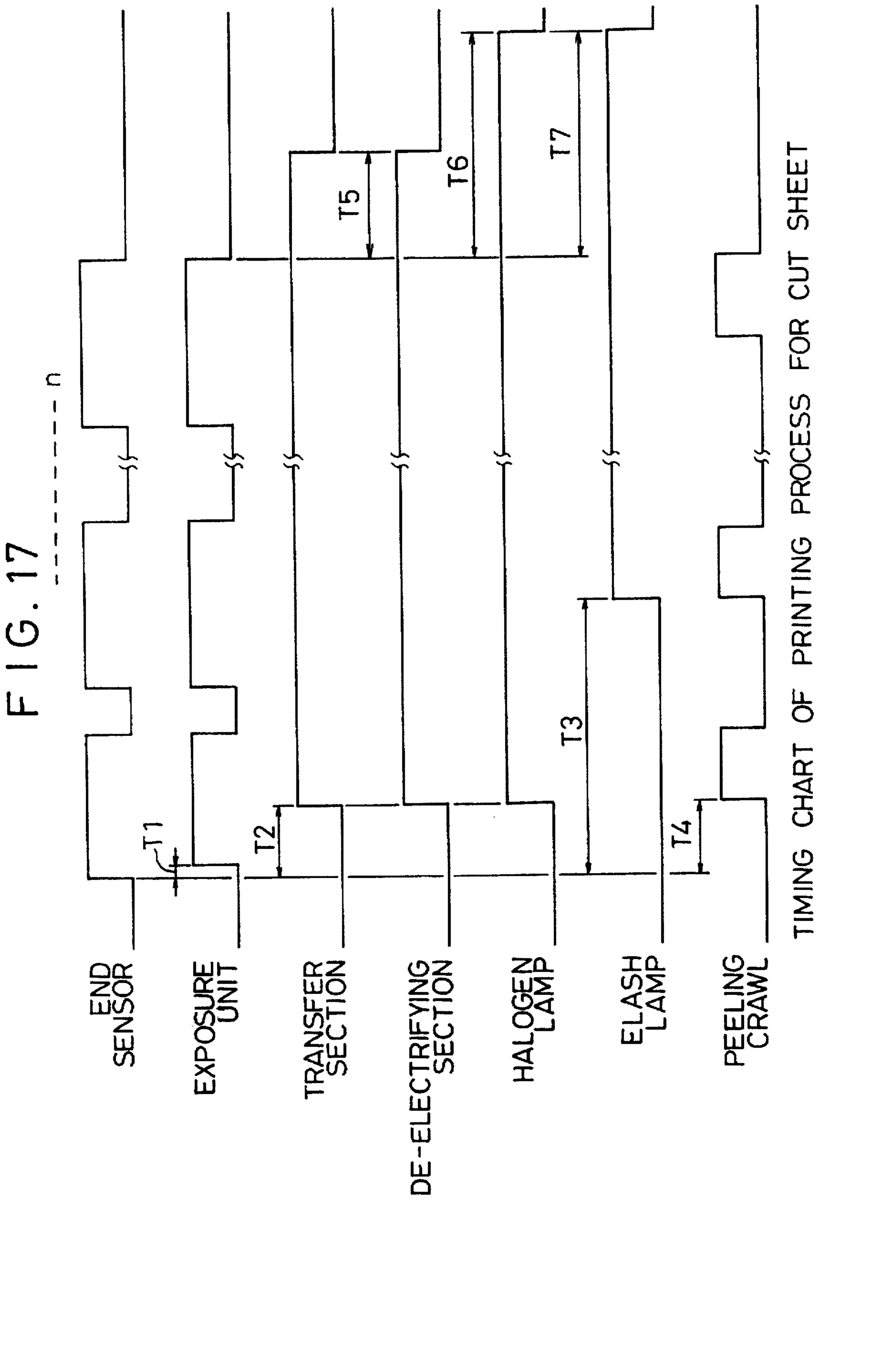
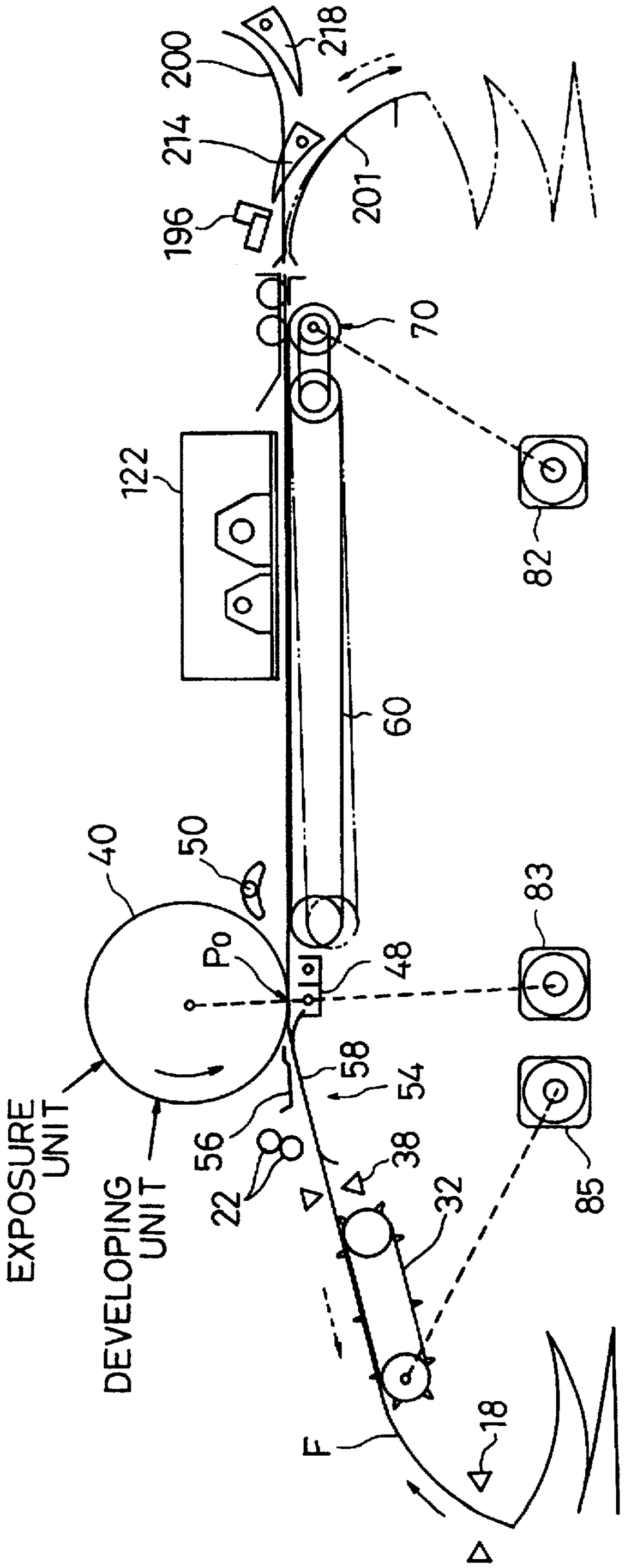

T1
T2
T3
T4
T5
T6
T7
n
TIMING CHART OF PRINTING PROCESS FOR CUT SHEET
END SENSOR
EXPOSURE UNIT
TRANSFER SECTION
DE-ELECTRIFYING SECTION
HALOGEN LAMP
FLASH LAMP
PEELING CRAWL

FIG. 17

FIG. 18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EXPOSURE UNIT
DEVELOPING UNIT
F
18

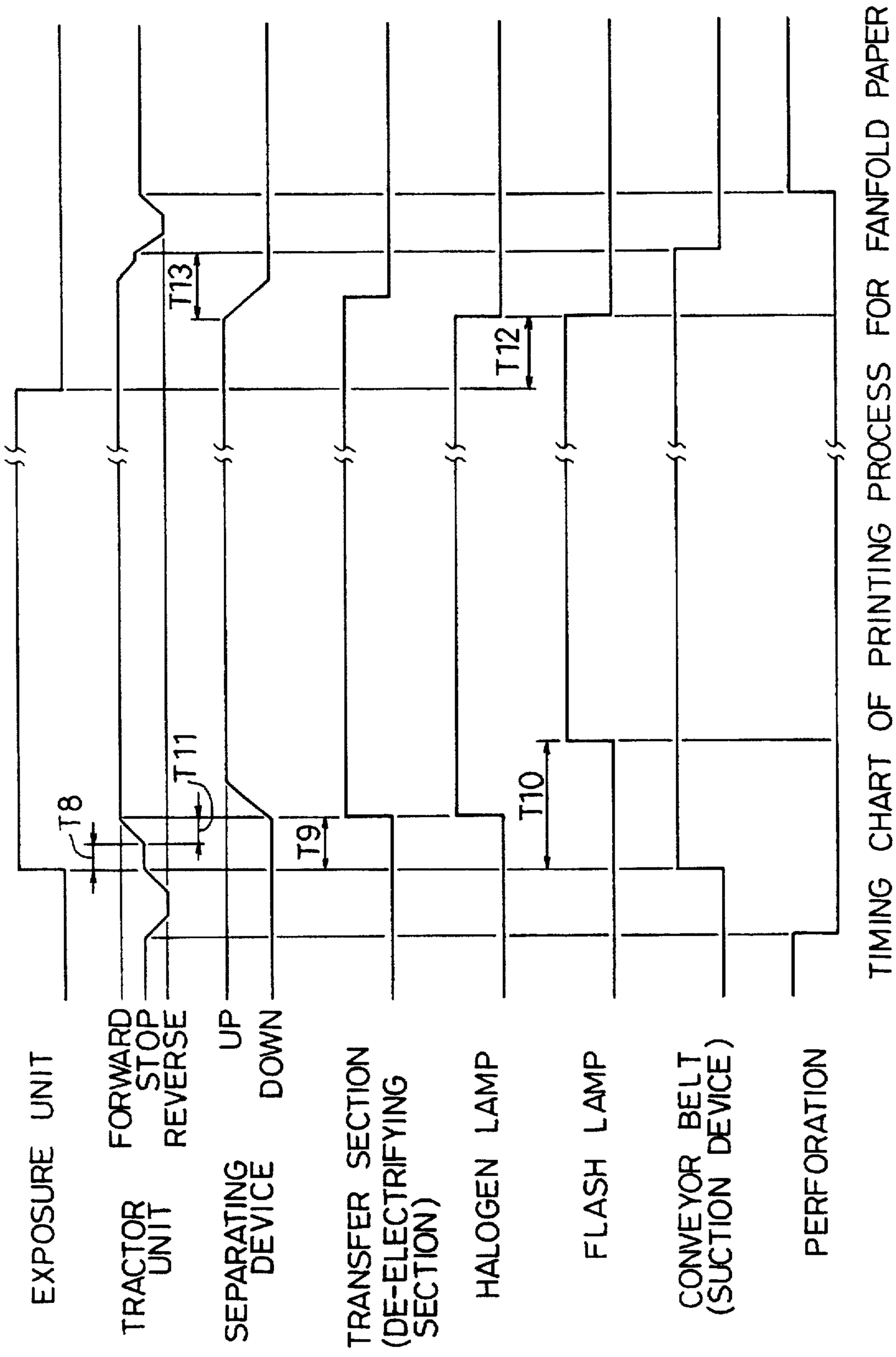
EXPOSURE UNIT
FORWARD
STOP
REVERSE
TRACTOR UNIT
UP
DOWN
SEPARATING DEVICE
TRANSFER SECTION (DE-ELECTRIFYING SECTION)
HALOGEN LAMP
FLASH LAMP
CONVEYOR BELT (SUCTION DEVICE)
PERFORATION
T8
T9
T10
T11
T12
T13
TIMING CHART OF PRINTING PROCESS FOR FANFOLD PAPER

FIG. 19

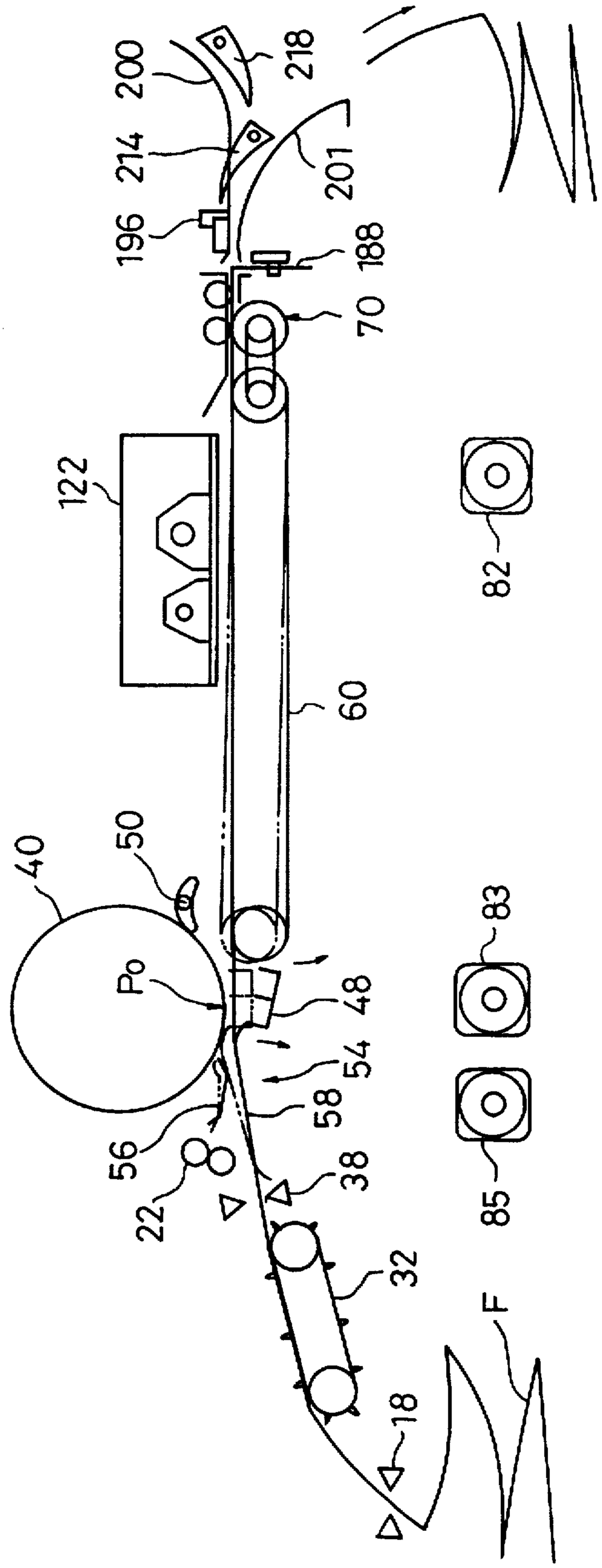
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FIG. 20

