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Description

This invention relates to a heat transfer recording apparatus employing an ink donor film, and more particularly, to such an apparatus which can prevent formation by any 'wrinkle' on the ink donor film.

A heat transfer recording system employing an ink donor film and a thermal head (heating element), and adapted for selective heat transfer of ink from the film to a recording medium has the advantage of permitting the recording of information on ordinary paper at a lower cost.

The ink donor film having one surface coated with a hot-melt ink has hitherto been in the form of a composite roll in which the film is wound with recording paper, and the ink surface of the film is superposed on the recording paper. The ink donor film and the recording paper are drawn from their composite roll by a pair of drive rollers, and transported to the recording station in their superposed condition. The thermal head transfer ink from the ink donor film to the recording paper by selective heating, and the paper is then separated from the ink donor film. The ink donor film is wound on a take-up roll, and recovered. The recording paper is discharged through a discharge opening after it has been cut as required.

Fig. 1 is an exaggerated illustration of the mechanism by which the ink donor film and the recording paper are withdrawn from their composite roll in a conventional heat transfer recording apparatus. The recording paper 4 and the ink donor film 5 are withdrawn from the composite roll 1 by a pair of drive rolls 2 and 3, and their thickness are designated as t_1 and t_2, respectively. The ink donor film 5, which is wound outwardly of the paper 4, has a greater withdrawn length of approximately $\pi(t_1 + t_2)$ than the paper 4 for each revolution of the composite roll 1. Accordingly, the ink donor film 5 slackens. The 'slack' forms a wave on the ink donor film 5, resulting in the formation of 'wrinkle' which may bring the film out of contact with the paper and disable recording by heat transfer at the recording station.

In US—A—4 039 932 a heat transfer recording apparatus of the type is described having a recording station through which a recording medium and an ink donor film having a heat transfer type ink on one surface thereof are passed through while in contact with one another and wherein said donor film is selectively heated at the recording station to transfer ink from said donor film to the recording medium to thereby record an image. The ink donor film is fed to the recording station in a circumferential direction of a rotating drum whereas said recording medium is separately supplied by way of a source of discrete sheets lying on a table. The ink donor film and the recording medium are thus conveyed to the recording station from separate sources. Furthermore, the known apparatus comprises also a transport system for independently transporting the recording medium and the ink donor film to the recording station. However, the transport system for the ink donor film is comprised of a drum mounted on a fixed drive axle, whereas the support system for the discrete recording sheets consists of feed-rollers.

Should in a heat transfer type recording apparatus of this type, the ink donor film be required to be as thin as several tens of microns in order to ensure transmission of heat, and proper resolution the said ink donor film is very likely to skew when it is subjected to any tension caused by error in the positioning of various parts of the film transport system. Any such skew produces a wave on the ink donor film in a direction which is perpendicular to that of its travel, and a wrinkle is formed thereon in the area between the thermal head and the back roll. The wrinkle on the ink donor film disables recording of information by heat transfer. Accordingly, cost reduction of such an apparatus is hindered since it is necessary to ensure a high degree of accuracy in the fabrication and positioning of parts