FIG. 21

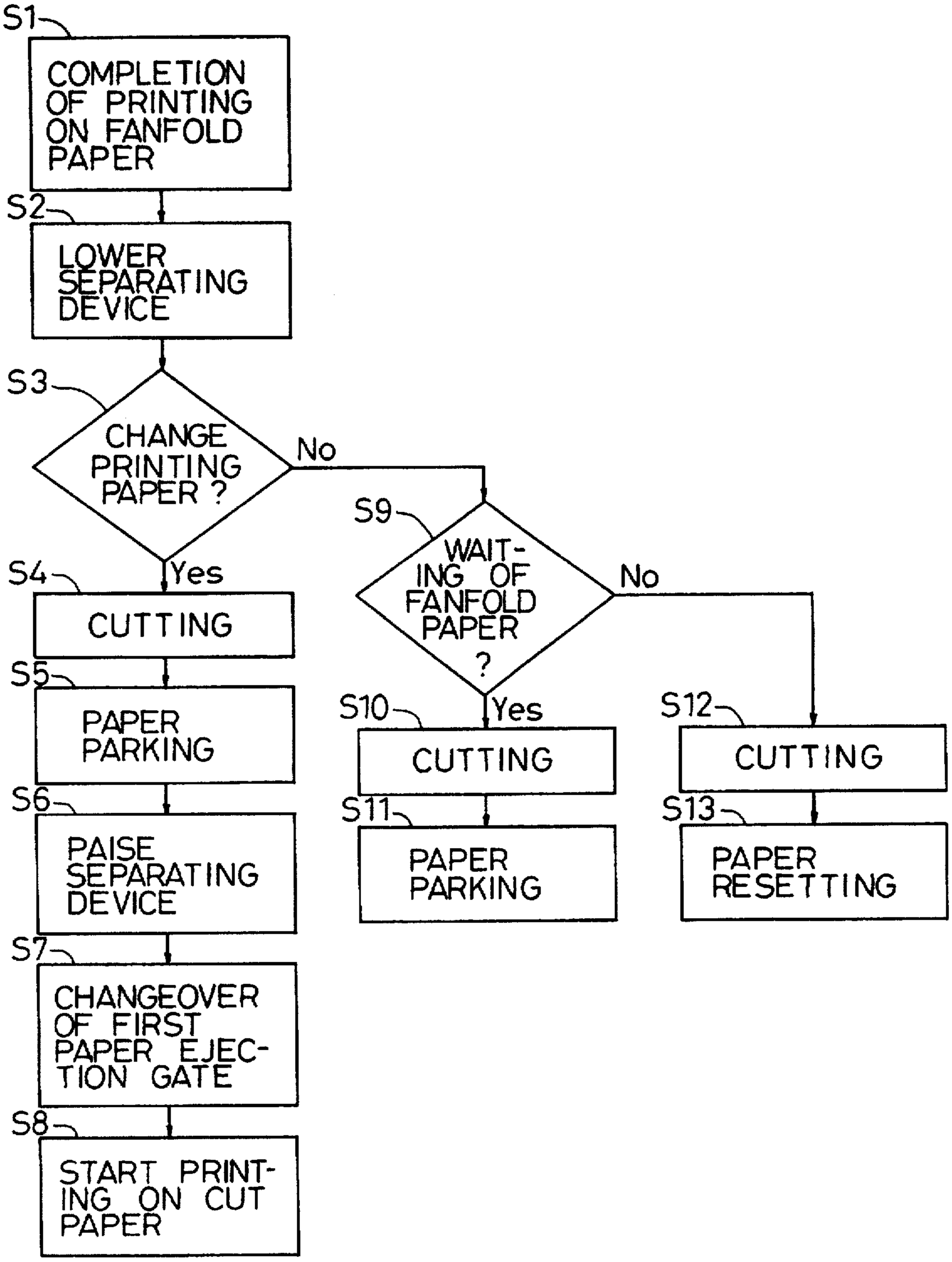

S1
COMPLETION OF PRINTING ON FANFOLD PAPER
S2
LOWER SEPARATING DEVICE
S3
CHANGE PRINTING PAPER ?
No
Yes
S4
CUTTING
S5
PAPER PARKING
S6
PAISE SEPARATING DEVICE
S7
CHANGEOVER OF FIRST PAPER EJECTION GATE
S8
START PRINTING ON CUT PAPER
S9
WAITING OF FANFOLD PAPER ?
No
Yes
S10
CUTTING
S11
PAPER PARKING
S12
CUTTING
S13
PAPER RESETTING

FIG. 22

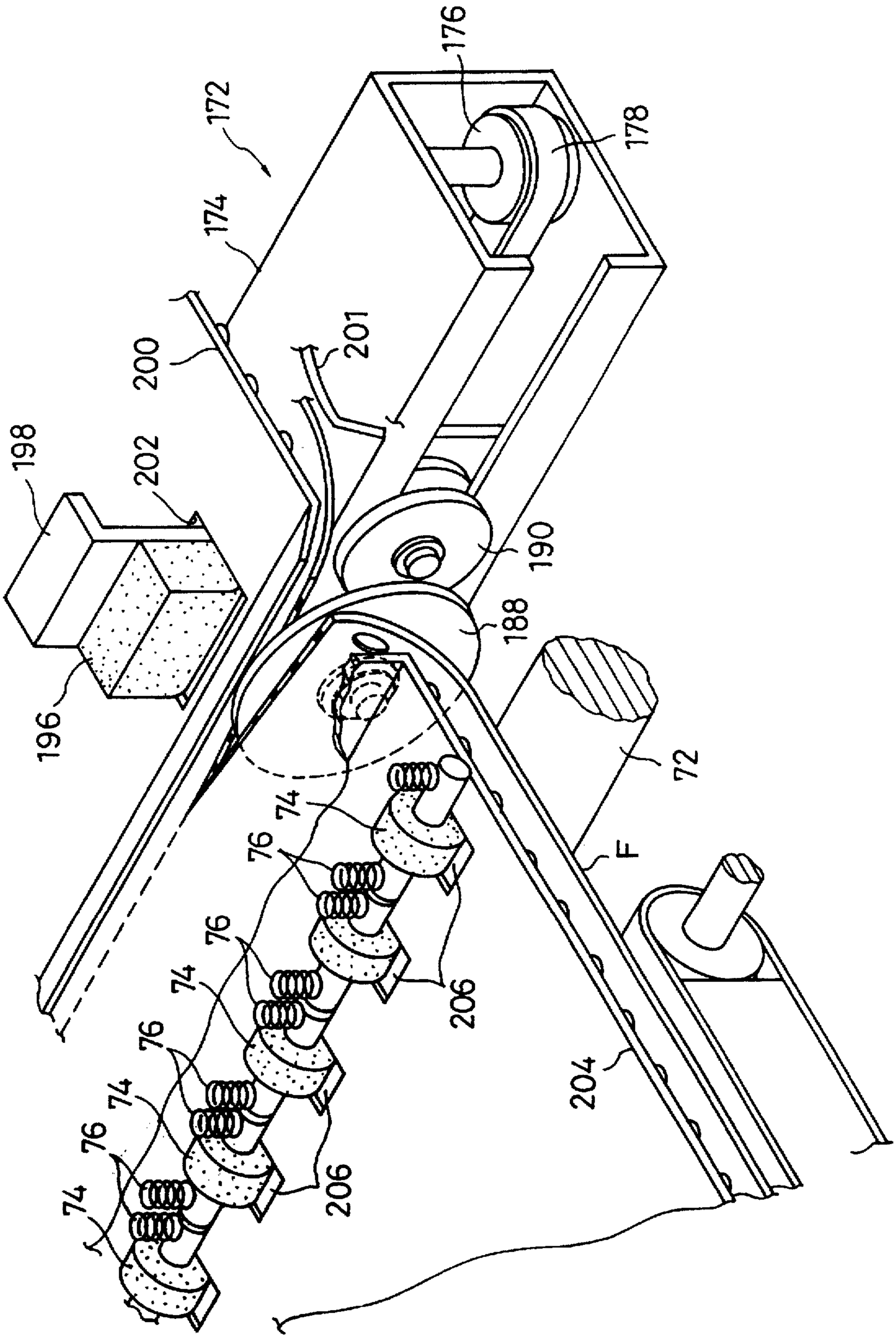


FIG. 23

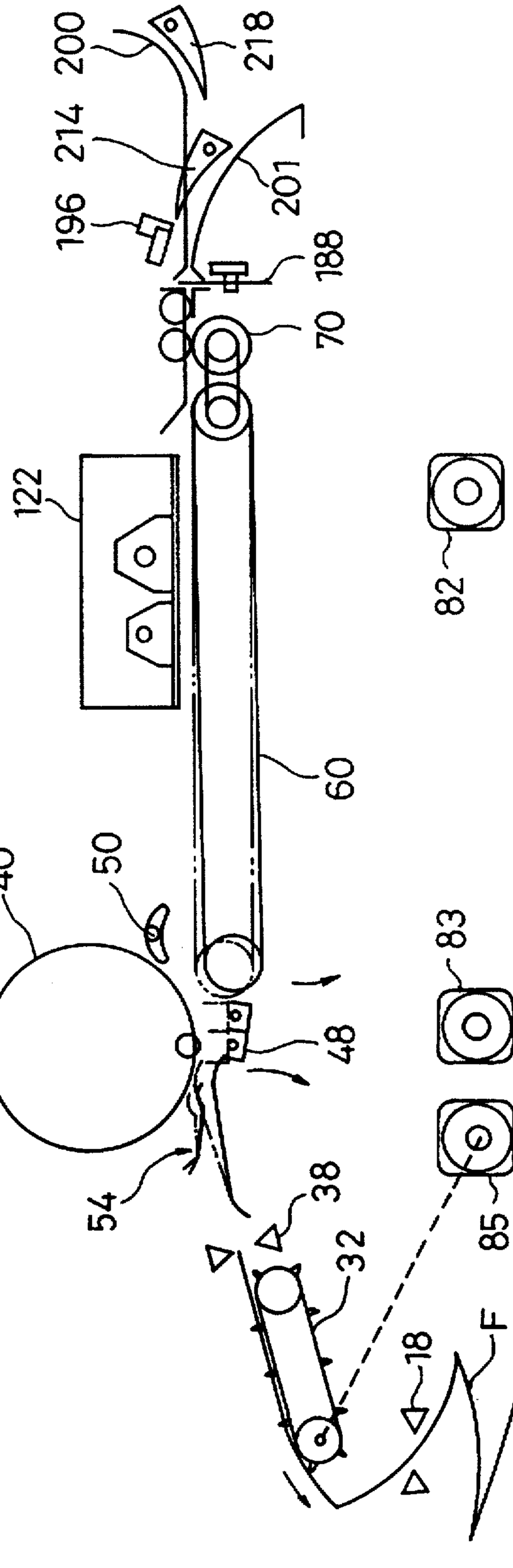


FIG. 24

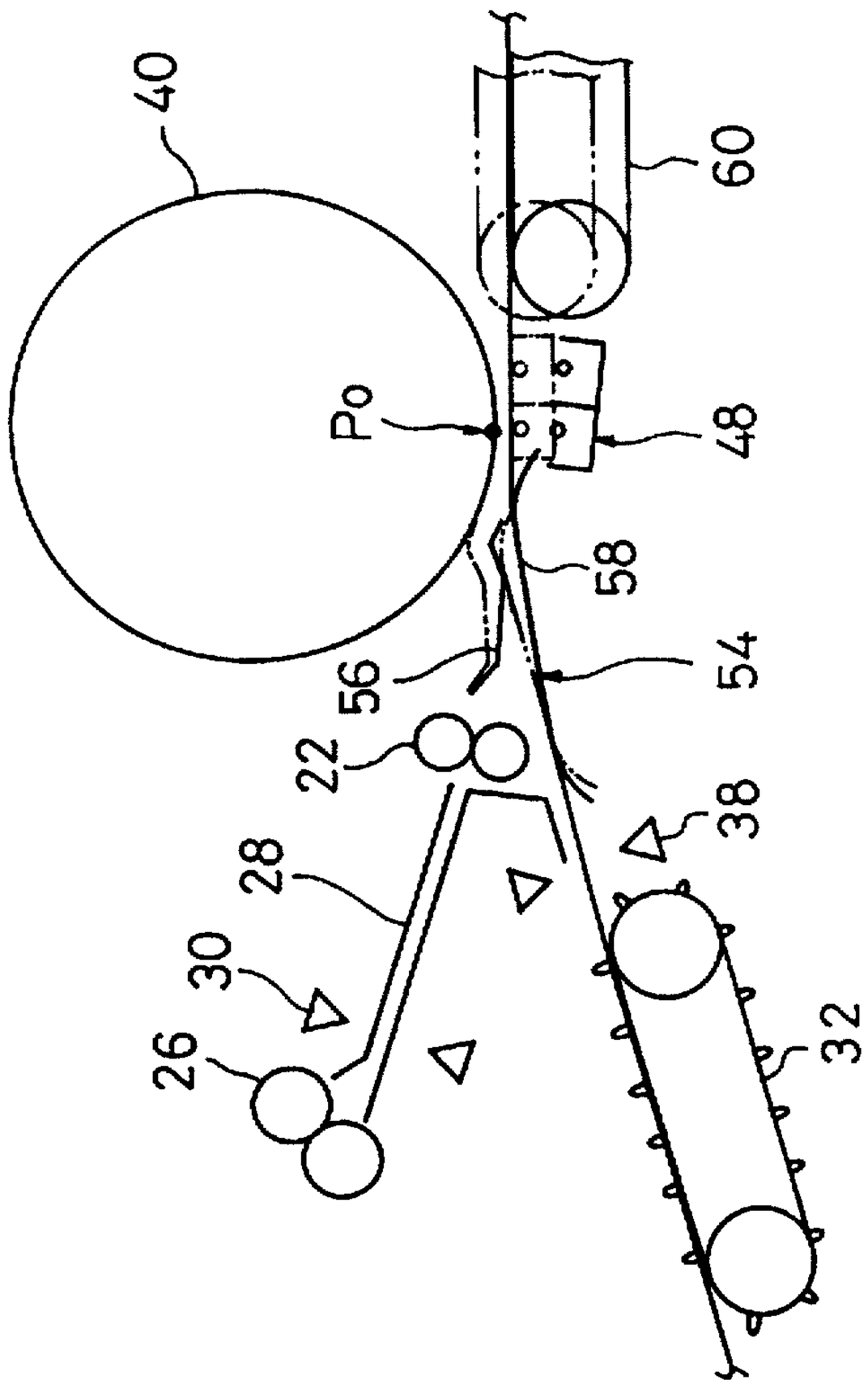
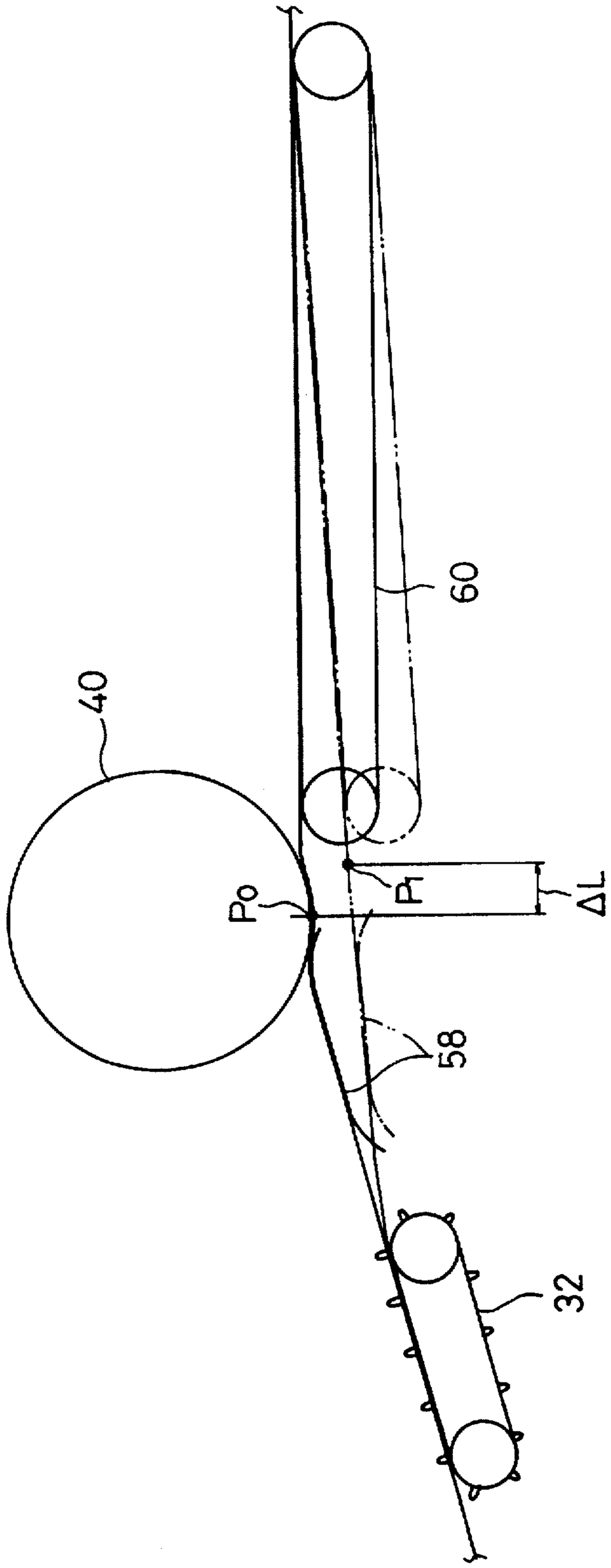


FIG. 25



ELECTROPHOTOGRAPHIC APPARATUS CAPABLE OF SELECTIVELY USING CUT SHEET AND CONTINUOUS PAPER AND METHOD THEREFOR

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an electrophotographic apparatus in which cut sheet and continuous paper such as fanfold paper and rolled paper can be selectively used, and a method for electrophotographic process on the cut sheet and continuous paper.

2. Description of the Related Art

An electrophotographic apparatus designed to selectively print data on cut sheet or continuous paper is disclosed in U.S. Pat. Nos. 4,929,282 and 4,941,377, for example. The electrophotographic apparatus disclosed in the above U.S.P. documents includes a common paper feeding path for feeding one of the printing papers of cut sheet and continuous paper and effects the electrophotographic process for the printing paper in the process of feeding the printing paper along the common paper feeding path. That is, while the printing paper is fed along the common paper feeding path, a toner image is transferred to the printing paper when it comes to an image transferring position which is previously determined on the common feeding path and then the toner image is fixed on the printing paper in the fixing position which is defined on the downstream side of the transferring position.

In the known electrophotographic apparatus, paths for supplying cut sheet and continuous paper to the common feeding path are different and methods for supplying paper in the respective supplying paths are different from each other. As a result, when a print starting command signal is generated and cut sheet or continuous paper is fed to the transferring position on the common feeding path via the corresponding paper supplying path, transferring timings at which the cut sheet and continuous paper are fed to the transferring position after generation of the print starting command signal are different from each other. Therefore, if the transferring timing is determined according to the feeding operation of one of the two types of printing papers, then it becomes impossible to correctly transfer a toner image onto the other type printing paper. In this case, if flash light is used for fixing the toner image, not only the transferring timing but also the fixing timing is deviated and part of the toner image may be kept unfixed.

When a flash type fixing unit is used, the quality of fixing may be deteriorated unless uniform light energy is applied to the toner image on the printing paper or to the printing surface.

Further, when continuous paper is used, it is preferable to automatically cut off the continuous paper after a sequence of printing operations is effected. However, when fanfold paper is used as the continuous paper, the perforation line of the fanfold paper to be cut off must be aligned with the cutting position, making it difficult to correctly cut off the fanfold paper.

SUMMARY OF THE INVENTION

An object of this invention is to provide an electrophotographic apparatus and a method with which the above problems can be solved, cut sheet and continuous paper can be easily dealt with, the printing operation for respective types of printing papers can be adequately effected and fanfold paper can be automatically cut off when the fanfold paper is used.

The above object can be attained by an electrophotographic apparatus of this invention, and the apparatus comprises the following means as the basic means, that is, first supplying means for supplying cut sheet as printing paper towards a common feeding path; second supplying means for supplying continuous paper as printing paper towards the common feeding path; feeding means for feeding the printing paper supplied from one of the first and second supplying means; image forming means for forming an electrostatic latent image on a photosensitive medium; developing means for developing the latent image on the photosensitive medium into a toner image; transferring means for transferring the toner image from the photosensitive medium onto the printing paper lying on the common feeding path at a preset transferring position; and fixing means for fixing the transferred toner image on the printing paper at a preset fixing position on the common feeding path.

The above object can be attained by further providing cutting means capable of cutting continuous paper at a cutting position set on the downstream side of the fixing position with respect to the feeding direction of the paper and retracting means for drawing back the cut end of the continuous paper which is left behind on the common feeding path after the continuous paper cutting operation to a position which lies on the upstream side of the common feeding path and does not prevent supply of the cut sheet by the first supplying means, in addition to the basic means of the above electrophotographic apparatus.

According to the above electrophotographic apparatus, continuous paper is cut off after the printing operation for the continuous paper is completed, and the upstream side portion of the continuous paper is automatically removed from the common feeding path. Therefore, so-called paper parking of the continuous paper may be automatically effected, and after this, the printing operation for cut sheet can be immediately started.

The electrophotographic apparatus further includes separation means for separating the common feeding path from the photosensitive medium when the continuous paper is drawn back. It is preferable for the separation means to separate the common feeding path not only from the photosensitive medium but also from the fixing means. If such separation means is operated when the continuous paper is drawn back, interference which may be caused by the continuous paper on the photosensitive medium and fixing means can be avoided.

In order to deal with fanfold paper which is used as the printing paper, the cutting means includes means for aligning one of the perforation lines of the fanfold paper which is to be cut off with the preset cutting position, holding means for holding portions of the fanfold paper which respectively lie on the upstream and downstream sides with respect to the aligned perforation line, and a cutting member for cutting off the fanfold paper at the aligned perforation line by pulling the fanfold paper in a direction perpendicular to the perforation line while being moved along the aligned perforation line.

Even when the perforation line of the fanfold paper is not exactly set, the cutting member of the cutting means can apply a pulling force to a portion of the fanfold paper near the aligned perforation line. Therefore, at the time of cutting

off the fanfold paper, it is not necessary to exactly align the perforation line with the preset cutting position and the cutting operation can be easily effected.

The object of this invention can be attained not only by the apparatus having the cutting means and retracting means but also by a electrophotographic method having additionally the functions of the above cutting means and retracting means.

Another object of this invention is attained by an electrophotographic method which comprises the following steps as the basic steps, that is, a supplying step of selecting one of cut sheet and continuous paper as a printing paper and supplying the selected printing paper towards a common feeding path; an image forming step of forming an electrostatic latent image of a photosensitive medium; a developing step of developing the latent image on the photosensitive medium into a toner image; a transferring step of transferring a toner image on the photosensitive medium to the printing paper at a transferring position set on the common feeding path when the printing paper is fed along the common feeding path, and a fixing step of fixing the transferred toner image on the printing paper at a fixing position set on the common feeding path.

In order to attain the above object, the method further includes an outputting step of outputting one of different timing signals for the transferring step according to the type of the selected printing paper prior to one of the supplying step and the transferring step in addition to the above basic steps. With the above outputting step, the transferring step can be adequately effected for the selected printing paper with the timing signal used as a reference.

Further, in order to attain the above object, the fixing step is effected by use of a fixing unit. The fixing unit has a flash lamp disposed therein and a light energy distribution in which 70 to 80% of the total emission energy is concentrated on a central portion of 50% of an area illuminated by flash light with respect to a feeding direction of the printing paper each time flash light is emitted from the flash lamp.

If the feeding speed of the printing paper is v, the length of a portion of the printing paper on which 70% of the total emission energy is concentrated in the feeding direction is W, the triggering frequency of the flash lamp is f, and the number of light emitting operations of the flash lamp is n, then the following equation is obtained.

$$v/f=n\cdot W$$

In this case, the number n of light emitting operations is set within a range of 1.2 to 1.8.

If the number n of emission times of the flash light is set as described above, flash lights can be applied to the printing paper passing by the flash lamp in an adequately superposed manner, and as a result, uniform light energy can be applied to the printing paper in the feeding direction.

These and other objects, features and advantages of the present invention will become apparent from the Detailed Description of the Invention when considered in conjunction with the accompanying Drawings. In this case, the drawings only show an example and this invention is not limited thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic view showing an electrophotographic apparatus according to one embodiment of this invention;

FIG. **2** is an enlarged view showing a photosensitive drum of FIG. **1** and members disposed around the photosensitive drum;

FIG. **3** is a perspective view showing a scuff roller unit disposed on the termination side of a belt conveyer of FIG. **1**;

FIG. **4** is a side view schematically showing the scuff roller unit;

FIG. **5** is an enlarged view showing a separating device of FIG. **1**;

FIG. **6** is an enlarged view showing a fixing unit of FIG. **1**;

FIG. **7** is a longitudinal section of the fixing unit;

FIG. **8** is a side view of a lamp holder disposed in the fixing unit;

FIG. **9** is a bottom view of the fixing unit;

FIG. **10** is a diagram showing the distribution of light energy applied to the printing paper from a flash lamp of the fang unit when light is emitted from the flash lamp;

FIG. **11** is a diagram showing the distribution of light energy applied to the printing paper when light is repeatedly emitted from the flash lamp;

FIG. **12** is a perspective view of a cutting device of FIG. **1** with partly cut-away portion;

FIG. **13** is a cross sectional view showing the cutting device in the operative state;

FIG. **14** is a perspective view of a cutting device according to another embodiment;

FIG. **15** is an enlarged view showing part of an ejecting section of FIG. **1**;

FIG. **16** shows a state in which the printing process for cut sheet is started in the apparatus;

FIG. **17** is a timing chart showing the operation effected in the printing mode for cut sheet;

FIG. **18** shows a state in which the printing process for fanfold paper is started in the apparatus;

FIG. **19** is a timing chart showing the operation effected in the printing mode for fanfold paper;

FIG. **20** shows a state in which the printing mode for fanfold paper is completed in the apparatus;

FIG. **21** is a flowchart showing the steps of a process effected after the printing mode for fanfold paper is completed;

FIG. **22** is a perspective view of the cutting device set in the state shown in FIG. **13**;

FIG. **23** shows a state in which paper parking of FIG. **21** is completed in the apparatus;

FIG. **24** shows a state in which fanfold paper set in the paper parking state is fed out for automatic setting; and

FIG. **25** shows the operation of effecting the alignment for perforation line of the fanfold paper at the time of automatically setting the fanfold paper.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. **1**, an electrophotographic apparatus roughly includes paper stacking sections **2** and **4**, feeding section **6**, printing section **8**, and paper ejecting section **10**.

The stack section **2** is arranged in an upper position and the stack section **2** has a tray **12**. A large number of sheets of cut paper C are stacked and stored in the tray **12**. A take-out roller **14** is disposed above the tray **12** and is

positioned near the feeding section **6**. Further, the take-out roller **14** is set in contact with one of the cut sheets C which lies in the topmost position in the tray **12**. Therefore, when the take-out roller **14** is rotated, the cut sheet in the tray **12** is sequentially taken out one at a time and supplied towards the succeeding stage or the feeding section **6**.

The other stack section **4** is disposed below the stack section **2** and the stack section **4** also has a tray **16**. Fanfold paper F is set in a folded form in the tray **16**. An end sensor **18** which is an optical sensor having a light emitting element and a light receiving element is disposed above the tray **16**.

The feeding section **6** receives printing paper supplied from a selected one of the stack sections **2** and **4** and supplies the received printing paper towards the printing section **8**. That is, the feeding section **6** has a pair of separation rollers **20** disposed on the side of the stack section **2**. The separation rollers **20** are disposed near the take-out roller **14** and rotated in opposite directions. Therefore, as described before, when the take-out roller **14** is rotated, the cut sheet C taken out from the tray **12** passes through between the separation rollers **20**. The separation rollers **20** permit only one of cut sheet C supplied from the tray **12** to pass through therebetween. Thus, the cut sheet C is supplied to the feeding section **6** one at a time.

A pair of feed rollers **22** are disposed on the downstream side of the separation rollers **20** with respect to the feeding direction of the cut sheet C and are disposed in the boundary between the feeding section **6** and the printing section **8**. Further, a register guide **24** formed in a plate-like form, a pair of register rollers **26** and a pair of introducing guides **28** are arranged in this order as viewed from the separation roller **20** side between the separation rollers **20** and the feeding rollers **22**.

The cut sheet C is fed from between the separation rollers **20**, the front end of the cut sheet C strikes against the paired register rollers **26** and the feed of the cut sheet is temporarily stopped. Therefore, the cut sheet C is bent with the rear end portion thereof pressed against the register guide **24**, and as a result, the feeding posture of the cut sheet C is corrected so that the front end of the cut sheet C may be set parallel to the axial line of the paired register rollers **26**. That is, at this time, the so-called register correction of the cut sheet C is effected.

After this, when the paired register rollers **26** are rotated, the cut sheet C is fed through between the paired register rollers **26**, and is guided towards the feeding rollers **22** by the paired introducing guides **28**, and then supplied to the printing section **8** by means of the feeding rollers **22**.

An end sensor **30** is arranged between the register rollers **26** and the feeding rollers **22**. Also, the end sensor **30** has a light emitting element and a light reception element which are disposed with the feeding path of the cut sheet C, that is, introducing guides **28** disposed therebetween.

A tractor unit **32** is disposed in the lower position of the feeding section **6**. The fanfold paper F stored in the tray **16** passes through between the light emitting element and the light reception element of the end sensor **18** and is guided to the tractor unit **32**.

As is well known in the art, the tractor unit **32** has a pair of tractor belts and the feeding claws of the tractor belt are inserted into the feed holes formed on both side portions of the fanfold paper F. Therefore, the tractor unit **32** feeds the fanfold paper F towards the printing section **8** by sequentially inserting the feeding claws into the feed holes while the tractor belt is being driven.

A rotary encoder **34** is mounted on the driving shaft of the tractor unit **32** and electrically connected to a counter **36**.

When the driving shaft of the tractor unit **32** is rotated in the feeding direction of the fanfold paper F, the counter **36** accumulatively adds the number of pulses output from the rotary encoder **34** to the count thereof, and when the driving shaft of the tractor unit is rotated in the opposite direction, the counter **36** subtracts the number of pulses from the count thereof. As a result, the count thereof or the accumulated value of the number of pulses indicates the traveling distance of the fanfold paper F supplied from the tractor unit **34** to the printing section **8**.

Further, an end sensor **38** is disposed immediately at the front side of the tractor unit **32** with respect to the feeding direction of the fanfold paper F and the light emitting element and light reception element of the end sensor **38** are arranged with the feeding path of the fanfold paper F disposed therebetween.

In the printing section **8**, a photosensitive drum **40** is disposed on the side near the feeding section **6** and rotated at a constant speed in the counterclockwise direction in FIG. **1**. A charging unit **42**, exposure unit **44**, developing unit **46**, transferring/de-electrifying unit **48**, peeling claw **50** and cleaning unit **52** are arranged in this order around the photosensitive drum **40** in the rotating direction from a position directly above the photosensitive drum **40**.

With the rotation of the photosensitive drum **40**, the charging unit **42** charges the outer peripheral surface or the photosensitive surface of the photosensitive drum **40**, and after this, the photosensitive surface is exposed by the exposure unit **44**. The exposure unit **44** includes an LED array having light emitting diodes (LEDs) arranged in a row and the LED array emits a light beam towards the photosensitive surface so as to form an electrostatic latent image on the photosensitive surface according to image data supplied from a computer.

The electrostatic latent image formed on the photosensitive surface is developed into a toner image by the developing unit **46**. After this, the toner image is transferred to the printing paper which is attached to and fed on the photosensitive drum **40** by means of a transfer section **48**a of the transferring/de-electrifying unit **48**.

After the toner image is transferred, the printing paper is applied with an A.C. voltage from a de-electrifying section **48**b of the transferring/de-electrifying unit **48** and charges of the printing paper are rapidly discharged. As a result, the printing paper is adequately peeled from the photosensitive drum **40**. Thereafter, the remaining toner on the photosensitive surface of drum **40** is removed by means of the cleaning unit **52**.

The peeling claw **50** functions to prevent the printing paper which is now fed on the photosensitive drum **40** from being wound on the photosensitive drum **40**.

The printing paper is either the cut sheet or fanfold paper respectively supplied from the stacking section **2** or **4**.

A confluence guide **54** is disposed between the feeding section **6** and the photosensitive drum **40** and is shown in detail in FIG. **2**.

The confluence guide **54** has a pair of guide plates **56** and **58** respectively disposed in the upper and lower portions and a space between the guide plates defines part of the feeding path of the printing paper. The upstream side end of the upper guide plate **56** which lies near the feed rollers **22** is bent in an upward direction and the upstream side end of the lower guide plate **58** which lies near the end sensor **38** is bent in a downward direction. With this structure, an inlet port defined between the upstream side ends of the paired guide plates **56** and **58** is fully opened in the vertical direction

The cut sheet C which has passed through between the feed rollers **22** is guided by the upstream side end of the upper guide plate S6 and fed into a space between the guide plates **56** and **58**, and the fanfold paper F which has been fed from the tractor unit **32** is guided by the upstream side end of the lower guide plate **58** and fed into between the guide plates

As is clearly seen from FIG. **2**, the lower guide plate **58** is made longer than the upper guide plate **56** and the downstream side end of the lower guide plate **58** is set near the transferring position **P0** of the photosensitive drum **40**, that is, near the transfer section **48a**. Further, the downstream side end of the lower guide plate **58** is bent in a convex form towards the photosensitive surface so as to be close to the photosensitive surface of the photosensitive drum **40**. Therefore, when a line segment which contains the downstream side end of the lower guide plate **58** and is tangent to the photosensitive surface is considered, an angle θ made by the line segment and the flat central portion of the lower guide plate **58** is set so that the printing paper may be adequately and forcedly guided towards the transferring position **P0**.

The downstream side end of the upper guide plate **56** is formed in a triangular form projecting towards the photosensitive drum **40** and an angle made by part of the downstream side end of the upper guide plate which lies on the side of the photosensitive drum **40** and the central portion of the lower guide plate **58** is also set to θ.

Therefore, as shown in FIG. **2**, even if the front end portion of the cut sheet C is bent upwardly after the cut sheet C has passed through between the feed rollers and the sheet is guided between the guide plates **56** and **58** with this condition kept unchanged, the front end portion of the cut paper C is forcedly guided towards the downstream end of the lower guide plate **58** by the downstream end of the upper guide plate **56** as shown by broken lines in FIG. **2**, and as a result, the cut paper C can be adequately guided to the transferring position **P0**.

As is clearly understood from FIG. **1**, the function of the downstream side end of the upper guide plate **56** becomes significantly effective when the stacking section of the cut sheet C is disposed above the photosensitive drum **40** and therefore the inclination angle of the introducing guide **28** is set to be large.

A belt conveyer **60** is disposed near the photosensitive drum **40** and horizontally extends in a direction from a position near the transferring position **P0** to the ejecting section **10**. The belt conveyer **60** includes rollers **62** and **64** which are disposed in different positions in the feeding direction of the printing paper and a plurality of conveyer belts **66** stretched between the rollers **62** and **64**. As is more clearly understood by referring to FIG. **3**, each of the conveyer belts **66** has a large number of suction holes **67** and a pair of suction devices **68** are disposed between the forward movement belt section and reverse movement belt section of the conveyer belts **66** in different positions in the feeding direction. The suction devices have suction fans (not shown) disposed therein and the suction fans cause air flow from the upper side towards the lower side.

Therefore, the printing paper which has passed the photosensitive drum **40** is fed towards the succeeding stage ejecting section **10** by driving the conveyer belt **66** while it is attached to the conveyer belt **66** of the conveyer by suction force.

A scuff roller unit **70** is disposed on the downstream side of the belt conveyer **60**, that is, between the belt conveyer **60** and the ejecting section. As shown in FIG. **3**, the scuff roller unit **70** has a supporting roller **72** which is set at the same level as the roller **64** of the belt conveyer **60** and extends in parallel with the roller **64**. A plurality of free rollers **74** are disposed directly above the supporting roller **72** and arranged along the supporting roller. The free rollers **74** are rotatably mounted on the roller shafts which are supported by a bracket (not shown). A plurality of compression coil springs **76** are respectively disposed between the bracket and two ends of each of the roller shafts and the compression coil springs **76** bias the corresponding roller shafts, that is, free rollers **74** towards the supporting roller **72**.

A dual driving pulley **80** is mounted on the roller shaft **78** of the supporting roller **72**, and one of the pulley portions of the driving pulley **80** is coupled to an output pulley of an electric motor **82** (FIG. **16**) via a driving belt **84** and the other pulley portion is coupled to a pulley **86** disposed on the belt conveyer **60** side via a transmission belt **88**. The pulley **86** is mounted on the roller shaft of the roller **64**. Therefore, the driving force of the electric motor **82** is transmitted to the driving pulley **80** to rotate the supporting roller **72**, and at the same time, the driving force is transmitted to the roller **64** of the belt conveyer via the driving pulley **80** to drive the conveyer belt **66** in the preset direction.

Since the supporting roller **72** has the same diameter as the roller **64** of the belt conveyer **60** side, the circumferential speed of the supporting roller **72** and the traveling speed or feeding speed of the conveyer belt **66** are set equal to each other.

Even in a case where the perforation line of the fanfold paper F projects from the flat surface of the fanfold paper F as shown in FIG. **4** when the fanfold paper F pass between the belt conveyer **60** and the supporting roller of the scuff roller unit **70** and is further fed in the feeding direction, the portion of the perforation line may smoothly pass between the supporting roller **72** and the free rollers **74** because the free rollers **74** elastically press the fanfold paper against the supporting roller **72**. Thus, the fanfold paper F can be fed at a constant speed irrespective of the presence of the perforation lines.

The confluence guide **54**, transferring/de-electrifying unit **48** and belt conveyer **60** are supported on a separating device **90** which is shown in FIG. **5**. The separating device **90** has a supporting frame **92** disposed below the photosensitive drum **40**. The supporting frame **92** has a pair of side plates **94** which are disposed to face each other and separated from each other in an axial direction of the photosensitive drum **40**. The side plates **94** extend from the confluence guide **54** to the end of the belt conveyer **60**.

A shaft **96** is provided on one of the end portions of the supporting frame **92** which lies on the upstream side with respect to the feeding direction of the printing paper. The shaft **96** is disposed to extend between the side plates **94** and rotatably mounted at both ends on the side plates **94**. A pair of holder plates **98** are mounted on the shaft **96** and separately disposed to face each other in the supporting frame **92**.

The confluence guide **54** and transferring/de-electrifying unit **48** are disposed between the holder plates **98** and fixed on the upper portions of the holder plates **98**.

Rectangular openings **100** are formed in the central portions of the holder plates **98** and a roller shaft **102** is disposed to extend through the openings **100**. Both ends of the roller shaft **102** are rotatably mounted on the side plates **94** of the supporting frame **92** and one of the ends is connected to a driving motor (not shown).

An eccentric roller **104** is mounted on the roller shaft **102** in the openings **100** and is rotatably disposed in the opening **100**.

Further, short links **106** which extend downwardly are each rotatably mounted at one end on a corresponding one of the holder plates **98** near the opening **100**. Long links **108** which are disposed below the belt conveyer **60** and extend towards the terminal end of the belt conveyer **60** are each rotatably coupled at one end with the lower end of a corresponding one of the short links **106**. The long link **108** is rotatably mounted at the other end thereof on the corresponding side plate **94** via a shaft **111**.

Supporting arms **110** are rotatably mounted at the lower end thereof on the central portions of the long links **108**. The supporting arm **110** extends upwardly to the belt conveyor **60** and the upper end thereof is formed as a hook **112** which is engaged with a pin **114** projecting from the corresponding side frame of the belt conveyer **60**. The long links **108** and the supporting arms **110** are connected to each other by means of extension springs **116**. The extension springs **116** bias and rotate the corresponding supporting arms **110** in such a direction as to push the hooks **112** thereof towards the respective pins **114** and bias and rotate the long arms **108** in such a direction as to push one-side ends of the long arms **108** upwardly. Further, a guide roller **118** is rotatably mounted on the surface of the supporting arm **110** which lies on the belt conveyer **60** side and the guide rollers **118** can be moved along guide grooves **120**. The guide grooves **120** are formed in the side frames of the belt conveyer **60** and extend in the feeding direction of the printing paper.

Therefore, as shown in FIG. **5**, each of the holder plates **98** is pushed into a raised position via the short links **106** by means of the long links **108** and set in the raised position, and the confluence guide **54** and transferring/de-electrifying unit **48** are set in the operative position which is near the photosensitive drum **40**. At this time, the belt conveyer **60** is supported in a horizontal position by means of the paired supporting arms **110**.

If the eccentric rollers **104** are rotated in the state shown in FIG. **5**, the eccentric rollers **104** push the edges of the openings **100** in the holder plates **98** downwardly as indicated by two-dot-dash lines. As a result, the paired bolder plates **98** are rotated downwardly around the shaft **96** and the confluence guide **54** and the transferring/de-electrifying unit **48** are moved downwardly and separated from the photosensitive drum **40**.

The downward movement of the holder plates **98** is converted to the rotational movement of the long links **108** via the short links **106**. That is, the long links **108** are rotated downwardly around the shaft **111** against the spring force of the extension springs **116**. With this rotational movement, the supporting arms **110** are also pushed downwardly and the belt conveyer **60** is rotated downwardly around the roller **64** which lies on the termination side and one of the end portions thereof lying on the upstream side is separated from the photosensitive drum **40**.

If the supporting arms **110** are rotated in a direction to release the engagement of the hooks **112** with the pins **114** lying on the belt conveyer **60** side, the supporting arms **110** rotate the belt conveyer **60** by a large angle via the guide roller **118** as indicated by two-dot-dash lines. As a result, the belt conveyer **60** is largely separated from the photosensitive drum **40** and occurrence of printing paper jam on the belt conveyer **60** may be easily removed.

A fixing unit **122** is disposed directly above the belt conveyer **60** and the fixing unit **122** is placed on the termination side of the belt conveyer **60**. The fixing unit **122** is shown in detail in FIGS. **6** to **9**. The fixing unit **122** has a box-type lamp housing **124** and an opening **126** is formed in the bottom surface of the lamp housing **124**, that is, in the surface which faces the printing paper fed by the belt conveyer **60**. The lamp housing **124** has a width larger than the width of the printing paper in the transverse direction of the belt conveyer **60**.

A halogen lamp **128** for preheating and a flash lamp **130** made of a xenon lamp for fixing are disposed in the lamp housing **124** and arranged in this order from the upstream side in the feeding direction of the printing paper. These lamps extend in the lengthwise direction of the lamp housing **124**, that is, in the transverse direction of the belt conveyer **60** and two ends thereof are supported on the lamp housing **124** via a pair of holders **132** and **134**. Further, in the lamp housing **124**, reflecting plates **136** and **138** are disposed above the two lamps to cover the lamps. The reflecting plates are mounted on the lamp housing **124** by use of suitable mounting means (not shown).

As shown in FIGS. **7** and **8**, the holder **132** which is one of the above paired holders includes a socket **140** attached to the lamp end portion and a supporting plate **142** for suspending the lamp end via the socket **140**. The socket **140** is formed in a stepped cylindrical configuration and formed of an electrically insulation material such as polyimide or ceramics which has a high heat-resisting property. A mounting hole with which the lamp end portion is engaged is formed in the large-diameter portion of the socket **140** and the small-diameter portion thereof is formed to be inserted into a holding hole **144** of the supporting plate **142**. More specifically, the supporting plate **142** is formed of a rectangular leaf spring and the holding hole **144** is formed in the central portion of the supporting plate **142** as is clearly shown in FIG. **8**. The upper end portion of the supporting plate **142** is bent, set in close contact with the ceiling wall and attached to the ceiling wall by use of an attaching screw. Therefore, the supporting plate **142** can be suspended from the ceiling wall of the lamp housing **124**. Also, the lower end portion of the supporting plate **142** is slightly bent in the same direction as the upper end portion thereof. A slit **148** is formed in the supporting plate **142** to straightly extend from the holding hole **144** of the supporting plate to the bottom end thereof. Since a cord **150** extending from the socket **140** can be previously guided into the holding hole **144** via the slit **148** if the slit **148** is formed in the supporting plate **142**, the socket or the lamp end portion can be inserted into the holding hole **144** without paying any attention to the presence of the cord.

The other holder has substantially the same construction as the holder described above, but a supporting plate **152** of the holder **134** is formed of a normal rigid metal plate instead of the leaf spring.

If both end portions of the lamp are supported by means of the paired holders **132** and **134**, the lamp can be elastically supported between the holders. Therefore, particularly when the lamp is a flash lamp and even if the lamp vibrates at the time of light emission thereof, the vibration is effectively alleviated by the elastic property of the supporting plate **142** made of the leaf spring, thereby preventing a large load from being applied to the bulb of the lamp. Further, since the supporting plate **152** of the other holder has high rigidity, the vibration of the lamp Will not be amplified and can be rapidly attenuated. It is considered that the vibration of the flash lamp **130** is caused by air around the bulb which is rapidly heated and expanded at the time of light emission.

When the lower end portion of the supporting plate **142** of the former holder **132** is lifted upwardly and the supporting

plate **142** is elastically deformed as indicated by two-dot-dash lines in FIG. **7**, the lamp end portion can be removed from the holding hole **144** of the supporting plate **142**, and as a result, the lamp can be removed from the paired holders. After this, a new lamp may be supported between the paired holders and thus the lamp can be replaced.

The opening **126** of the lamp housing **124** has a rectangular rim **154** whose internal edge portion projects downwardly and which is surrounded by a sponge member **156** formed of silicone rubber The sponge member **156** slightly projects downwardly from the rim **154**.

The opening **126** is covered with a rectangular transparent glass plate **158** from the bottom side and the peripheral portion of the glass plate **158** is pressed against and fixed on the bottom surface of the lamp housing **124** via the sponge member **156** by means of a plurality of fittings. The glass plate **158** is used to protect the halogen lamp **128** and flash lamp **130** on one hand and prevent toners and dusts from being attached to the lamps on the other.

As is more clearly understood from FIG. **9**, the above fitting includes a cross metal fitting **160** and a pair of side metal fitting **162**. The cross metal fitting **160** is formed of a plate disposed to extend along one of the end sides of the glass plate **158** which lies on the upstream side with respect to the feeding direction of the printing paper and having a stepped portion in the feeding direction. The cross metal fitting **160** is fixed on the bottom surface of the lamp housing **124** by means of a plurality of fitting screws **164** so as to hold the one-side end portion of the glass plate **158** between the bottom surface of the lamp housing **124** and the stepped portion of the cross metal fitting via the sponge member **156**.

The paired side metal fitting **162** are disposed to respectively extend along both sides of the glass plate **158** which are set parallel to the feeding direction of the printing paper. The side metal fitting **162** have substantially the same structure as the cross metal fitting **160** and are fixed on the bottom surface of the lamp housing **124** by means of a plurality of fitting screws **164** so as to hold corresponding one-side edge portions of the glass plate **158** between the bottom surface of the lamp housing **124** and the stepped portion of the side metal fitting via the sponge member **156**.

A pair of auxiliary metal fittings **166** are disposed on both sides of the remaining side end portion of the glass plate **158**. The auxiliary metal fittings **166** are sufficiently smaller than the cross metal fitting **160** and side metal fitting **162**, but have substantially the same cross sections as the latter metal fittings. Therefore, the remaining side end portion of the glass plate **158** is also held between the bottom surface of the lamp housing **124** and the paired auxiliary metal fittings **166** via the sponge member **156**.

The paired auxiliary metal fittings **166** are separately disposed from each other with a distance sufficiently larger than the width of the printing paper, and therefore, when the printing paper is fed directly below the fixing unit **122** by the belt conveyer **60**, the front end of the printing paper may freely pass through between the paired auxiliary metal fittings **166**.

A paper guide **168** is attached to the end face of the lamp housing **124** which lies on the cross metal fitting side and the lower end portion of the paper guide **168** is formed to extend along the belt conveyer **60** and towards the downstream side of the belt conveyer **60** so as to be continuous with the lower end portion of the cross metal fitting **160**. Therefore, when the printing paper has reached the fixing unit **122**, the front end portion thereof is guided by the paper guide **168** and stably fed below the glass plate **158** and the front end portion of the printing paper will not be caught by the cross metal fitting **160**.

Another paper guide **170** is attached to the bottom surface of the lamp housing **124** on the auxiliary metal fitting side and the paper guide **170** is formed to extend along the belt conveyer **60** towards the downstream side of the belt conveyer **60**. Therefore, after the front end of the printing paper has passed below the glass plate of the fixing unit **122**, the paper guide **170** guides the front end of the printing paper and ejects the front end to the exterior of the fixing unit **122** without fail.

Although not shown in the drawing, the fixing unit **122** has cooling means for supplying cool air into the lamp housing **124** so as to prevent the halogen lamp **128** and flash lamp **130** from being overheated.

FIG. **10** shows the distribution of light energy applied to the printing paper in the feeding direction of the printing paper when flash light is emitted once from the flash lamp **130**. As is clearly understood from the distribution, in an illumination area A1 of the flash light on the printing paper, 70 to 80% of the total light energy is concentrated on an area A2 which is the central portion of the area A1 and occupies 50% of the area A1. The above light energy distribution is obtained by adequately selecting the shapes of the reflecting plates **136** and **138**. However, it is impossible to apply light energy which is uniform in the entire portion of the illumination area A1 only by use of the reflecting plates.

Therefore, in order to apply uniform light energy on the entire printing area of the printing paper to be fed, it is necessary to repeatedly apply flash light to the printing surface by taking the triggering frequency of the flash lamp and the feeding speed of the printing paper into consideration.

In this case, if the feeding speed of the printing paper is v, the triggering frequency of the flash lamp is f, an area on which light energy of sufficiently large amount for fixing the toner image is applied in the illumination area A1 is W, and the number of flash light emitting operations is n, then the values of v, f and n are determined to satisfy the following equation.

$$v/f=n\cdot W$$

In general, the number n of light emitting operations is set to a natural number of 1 or 2, and when the number n of light emitting operations is set to 2, light energy applied to the printing surface has a distribution characteristic E2 shown by broken lines in FIG. **11**. However, as is clearly seen from the distribution characteristic E2, the light energy applied to the printing surface significantly varies in the feeding direction of the printing paper. Therefore, when the above distribution characteristic is used, the output of the flash lamp is adjusted to set the level of light energy necessary for fixing to EL or EH. In the former case, in an area of high energy, toners on the printing surface explosively boil to deteriorate the quality of fixation or contaminate the printing paper and peripheral members with gas generated by decomposition of the toners. In the latter case, the fixing strength of toners is weak and the toners tend to be removed from the printing surface.

The distribution characteristic E1 of light energy obtained in a case where the number n of light emitting operations is set to 1 is indicated by one-dot-dash lines in FIG. **11**. Variation in the light energy of the distribution characteristic E1 is smaller than that of the distribution characteristic E2, but even in this case, the above problems cannot be solved.

With the above condition taken into consideration, in this embodiment, the number n of light emitting operations is set

to a value within a range of 1.2 to 1.8, and preferably, 1.3 to 1.7. For example, the distribution characteristic E1.44 of light energy obtained when the number n of light emitting operations is set 1.44 is indicated by a solid line in FIG. **11**. As is clearly seen from the distribution characteristic E1.44, variation in the light energy is significantly suppressed in comparison with the cases of the distribution characteristics E1 and E2, and as a result, substantially uniform light energy can be applied to the entire area of the printing surface to be fed.

As is schematically shown in FIGS. **1** and **5**, a cutting device **172** is disposed near the ejecting section **10** on the downstream side of the belt conveyer **60**, and thus, the scuff roller unit **70** is placed between the cutting device **172** and the belt conveyer **60**.

The cutting device **172** is shown in detail in FIGS. **12** and **13**. The cutting device **172** has a hollow box-type beam **174** which is disposed on the supporting roller **72** side of the scuff roller unit **70**, that is, below the feeding path of the printing paper and horizontally extends in a transverse direction of the feeding path. Two end portions of the beam **174** project outwardly from the feeding path and a pair of pulleys **176** (only one of which is shown in the drawing) are horizontally arranged in the two end portions of the beam. The shafts of the pulleys **176** extend upwardly and are rotatably supported on the beam **174**, and the shaft of one of the pulleys further projects from the beam **174** and is coupled to a driving source. A driving belt **178** is stretched over the paired pulleys **176** and the driving belt **178** can be reciprocally moved by forward and reverse rotations of the driving pulley **176**.

As shown in FIG. **13**, part of the driving belt **178** which lies on the side of the scuff roller unit **70** is held between a pair of pinch plates **180** which are formed to extend along the driving belt **178** and are connected to each other by use of a plurality of connection bolts **182**. A cutter shaft **184** horizontally projects from the outside pinch plate, that is, one of the pinch plates which lies on the side of the scuff roller unit **70**. The proximal end of the cutter shaft **184** is supported on the central portion of the outside pinch plate **180** and the distal end thereof projects to the exterior of the beam **174** through a guide slot **186** of the beam **174**. The guide slot **186** is formed in the side wall of the beam **174** and extends in the lengthwise direction of the beam **174**.

A cutter disk **188** is rotatably attached to the distal end of the cutter shaft **184** via a holder sleeve **187**. The cutter disk **188** has such a diameter as to slightly project upwardly from the feeding path of the printing paper and a constant thickness t which is adequately determined to break the perforation line of the fanfold paper F.

Further, a pair of guide wheels **190** are disposed on both sides of the cutter disk **188** in the lengthwise direction of the beam **174**. Each of the guide wheels **190** has a pair of pinch disks **192** sandwiching the side wall of the beam **174** and a wheel section **194** which connects the pinch disks **192** to each other and is disposed to freely slide along the guide slot **186**. Although not shown in the drawing, a wheel shaft projects from the pinch disk **192** which is disposed inside in the beam **174**. Like the cutter shaft **184**, the wheel shaft is supported on the outside pinch plate **180**.

Therefore, when the driving belt **178** is driven, the cutter disk **188** reciprocally moves along the side wall of the beam **174**. Since, at this time, each of the guide wheels **190** is moved with the side wall of the beam **174** held between the paired pinch disks **192** and the wheel section **194** guided by the guide slot **186** in the side wall, the orientation of the cutter disk **188** can be kept unchanged.

A plurality of holding pads **196** are disposed above the beam **174** and arranged at a regular interval along the lengthwise direction of the beam **174**. In FIG. **12**, only one holding pad **196** is shown.

Each of the holding pads **196** is formed of rubber in a cubic form and connected to a lifting/lowering means (not shown) via a holder plate **198**. A pair of guide plates **200** and **201** are arranged between the holding pads **196** and the beam **174** with the feeding path of the printing paper disposed therebetween in the vertical direction and openings **202** are formed in the guide plate **200** which is the upper one of the above paired guide plates in position corresponding to the holding pads **196**. The opening **202** has a size such that the holding pad **196** can be inserted therein.

The upper and lower guide plates **200** and **201** are formed to extend from the printing section **8** into the ejecting section **10**, and the upper guide plate **200** is bent upwardly in the ejecting section **10** and the lower guide plate **201** is bent downwardly in the ejecting section (refer to FIG. **5**).

Another upper guide plate **204** is disposed above the belt conveyer **60** on the upstream side of the guide plate **200** and the upper guide plate **204** is formed to extend from the terminal end of the belt conveyer **60** and over the scuff roller unit **70**. Therefore, openings **206** are formed in the upper guide plate **204** in positions corresponding to the free rollers **74** of the scuff roller unit **70** and thus the free rollers **74** are respectively set in contact with the supporting rollers **72** via the corresponding openings **206**. Further, a lower guide plate **208** is disposed below the feeding path between the scuff roller unit **70** and the cutting device **172**.

A preset gap is provided between the lower guide plates **208** and **201** to permit the movement of the cutter disk **188**.

As is schematically shown in FIGS. **1** and **5**, a detector **210** for detecting passage of the printing paper is disposed between the scuff roller unit **70** and the cutting device **172**.

The cutting device **172** may use a triangular plate **212** as shown in FIG. **14** instead of the cutter disk **188**.

As shown in FIG. **15**, a first ejection gate **214** is disposed between the upper guide plate **200** and the lower guide plate **201** in the ejecting section **10**. The first ejection gate **214** can be rotated around a supporting shaft **216** according to whether the printing paper to be fed is cut paper C or fanfold paper F.

Further, a second ejection gate **218** and a paper ejecting tray **220** are sequentially arranged on the downstream side of the first ejection gate **214**. The second ejection gate **218** is also mounted to rotate around a supporting shaft **222** and the paper ejecting tray **220** is mounted to rotate around a supporting shaft (not shown).

As shown in FIG. **1**, the upper guide plate **200** is connected to an ejecting path for the cut sheet C and the ejecting path extends upwardly and is bent towards the belt conveyer **60** so as to be open to the upper surface of the electrophotographic apparatus.

Assuming that cut sheet C is used as the printing paper, then the first and second ejection gates **214** and **218** are rotated downwardly and set to the respective lowered positions as indicated by solid lines in FIG. **15**. In this case, the distal end portion of the first ejection gate **214** crosses the lower guide plate **201** to close the path extending along the lower guide plate **201** and open a path extending along the upper guide plate **200**. Also, the second ejection gate **218** opens the path extending along the upper guide plate **200**. In this condition, the cut sheet C fed from the belt conveyer **60** is guided by the first and second ejection gates **214** and **218** along the upper guide plate **200** and fed in the upward direction as shown by arrows of solid lines in FIG. **15**. After

this, the cut sheet C is fed along the ejecting path and ejected towards the upper surface of the apparatus. In this case, the cut sheet C is ejected from the apparatus to the exterior with the printed surface facing down, that is, in the so-called face-down state.

When the paper ejecting tray **220** is rotated downwardly from the vertical position indicated by a solid line of FIG. **15** and set to a horizontal position indicated by two-dot-dash lines, the second ejection gate **218** is rotated around the supporting shaft **222** upwardly from the lowered position indicated by the solid line in connection with the paper ejection tray **220** and set to the raised position indicated by two-dot-dash lines. At this time, since the distal end of the second ejection gate **218** crosses the upper guide plate **200** to close the path extending along the upper guide plate **200**, the cut sheet C is fed through between the upper guide plate **200** and the first ejection gate **214**, then straightforwardly fed to the paper ejecting tray **220** as indicated by an arrow of broken lines and received onto the paper ejecting tray **220**. In order to correctly guide the cut sheet C towards the paper ejecting tray **220**, an auxiliary guide plate **224** is disposed between the first ejection gate **216** and the paper ejecting tray **220**. In this case, the cut sheet C is ejected onto the paper ejecting tray **220** with the printed surface facing up, that is, in the so-called face-up state.

When fanfold paper F is used as the printing paper, the first ejecting gate **214** is rotated from the lowered position indicated by the solid line to the raised position. In the raised position, the distal end of the first ejection gate **214** crosses the upper guide plate **200** to close the path extending along the upper guide plate **200** and open the path extending along the lower guide plate **201**. Therefore, the fanfold paper F fed is guided along the lower guide plate **201** and fed downwardly as indicated by an arrow of one-dot-dash lines.

Even when the first ejection gate **214** is set in the lowered position, the fanfold paper F passes on the paper ejecting tray **220** and can be ejected from an ejecting port of the electrophotographic apparatus if the second ejection gate **218** is set in the raised position. In this case, if a succeeding stage processing device is connected to the ejecting port of the apparatus, the printed fanfold paper F may be continuously supplied from the apparatus to the processing device.

A paper ejecting stacker **226** is disposed in the lower portion of the ejecting section **10**. The fanfold paper F guided along the lower guide plate is sequentially folded along the perforation lines and stacked on the paper ejecting stacker **226**. In order to fold the fanfold paper F without fail, a flat belt **228** and a chain belt **230** are disposed to face each other between the paper ejecting stacker **226** and the lower guide plate **201**. A plurality of claws **232** are disposed at a regular interval and project from the flat belt **228**. Therefore, when the fanfold paper F passes through between the flat belt and the chain belts while the flat belt **228** and the chain belts **230** are being driven in a preset direction, the claws **232** of the flat belt **228** and the chain belt **230** cooperate with each other to sequentially fold the fanfold paper F at each perforation line.

The paper ejecting stacker **226** can be lowered according to the height of the stack of the fanfold paper F.

Next, the printing process for the printing paper is explained.

When a selection signal for cut sheet C is supplied from a host computer or a manual switch of the electrophotographic apparatus to a control circuit (not shown) of the apparatus, the paired feed rollers **22**, photosensitive drum **40**, belt conveyer **60** and scuff roller unit **70** of the printing section **8** are driven. At this time, the circumference speed VF of the feed rollers **22** and the feeding speed VC**0** of the belt conveyer **60** and scuff roller unit **70** are controlled to the same speed as the circumferential speed VD of the photosensitive drum **40** as shown in FIG. **16**. That is, the above speeds are set to satisfy the relation expressed by the following equation.

VD=VF=VC**0**

As shown in FIG. **16**, the feed roller **22** and photosensitive drum **40** are rotated by means of the same electric motor **83** and the suction device **68** is driven at the same time that the belt conveyer **60** is driven.

At this time, the separation device **90** is set in the raised operative state in which the confluence guide **54**, the transferring/de-electrifying unit **48** and the belt conveyer **60** are set in the operative position, that is, they are pushed upwardly to the printing position, and the fanfold paper F is set in a state in which the front end thereof is pushed back to the tractor unit **32**. Further, in the ejecting section **10**, the first ejection gate **214** is set in the lowered position and the second ejection gate **218** is set in either the lowered position or the raised position.

When a printing starting signal is supplied from the host computer, the take-out roller **14** and the separation rollers **20** are rotated to take out one sheet of cut paper C from the tray **12** in the stacking section **2**. The register-correction is effected for the cut sheet C by the register rollers **26** and the cut sheet C is fed from the register rollers **26** into the introducing guides **28** at a constant speed. The cut sheet C fed into the introducing guides **28** is further fed through the confluence guide **54** by means of the feed rollers **22** and then supplied to the transferring position **P0** of the photosensitive drum **40**. In this case, the register rollers **26** are rotated at the same circumferential speed as the feed rollers **22**.

When the cut sheet C is fed in the introducing guides **28** and the front end of the cut sheet C has reached the end sensor **30**, the end sensor **30** detects the passage of the front end of the cut sheet C and outputs a detection signal.

As shown in FIG. **17**, when time T1 has passed after the output time of the detection signal which is set as reference time, the exposure unit **44** forms an electrostatic latent image on the photosensitive surface of the drum **40** according to image data supplied from the host computer.

The transferring/de-electrifying unit **48** and the halogen lamp **128** of the fixing unit **122** are operated when time T2 (T2>T1) has passed after the output time of the detection signal. The time T2 is set to a period of time required for the front end of the cut sheet C to reach the transferring position of the photosensitive drum **40** after the detection signal has been output.

Further, the flash lamp **130** of the fixing unit **122** is repeatedly operated to intermittently emit light when time T3 (T3>T2) has passed after the output time of the detection signal. The time T3 is set to a period of time required for the front end of the cut sheet C to reach a position directly below the flash lamp **130** of the fixing unit **122** after the detection signal has been output.

If the time T1 is adequately set, the electrostatic latent image which is formed on the photosensitive surface of the drum **40** in an exposing position Q in FIG. **16** is fed with rotation of the photosensitive drum **40** and then developed into a toner image by the developing unit **46**. After this, when the toner image reaches the transferring position **P0** of the photosensitive drum **40**, the front end of the cut sheet C also reaches the transferring position **P0**. Then, the toner image on the photosensitive drum **40** is transferred to the cut sheet C in the transferring position **P0** by the transfer section **48**a of the transferring/de-electrifying unit **48**.

After transfer of the toner image, charges on the cut sheet C are removed by the de-electrifying section **48**b of the transferring/de-electrifying unit **48** for peeling the cut sheet C from the photosensitive drum **40**.

Further, when time T4 (time T4 is slightly longer than time T2) has passed after the detection signal is output from the end sensor **30**, the peeling claw **50** is operated for a preset period of time and then brought into contact with the photosensitive drum **40**. Thus, the peeling claw **50** prevents the cut sheet C from being wound on the photosensitive drum **40** when the front end of the cut sheet C passes the photosensitive drum **40**.

When the rear end of the cut sheet C passes through between the feed rollers **22**, the front end thereof reaches a position on the belt conveyer **60**. Therefore, the feeding operation of the cut sheet C is now effected by the belt conveyer **60** and the cut sheet C is fed while being attached to the conveyer belt **66** by suction force.

When the cut sheet C having a toner image transferred thereon is fed on the conveyer belt **66** and passes directly below the fixing unit **122**, the toners forming the toner image on the cut sheet C are previously heated by the halogen lamp **128**, applied with flash light from the flash lamp **130** and then melt to be fixed on the cut sheet C.

Since the number of emission times of flash light is determined as described before, uniform light energy of adequate amount is applied to the printing surface of the cut sheet C. Therefore, fixation of the toner image on the printing paper can be effected with high reliability, generation of gas caused by decomposition of the toners can be suppressed and contamination of the cut sheet C and the peripheral members by the gas can be prevented.

One of the end portions of the glass plate **158** of the fixing unit **122** which lies on the downstream side in the feeding direction of the printing paper is fixed by use of the paired auxiliary metal fitting **166** as described before and the auxiliary metal fitting **166** are set in position apart from the feeding area of the printing paper. Therefore, when the printing paper passes a position directly below the fixing unit **122**, the front end of the cut paper C will not be caught by the fixing unit **122**.

In this embodiment, since time at which the detection signal is output from the end sensor **30** is set as a reference timing and light emission of the flash lamp is started when the front end of the cut sheet C has reached a position directly below the flash lamp **130**, the flash lamp **130** can be prevented from wastefully emitting light and the service life of the lamp can be extended.

After the cut sheet C has been fed to the fixing unit **122** and subjected to the fixing process, the cut sheet C is fed from the belt conveyer **60** to the ejecting section **10** via the scuff roller unit **70** which are operated in synchronism with the belt conveyer **60** and the cutting device **172**. At this time, the cutter disk **188** of the cutting device **172** is set in the standby position separated from the feeding path of the printing paper as shown in FIG. **12**. Therefore, the cutter disk **188** will not obstruct the passage of the cut sheet C.

In the ejecting section **10**, whether the ejection state of the cut sheet C is set to the face-up state or face-down state is determined according to the position of the second ejection gate **218** and then the cut sheet C is ejected onto the paper ejecting tray **220** or to the exterior of the electrophotographic apparatus.

When the rear end of the cut sheet C has passed the end sensor **30**, generation of the detection signal from the end sensor **30** is stopped, and when the front end of a new cut sheet C passes the end sensor **30**, a detection signal is output again. That is, the end sensor **30** repeatedly outputs a detection signal each time the cut sheet C is taken out from the tray **12**.

The exposure unit **44** intermittently receives image data for one sheet of cut paper C from the host computer. Therefore, the exposure unit **44** intermittently effects the writing operation of an electrostatic latent image on the photosensitive drum **40** according to supply of the cut sheet C as shown in FIG. **17**.

The transferring/de-electrifying unit **48** and the halogen lamp **128** of the fixing unit **122** are kept in the operative state until the last cut paper C to be printed has passed therethrough. That is, when the image writing operation effected by the exposure unit **44** for the last cut sheet C is completed, the time of termination of the image writing operation is set as a reference timing, the operation of the transferring/de-electrifying unit **48** is interrupted when time T5 has passed after the time of termination, and the operations of the halogen lamp **128** and flash lamp **130** of the fixing unit **122** are sequentially interrupted when time T6 and time T7, which is slightly longer than the time T6, have passed after the time of termination, respectively.

Next, the printing process of fanfold paper F is explained with reference to FIGS. **18** and **19**.

In FIG. **18**, the fanfold paper F is drawn out by the tractor unit **32** and extends on the belt conveyer **60** of the printing section **8** to the end portion of the belt conveyer **60**. That is, this state is set up after a selection signal for the fanfold paper F is supplied to the control circuit of the electrophotographic apparatus from the host computer or manual switch, the printing operation for the fanfold paper F in the preceding cycle is completed, and then the fanfold paper F is set again.

At this time, the feeding operation of the fanfold paper F is interrupted with one of the perforation lines aligned with the transferring position **P0** of the photosensitive drum **40**, and then the separation device **90** is lowered to set the confluence guide **54**, transferring/de-electrifying unit **48** and belt conveyer **60** in positions separated from the photosensitive drum **40** and fixing unit **122**. In this case, the first ejection gate **214** of the ejecting section **10** is set in the raised position.

If, in the above state, a printing starting signal is supplied from the host computer to the control circuit, the photosensitive drum **40** is rotated at a constant circumferential speed VD and the photosensitive surface is cleaned by the cleaning unit **52**. When the cleaning operation is completed, the tractor unit **32** is driven in a reverse direction for a preset period of time by the electric motor **85** and then stopped. As a result, the fanfold paper F is drawn back towards the tractor unit **32** by a preset length as indicated by broken lines in FIG. **18**. In this printing process, the electric motor **83** drives only the photosensitive drum **40** and the power transmission path between the electric motor **83** and the feed rollers **22** is cut off.

As shown in FIG. **19**, the belt conveyer **60** and scuff roller unit **70** start to be driven at the same time as the interruption of the tractor unit **32** and the feeding speed thereof is set to VC1. The electric motor **82** which is the driving source for the belt conveyer **60** and scruff roller unit **70** is controlled to set the feeding speed VC1 higher than the circumferential speed of the photosensitive drum **40** by approx. 10%. The suction device **68** of the belt conveyer **60** is also operated at the same time that the belt conveyer **60** is driven.

At the same time as the driving of the belt conveyer **60** and scuff roller unit **70**, the exposure unit **44** starts the writing operation of an electrostatic latent image on the

photosensitive surface of the drum **40** according to image data from the host computer.

After the writing operation of an electrostatic latent image by the exposure unit **44** has started and when time **T8** has passed from the starting time of the image writing operation which is set as a reference timing, the tractor unit **32** is driven in the forward direction to start the feeding operation for the fanfold paper F. The feeding speed VT of the fanfold paper F fed by the tractor unit **32** is set equal to the circumferential speed VD of the photosensitive drum **40**. When time **T9** has passed after the starting time of the image writing operation, the transferring/de-electrifying unit **48** and the halogen lamp **128** of the fixing unit **122** are simultaneously operated, and when time **T10** has passed, the flash lamp **130** of the fixing unit **122** is operated.

The timing at which the operation of the flash lamp **130** is started is set equal to the timing at which the perforation line of the fanfold paper F drawn back towards the tractor unit **32** from the transferring position **P0** reaches the transferring position **P0** again.

By effecting the above timing control, the toner image on the fanfold paper F which is not yet subjected to the fixing process in the printing process of the preceding cycle, that is, the toner image on the fanfold paper F left behind in a portion of the feeding path between the photosensitive drum **40** and the fixing unit **122** can be securely fixed. Therefore, the operation starting timing of the flash lamp in the printing process for the fanfold paper F is set to a timing which is earlier than that in the case of printing process for the cut sheet C.

The operation timing of the transferring/de-electrifying unit **48** and the halogen lamp **128** is the same as that set in the case of printing process for the cut sheet C.

As described before, when the tractor unit **32** is driven after the time **T8** has passed from the operation starting time of the belt conveyer **60** and scruff roller unit **70**, that is, the starting time of writing operation of an image on the photosensitive drum **40**, the tractor unit **32** effects the constant-speed driving operation to feed the fanfold paper F at the constant speed VT. When the tractor unit **32** is set into the constant-speed driving mode, that is, when time **T11** has passed after the starting time, the separation device **90** is moved to the raised position to raise the confluence guide **54**, transferring/de-electrifying unit **48** and belt conveyer **60** to the respective operative positions, that is, the printing position.

Therefore, the fanfold paper F is guided into the confluence guide **54** at the constant feeding speed VT by the tractor unit **32** and then forcedly guided to the transferring position of the photosensitive drum **40**.

Then, when the toner image on the photosensitive surface of the drum **40** reaches the transferring position **P0** after the perforation line of the fanfold paper F which was drawn back towards the tractor unit **32** has passed the transferring position **P0**, the toner image is transferred from the photosensitive drum **40** to the fanfold paper F and then fixed by the fixing unit **122** in the same manner as in the case of the cut sheet C. After this, the printed fanfold paper F is folded and stacked in the paper ejecting stacker **226** of the ejecting section **10**.

Since the feeding speed VC1 of the belt conveyer **60** and scuff roller unit **70** is set higher than the feeding speed VT of the tractor unit **32**, the fanfold paper F is fed with a slip on the belt conveyer **60** and the supporting roller of the scuff roller unit **70** while receiving a suction force in the belt conveyer **60**. Thus, since the fanfold paper F is fed under tension, the printing surface of the fanfold paper F is made flat without fail in the transferring position **P0** and the fixing position, thereby making it possible to stably fix the toner image.

When all of the image data to be printed is supplied from the host computer to the exposure unit **44** and the image writing operation by the exposure unit **44** is completed as shown in FIG. **19**, the operation of the halogen lamp **128** and flash lamp **130** of the fixing unit **122** is interrupted when time **T12** has passed after the time of completion, and at the same time, the separation device **90** starts to be moved to the lowered position so that the confluence guide **54**, transferring/de-electrifying unit **48** and belt conveyer **60** will start to be separated from the photosensitive drum **40** and the fixing unit. However, even if the downward movement of the separation device **90** is started, the operation of feeding out the fanfold paper F is continuously effected at this time and the perforation line of the fanfold paper F crosses the transferring position **P0** and is further fed.

When time **T13** has passed after the starting time of the downward movement of the separation device **90**, the tractor unit **32** is decelerated, stopped and driven in the reverse direction to draw back the fanfold paper F by a preset length Thus, the perforation line of the fanfold paper F is aligned with the transferring position **P0** of the photosensitive drum **40**. The operation of aligning the perforation line of the fanfold paper F with respect to the transferring position **P0** can be attained by controlling the operation of the tractor unit **32** according to the count of the counter **36**. Further, the time in which the belt conveyer **60** and suction device **68** are stopped is set equal to the time in which the tractor unit **32** is temporarily stopped.

If fanfold paper F set on the tray **16** in the stacking section **4** is used up in the printing operation for the fanfold paper F and the rear end of the fanfold paper F is detected by the end sensor **18**, the electric motor **82** for the belt conveyer **60** and scuff roller unit **70** is decelerated after the time of rear end detection or in a period from the time of rear end detection until the rear end of the fanfold paper F passes the tractor unit **32**, and the feeding speed of the conveyer belt **60** is lowered to the feeding speed VC0 which is the same as the circumferential speed VD of the photosensitive drum **40**. Therefore, even if the rear end of the fanfold paper F passes the tractor unit **32**, the fanfold paper F is fed at the same feeding speed as the feeding speed of the tractor unit **32** so that the toner image can be stably transferred to and fixed on the fanfold paper F to the last page. The feeding speed of the belt conveyer **60** is lowered instantaneously or gradually after the time of rear end detection.

Next, the process effected after the printing process for the fanfold paper F is completed in the electrophotographic apparatus is explained.

First, when the printing process for the fanfold paper F is completed, the separation device **90** is moved downwardly, and as a result, the confluence guide **54**, transferring/de-electrifying unit **48** and belt conveyer **60** are set in positions separated from the photosensitive drum **40** and the fixing unit **122** in the downward direction as indicated by a solid line in FIG. **20**. FIG. **21** is a flowchart showing the steps of the post-processing, and in this flowchart, the steps **S1** and **S2** are already effected.

If a selection signal for cut sheet C is output from the host computer or the manual switch of the electrophotographic apparatus, the result of determination in the step **S3** is "YES" and the cutting process (step **S4**) of the fanfold paper F is effected.

In the cutting process, the tractor unit **32** is driven in the forward direction to feed the fanfold paper F until the

perforation line which has been aligned with the transferring position **P0** reaches a position of the cutting device **172**. At this time, the halogen lamp **128** and flash lamp **130** are operated. As a result, the toner image on the fanfold paper F left behind between the photosensitive drum **40** and the fixing unit **122** in the printing process of the preceding cycle can be securely fixed. After this, as shown in FIG. **13**, the holding pads **196** of the cutting device **172** are lowered so that a down stream portion of the fanfold paper F which lies on the downstream side of the perforation line may be held between the holding pads **196** and the lower guide plate **201**. On the other hand, an upstream portion of the fanfold paper F which lies on the upstream side of the perforation line is held between the supporting roller **72** of the scuff roller unit **70** and the free rollers **74**.

Thus, the portions of the fanfold paper F which lie on the upstream side and downstream side with respect to the perforation line are held.

If, in this condition, the driving belt **178** of the cutting device **172** is driven, the cutter disk **188** which has been set in the standby position is guided by the paired guide wheels **190** and moved along the perforation line of the fanfold paper F. Since the cutter disk **188** projects upwardly to a level higher than the feeding path of the fanfold paper F, the cutter disk **188** moves while it is pushing up the perforation line of the fanfold paper F as shown in FIG. **22**. Since the portions of the fanfold paper F which lie on the upstream side and downstream side with respect to the perforation line are held, a pulling force is applied to the perforation line by the pushing-up of the cutter disk **188** and the end portion thereof is cut apart. If a cut is thus made in the end portion of the perforation line, the portion of the perforation line is easily cut apart when the cutter disk **188** moves along the perforation line while rotating, and as a result, the fanfold paper F is completely cut off at the perforation line. After this, the driving belt **178** is driven in the reverse direction, the cutter disk **188** is returned to the standby position and the holding pads **196** are raised.

After the fanfold paper F is cut apart, that portion of the fanfold paper F which lies on the upstream side is fed towards the ejecting section **10** and folded and stacked on the paper ejecting stacker **226**.

Unlike a blade, the outer peripheral portion of the cutter disk **188** is not sharp and is set in area-contact with a portion of the perforation line of the fanfold paper F with a constant width. Therefore, even when the outer periphery of the cutter disk **188** is not precisely positioned at the perforation line of the fanfold paper F, a portion of the fanfold paper F which lies near the perforation line is pushed upwardly by the cutter disk **188** so that the fanfold paper F can be cut apart at the perforation line which is a weak portion of the fanfold paper F.

Since the cutter disk **188** moves while rotating, the fanfold paper F can be smoothly cut apart at the perforation line by applying a pushing force thereto, but it is also possible to cut apart the fanfold paper F at the perforation line by use of the triangular plate **212** of the cutting device shown in FIG. **14** to apply a pushing force thereto.

When the cutting process is completed, the tractor unit **32** is driven in the reverse direction to draw back the fanfold paper F which is left on the belt conveyer **60**. When the cut end of the fanfold paper F is detected by the end sensor **38**, the operation of the tractor unit **32** is interrupted and the fanfold paper F is set in the standby state as shown in FIG. **23**. That is, at this timing, the paper parking is completed (step **S5**). The standby position of the fanfold paper F may be set to any position if it does not obstruct the passage of the cut sheet C, and therefore, the cut end of the fanfold paper F is not necessarily set in the position of the end sensor **38** but may be set within the confluence guide **54**.

After this, the separation device **90** is moved upwardly to the raised position (step **S6**) and the first ejection gate **214** of the ejecting section **10** is set to the lowered position (step **S7**) so as to make ready for the printing process for the cut sheet C as described before (step **S8**).

When the result of determination in the step **S3** is "NO", whether the fanfold paper F is set to the standby position or not is determined (step **S9**), and if the result of determination is "YES", the cutting process and paper parking which are respectively similar to the steps **S4** and **S5** are sequentially effected (steps **S10** and **S11**). Therefore, at this stage, the operation of exchanging the fanfold paper F can be effected. Determination in the step **S9** is effected according to an instruction signal from the host computer or manual switch.

If the result of determination is "NO", the cutting process is effected (step **S12**) and then the fanfold paper F is set again (step **S13**). In the step of setting the fanfold paper F again, a perforation line of the fanfold paper F is aligned with the transferring position.

Next, the procedure effected from the time when the fanfold paper F is set in the paper parking state until the fanfold paper F is automatically set is explained. In this case, the separation device **90** is set in the lowered position.

In the automatically setting operation, the tractor **32** is first driven in the forward direction and the fanfold paper F is supplied towards the confluence guide **54**. After the front end of the fanfold paper F is detected by the end sensor **38**, the feeding length of the fanfold paper F which has passed the end sensor **38** is continuously calculated by means of the rotary encoder **34** and the counter **36**.

Since the front end of the fanfold paper F strikes against the upper guide plate **56** of the confluence guide **54** set in the lowered position as indicated by two-dot-dash lines in FIG. **24**, the traveling direction thereof is restricted. Therefore, the front end of the fanfold paper F is guided by the confluence guide **54** and passes through between the photosensitive drum **40** and the transferring/de-electrifying unit **48**. Also, when the fanfold paper F passes through the photosensitive drum **40**, the front end portion of the fanfold paper F will not be wound on the photosensitive drum **40** if the peeling claw **50** is set in contact with the photosensitive drum **40**.

The fanfold paper F is further fed on the belt conveyer **60**, and if the front end thereof is detected by the detector **210** (refer to FIGS. **1** and **5**) immediately after having passed through the scuff roller unit **70**, the operation of the tractor unit **32** is interrupted when one perforation line of the fanfold paper F is aligned with the transferring position according to the feeding length of the fanfold paper F by the tractor unit **32**.

Since the separation device **90** is set in the lowered position as described before, the feeding path of the fanfold paper F is changed when the separation device **90** is moved upwardly to the raised position even if the perforation line of the fanfold paper F has been aligned with the transferring position **P0** according to the feeding length, and the perforation line is deviated from the transferring position **P0** towards the tractor unit **32**. Therefore, in this case, the upward movement of the separation device **90** is taken into consideration, and the perforation line of the fanfold paper F is aligned with an imaginary transferring position **P1** which is deviated from the transferring position **P0** towards the downstream side by a preset length ΔL. As a result, the perforation line is precisely aligned with the transferring

position P0 when the separation device 90 is moved upwardly to the raised position.

When the automatic setting operation for the fanfold paper F is completed, the printing process described before can be effected.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

What is claimed is:

1. An electrophotographic apparatus comprising:

first supplying means for supplying cut sheet as printing paper towards a common feeding path;

second supplying means for supplying continuous paper as printing paper towards said common feeding path;

feeding means for feeding the printing paper supplied from one of said first and second supplying means along said common feeding path;

image forming means for forming an electrostatic latent image on a photosensitive medium;

developing means for developing the latent image on the photosensitive medium into a toner image;

transferring means for transferring the toner image on said photosensitive medium onto the printing paper lying on said common feeding path at a present transferring position;

fixing means for fixing the transferred toner image on the printing paper at a preset fixing position on said common feeding path;

cutting means for cutting continuous paper at a cutting position set on a downstream side of the fixing position with respect to a feeding direction of the printing paper;

retracting means for drawing back the continuous paper which is left behind on said common feeding path after the continuous paper is cut apart to a position which lies on an upstream side of said common feeding path and does not prevent supply of the cut sheet by said first supplying means; and

separating means for separating said common feeding path from said photosensitive medium and said fixing means when the continuous paper is moved in a reverse direction.

2. An apparatus according to claim 1, wherein said photosensitive medium is disposed on the upstream side of said common feeding path, and said first and second supplying means include a confluence guide disposed near the upstream side of said common feeding path, for guiding the cut sheet and continuous paper towards said common feeding path and moving means for moving said confluence guide towards and apart from said photosensitive medium.

3. An apparatus according to claim 2, further comprising means for operating said separating means in connection with said moving means.

4. An apparatus according to claim 1, wherein said photosensitive medium includes a rotatable drum having a peripheral surface as a photosensitive surface;

said first and second supplying means have a supplying speed of the printing paper which is the same as a moving speed of said photosensitive surface; and

said feeding means feeds the printing paper along said common feeding path at one of first and second feeding speeds which are respectively set for different types of printing papers, said first feeding speed, used when the printing paper is cut sheet, being set equal to said moving speed and supplying speed, and said second feeding speed, used when the printing paper is continuous paper, being set to be higher than said moving speed and supplying speed.

5. An apparatus according to claim 4, wherein said feeding means includes detecting means for detecting the rear end of the continuous paper on said second supplying means and a driving source for lowering said second feeding speed to said supplying speed in a period from the time the detecting means has detected the rear end of the continuous paper until the rear end of the continuous paper passes said second supplying means.

6. An electrophotographic apparatus comprising:

first supplying means for supplying cut sheet as printing paper towards a common feeding path;

second supplying means for supplying fanfold paper as printing paper towards said common feeding path;

feeding means for feeding the printing paper supplied from one of said first and second supplying means along said common feeding path, said feeding means including a pair of feeding rollers rotatably arranged at a preset position on said common feeding path, the printing paper passing between the feeding rollers;

image forming means for forming an electrostatic latent image on a photosensitive medium;

developing means for developing the latent image on the photosensitive medium into a toner image;

transferring means for transferring the toner image on said photosensitive medium onto the printing paper lying on said common feeding path at a transferring position;

fixing means for fixing the transferred toner image on the printing paper at a fixing position on said common feeding path, the fixing position being set on an upstream side of the preset position with respect to a feeding direction of the printing paper; and

cutting means for cutting fanfold paper at a cutting position set on a downstream side of the feeding rollers;

wherein said cutting means includes means for aligning one of perforation lines of the fanfold paper along which the fanfold paper is to be cut off with the cutting position; holding means for holding a portion of the fanfold paper which lies on a downstream side with respect to the aligned perforation line; and a cutting member for cutting off the fanfold paper at the aligned perforation line by pulling the fanfold paper in a direction perpendicular to the aligned perforation line while being moved along the aligned perforation line.

7. An apparatus according to claim 6, wherein said cutting means has a standby position which is set at one side of a feeding area of the printing paper and in which said cutting member is set in a non-operative mode.

8. An apparatus according to claim 7, wherein said cutting member is a disk which is movable along the aligned perforation line of the fanfold paper while being rotated as it contacts the fanfold paper.

9. An apparatus according to claim 6, wherein said apparatus further comprises retracting means for drawing back the fanfold paper which is left behind on said common feeding path after the fanfold paper is cut apart to a position which lies on an upstream side of said common feeding path and does not prevent supply of the cut sheet by said first supplying means.

10. An apparatus according to claim 9, further comprising separating means for separating said common feeding path from said photosensitive medium when the fanfold paper is moved in a reverse direction.

11. An apparatus according to claim 10, wherein said photosensitive medium is disposed on the upstream side of said common feeding path, and said first and second supplying means include a confluence guide disposed near the upstream side of said common feeding path, for guiding the cut sheet and fanfold paper towards said common feeding path and moving means for moving said confluence guide towards and apart from said photosensitive medium.

12. An apparatus according to claim 9, further comprising separating means for separating said common feeding path from said photosensitive medium and fixing means when the fanfold paper is moved in a reverse direction.

13. An apparatus according to claim 12, wherein said photosensitive medium is disposed on the upstream side of said common feeding path, and said first and second supplying means include a confluence guide disposed near the upstream side of said common feeding path, for guiding the cut sheet and fanfold paper towards said common feeding path and moving means for moving said confluence guide towards and apart from said photosensitive medium.

14. An apparatus according to claim 13, further comprising means for operating said separating means in connection with said moving means.

15. An apparatus according to claim 6, wherein said photosensitive medium includes a rotatable drum having a peripheral surface as a photosensitive surface;

said first and second supplying means have a supplying speed of the printing paper which is the same as a moving speed of said photosensitive surface; and

said feeding means feeds the printing paper along said common feeding path at one of first and second feeding speeds which are respectively set for different types of printing papers, said first feeding speed, used when the printing paper is cut sheet being set equal to said moving speed and supplying speed, and said second feeding speed, used when the printing paper is fanfold paper, being set to be higher than said moving speed and supplying speed.

16. An apparatus according to claim 15, wherein said feeding means includes detecting means for detecting the rear end of the fanfold paper on said second supplying means and a driving source for lowering said second feeding speed to said supplying speed in a period from the time the detecting means has detected the rear end of the fanfold paper until the rear end of the fanfold paper passes said second supplying means.

17. An apparatus according to claim 6, wherein said fixing means includes a fixing unit for fixing the toner image on the printing paper while not contacting the printing paper.

18. An electrophotographic method comprising:

a supplying step of selecting one of cut sheet and continuous paper as a printing paper and supplying the selected printing paper towards a common feeding path;

a feeding step of feeding the printing paper supplied from said supplying step along said common feeding path;

an image forming step of forming an electrostatic latent image on a photosensitive medium;

a developing step of developing the latent image on said photosensitive medium into a toner image;

a transferring step of transferring the toner image onto the printing paper at a preset transferring position set on said common feeding path;

a fixing step of fixing the transferred toner image on the printing paper at a preset fixing position set on said common feeding path;

a cutting step of cutting apart the continuous paper at a cutting position defined on a downstream side of said fixing position in a feeding direction of the printing paper;

a separation step of separating said common feeding path from said photosensitive medium and a fixing unit for effecting said fixing step; and

a retracting step of drawing back the continuous paper which is left behind on said common feeding path after the continuous paper is cut apart to a position which lies on an upstream side of said common feeding path and does not prevent supply of the cut paper.

19. A method according to claim 18, wherein said image forming step and developing step includes a process for moving said photosensitive medium; the printing paper is supplied towards said common feeding path at a supplying speed which is the same as a moving speed of said photosensitive medium in said supplying step; and, in said feeding step, the printing paper is fed by feeding means having a first feeding speed which is the same as said moving speed and supplying speed when the printing paper is cut paper and the printing paper is fed by the feeding means having a second feeding speed which is higher than said moving speed when the printing paper is continuous paper.

20. A method according to claim 19, further comprising a detection step of detecting the rear end of the continuous paper after the rear end of the continuous paper is subjected to said supplying step and before the rear end of the continuous paper is subjected to said feeding step; and a step of lowering a feeding speed of the continuous paper to said supplying speed in a period from the time the rear end of the continuous paper is detected in said detection step until the rear end of the continuous paper is supplied after being subjected to said supplying step.

21. An electrophotographic method comprising:

a supplying step of selecting one of cut paper and fanfold paper as a printing paper and supplying the selected printing paper towards a common feeding path;

a feeding step of feeding the printing paper supplied from said supplying step along said common feeding path, the printing paper passing between a pair of feeding rollers which are rotatably arranged at a present position on said common feeding path;

an image forming step of forming an electrostatic latent image on a photosensitive medium;

a developing step of developing the latent image on said photosensitive medium into a toner image;

a transferring step of transferring the toner image onto the printing paper at a transferring position set on said common feeding path, the transferring position being set on an upstream side of the preset position in a feeding direction of the printing paper;

a fixing step of fixing the transferred toner image on the printing paper at a fixing position between the transferring position and the present position on said common feeding path; and

a cutting step of cutting apart the fanfold paper at a cutting position defined on a downstream side of the preset position on said common feeding path after said fixing step is effected;

wherein said cutting step includes a process for aligning one of perforation lines of the fanfold paper along which the fanfold paper is to be cut off with the cutting position; a holding process for holding a portion of the fanfold paper which lies on a downstream side with

respect to the aligned perforation line; and a cutting process for cutting off the fanfold paper at the aligned perforation line by pulling the fanfold paper in a direction perpendicular to the aligned perforation line.

22. A method according to claim **21**, further comprising a retracting step of drawing back the fanfold paper which is left behind on said common feeding path after said cutting step to a position which lies on an upstream side of said common feeding path and does not prevent supply of the cut paper in said supplying step.

23. A method according to claim **22**, further comprising a retracting step effected before said retracting step, for separating said common feeding path from said photosensitive medium.

24. A method according to claim **22**, further comprising a separating step effected before said retracting step, for separating said common feeding path from said photosensitive medium and a fixing unit for effecting said firing step.

25. A method according to claim **22**, wherein said image forming step and developing step includes a process for moving said photosensitive medium; the printing paper is supplied towards said common feeding path at a supplying speed which is the same as a moving speed of said photosensitive medium in said supplying step; and, in said feeding step, the printing paper is fed by feeding means having a first feeding speed which is the same as said moving speed and supplying speed when the printing paper is cut paper and the printing paper is fed by the feeding means having a second feeding speed which is higher than said moving speed and supplying speed when the printing paper is fanfold paper.

26. A method according to claim **25**, further comprising a detection step of detecting the rear end of the fanfold paper after the rear end of the fanfold paper is subjected to said supplying step and before the rear end of the fanfold paper is subjected to said feeding step; and a step of lowering the feeding speed of the fanfold paper in said feeding step to said supplying speed in a period from the time the rear end of the fanfold paper is detected in said detection step until the rear end of the fanfold paper is supplied after being subjected to said supplying step.

27. A method according to claim **21**, wherein said fixing step is carried out by a fixing unit which fixes the toner image on the printing paper while not contacting the printing paper.

28. A printing apparatus comprising:

first supplying means for supplying cut sheet as printing paper towards a common feeding path;

second supplying means for supplying continuous paper as printing paper towards said common feeding path;

feeding means for feeding the printing paper supplied from one of said first and second supplying means alone said common feeding path;

image forming means for forming an image on the printing paper at an image forming position;

cutting means for cutting continuous paper at a cutting position set on a downstream side of the image forming position with respect to a feeding direction of the printing paper;

retracting means for drawing back the continuous paper which is left behind on said common feeding path after the continuous paper is cut apart to a position which lies on an upstream side of said common feeding path and does not prevent supply of the cut sheet by said first supplying means; and

separating means for separating said common feeding path from the image forming means when the continuous paper is moved in a reverse direction.

29. The apparatus according to claim 28, wherein the image forming position is located on the upstream side of said common feeding path, and said first and second supplying means include a confluence guide disposed near the upstream side of said common feeding path, for guiding the cut sheet and continuous paper towards said common feeding path and moving means for moving said confluence guide towards and apart from the image forming position.

30. The apparatus according to claim 29, further comprising means for operating said separating means in connection with said moving means.

31. The apparatus according to claim 28, wherein said image forming means has an image forming speed in relation to the feeding of printing paper;

said first and second supplying means have a supplying speed of the printing paper which is the same as the image forming speed of said image forming means; and

said feeding means feeds the printing paper along said common feeding path at one of first and second feeding speeds which are respectively set for different types of printing papers, said first feeding speed, used when the printing paper is cut sheet, being set equal to said image forming speed, and said second feeding speed, used when the printing paper is continuous paper, being set to be higher than said image forming speed.

32. The apparatus according to claim 31, wherein said feeding means includes detecting means for detecting the rear end of the continuous paper on said second supplying means and a driving source for lowering said second feeding speed to said supplying speed in a period from the time the detecting means has detected the rear end of the continuous paper until the rear end of the continuous paper passes said second supplying means.

33. A printing apparatus comprising:

image forming means for forming an image on fanfold paper;

feeding means for feeding fanfold paper; and

cutting means for cutting the fanfold paper at a cutting position on a downstream side of said image forming means;

wherein said cutting means includes means for aligning a perforation line of the fanfold paper along which the fanfold paper is to be cut off with the cutting position; holding means for holding portions of the fanfold paper which respectively lie on upstream and downstream sides with respect to the aligned perforation line; and a cutting member for cutting off the fanfold paper at the aligned perforation line by pulling the fanfold paper in a direction perpendicular to the aligned perforation line while being moved along the aligned perforation line.

34. The apparatus according to claim 33, wherein said cutting means has a standby position which is set at one side of a feeding area of the fanfold paper and in which said cutting member is set in a non-operative mode.

35. The apparatus according to claim 34, wherein said cutting member is a disk which is moveable along the aligned perforation line of the fanfold paper while being rotated as it contacts the fanfold paper.

36. The apparatus according to claim 33, wherein said feeding means includes supplying means for supplying cut sheet one by one on which an image is formed by said image forming means, and a common feeding path on which the fanfold paper and cut sheet are fed from said image forming means toward the cutting position;

said apparatus further comprises retracting means for drawing back the fanfold paper which is left behind on

said common feeding path after the fanfold paper is cut apart to a position which lies on an upstream side of said common feeding path and does not prevent supplying of the cut sheet by said supplying means.

37. The apparatus according to claim 36, further comprising separating means for separating said common feeding path from said image forming means when the fanfold paper is moved in a reverse direction.

38. The apparatus according to claim 37, wherein said image forming means is disposed on an upstream end of said common feeding path, and said feeding means further includes a confluence guide disposed near the upstream end of said common feeding path, for guiding the cut sheet and fanfold paper towards said common feeding path; and moving means for moving said confluence guide towards and apart from said image forming means.

39. The apparatus according to claim 38, further comprising means for operating said separating means in connection with said moving means.

40. The apparatus according to claim 33, wherein said image forming means has an image forming speed in relation to the feeding of the fanfold paper;

said feeding means includes supplying means for supplying cut sheets one by one on which an image is formed by said image forming means, and a common feeding path for guiding one of the fanfold paper and cut sheet from said image forming means toward the cutting position, wherein said feeding means feeds the fanfold paper at a first supply speed towards said common feeding path and said supplying means feeds a cut sheet at a second supply speed towards said common feeding path, the first and second supply speeds being the same as the image forming speed of said image forming means;

said feeding means feeds one of the fanfold paper and cut sheet along said common feeding path from said image forming means toward the cutting position at one of first and second feeding speeds which are respectively set for the cut sheet and fanfold paper, said first feeding speed for the cut sheet being set equal to said image forming speed and said second feeding speed for the fanfold paper being set to be higher than said image forming speed.

41. The apparatus according to claim 40, wherein said feeding means further includes detecting means for detecting the rear end of the fanfold paper when the fanfold paper is fed at said first supply speed and a driving source for lowering said second feeding speed to said first supply speed in a period from the time the detecting means has detected the rear end of the fanfold paper until the rear end of the fanfold paper is fed at said second feeding speed.

42. A printing apparatus comprising:

image forming means for forming an image on continuous printing paper at an image forming position;

first feeding means for feeding the printing paper towards said image forming position;

second feeding means for feeding the printing paper towards a cutting position on a downstream side of said image forming position with respect to the feeding direction of the printing paper;

cutting means for cutting the printing paper at said cutting position; and

retracting means for drawing back the printing paper after the cutting process for the printing paper is completed so that the front edge of the printing paper is located at said image forming position when the printing paper is to be subjected to successive printing, or the front edge of the printing paper is located at a position when the printing paper is to be removed.

43. The apparatus according to claim 42, further comprising separating means for separating the printing paper from said image forming position towards a direction perpendicular to the face of the printing paper, and wherein said first feeding means includes means for compensating a deviation of the front edge of the printing paper in the feeding direction of the printing paper, the deviation being produced by the motion of said separating means after the cutting process for the printing paper is completed when the printing paper is to be subjected to successive printing.

44. A printing method comprising:

a first supplying step of supplying cut sheet as printing paper towards a common feeding path;

a second supplying step of supplying continuous paper as printing paper towards said common feeding path;

a feeding step of feeding the printing paper supplied by one of said first and second supplying steps along said common feeding path;

an image forming step of forming an image on the printing paper at an image forming position;

a cutting step of cutting continuous paper at a cutting position defined on a downstream side of the image forming position with respect to a feeding direction of the printing paper;

a retracting step of drawing back the continuous paper which is left behind on said common feeding path after the continuous paper is cut apart to a position which lies on an upstream side of said common feeding path and does not prevent supply of the cut sheet by said first supplying step; and

a separating step of separating said common feeding path from the image forming position when the continuous paper is moved in a reverse direction.

45. The method according to claim 44, wherein said first and second supplying steps includes a guiding process for guiding one of the cut sheet and continuous paper towards the image forming position by means of a confluence guide disposed on an upstream side of the image forming position and a moving process for moving said confluence guide towards and apart from the image forming position.

46. The method according to claim 45, wherein said separating step is executed in connection with said moving process.

47. The method according to claim 44, wherein

an image is formed at an image forming speed in relation to the feeding of printing paper in said image forming step;

the printing paper is supplied at a supplying speed which is the same as the image forming speed in one of said first and second supplying steps; and

the printing paper is fed along said common feeding path by said feeding step at one of first and second feeding speeds which are respectively set for different types of printing papers, said first feeding speed used for cut sheet being set equal to said image forming speed, and said second feeding speed used for the continuous paper being set to be higher than said image forming speed.

48. The method according to claim 47, wherein said feeding step includes a detecting process for detecting the rear end of the continuous paper, and a decelerating process for lowering said second feeding speed to said supplying

speed while the rear end of the continuous paper is supplied at said supplying speed after the rear end of the continuous paper has been detected by said detecting process.

49. A printing method comprising:

an image forming step of forming an image on fanfold paper at an image forming position;

a feeding step of feeding the fanfold paper; and

a cutting step of cutting the fanfold paper at a cutting position on a downstream side of said image forming position with respect to a feeding direction of the fanfold paper;

wherein said cutting step includes a aligning process for aligning a perforation line of the fanfold paper along which the fanfold paper is to be cut off with the cutting position; a holding process for holding portions of the fanfold paper which respectively lie on upstream and downstream sides with respect to the aligned perforation line, and a cutting process for cutting off the fanfold paper at the aligned perforation line by using a cutting member, said cutting member pulling the fanfold paper in a direction perpendicular to the aligned perforation line while being moved along the aligned perforation line.

50. The method according to claim 49, wherein said cutting member is set in a non-operative mode at a standby position which is set at one side of a feeding area of the fanfold paper before said cutting step is executed.

51. The method according to claim 50, wherein a disk as said cutting member is used;

said disk is moved along the aligned perforation line of the fanfold paper while being rotated as it contacts the fanfold paper in said cutting step.

52. The method according to claim 49, wherein said feeding step includes a supplying process for supplying cut sheet one by one on which an image is formed by said image forming step, the fanfold paper and cut sheet are fed along a common feeding path from said image forming position toward the cutting position; and

said method further comprises a retracting step of drawing back the fanfold paper which is left behind on said common feeding path after the fanfold paper is cut apart to a position which lies on an upstream side of said common feeding path and does not prevent supply of the cut sheet by said supplying process.

53. The method according to claim 52, further comprising a separating step of separating said common feeding path from said image forming position when the fanfold paper is moved in a reverse direction.

54. The method according to claim 53, wherein said feeding step further includes a guide process for guiding the cut sheet and fanfold paper towards said common feeding path by means of a confluence guide which is disposed on the upstream end of said image forming position and a moving process for moving said confluence guide towards and apart from said image forming position.

55. The method according to claim 54, wherein said separating step is executed in connection with said moving process.

56. The method according to claim 49, wherein an image is formed at an image forming speed in relation to the feeding of the fanfold paper in said image forming step;

said feeding step includes a supplying process for supplying cut sheets one by one on which an image is formed by said image forming step, one of the fanfold paper and cut sheet is fed along a common feeding path from said image forming position toward the cutting position in said feeding step, wherein the fanfold paper and cut sheet are supplied at a supply speed towards said common feeding path, respectively, said supply speed being the same as the image forming speed in said image forming step; and

one of the fanfold paper and cut sheet is fed along said common feeding path from said image forming position toward the cutting position in said feeding step at one of first and second feeding speeds which are respectively set for the cut sheet and fanfold paper, said first feeding speed for the cut sheet being set equal to said image forming speed, and said second feeding speed for the fanfold paper being set to be higher than said image forming speed.

57. The method according to claim 56, wherein said feeding step further includes a detecting process for detecting the rear end of the fanfold paper when the fanfold paper is fed at said supply speed and a deceleration process for lowering said second feeding speed to said supply speed while the rear end of the fanfold paper is fed at said supply speed after the rear end of the fanfold paper has been detected.

58. A printing method comprising:

an image forming step of forming an image on continuous printing paper at an image forming position;

a first feeding step of feeding the printing paper towards said image forming position;

a second feeding step of feeding the printing paper towards a cutting position on a downstream side of said image forming position with respect to a feeding direction of the printing paper;

a cutting step of cutting the printing paper at said cutting position; and

a retracting step of drawing back the printing paper after the cutting step is completed so that the front edge of the printing paper is located at said image forming position when the printing paper is to be subjected to successive printing, or the front edge of the printing paper is located at a position on the upstream side of said image forming position when the printing paper is to be removed.

59. The method according to claim 58, further comprising a separating step of separating the printing paper from said image forming position towards a direction perpendicular to the face of the printing paper, and wherein said first feeding step includes a process for compensating a deviation of the front edge of the printing paper in the feeding direction of the printing paper, the deviation being produced by said separating step after the cutting step is completed when the printing paper is to be subjected to successive printing.

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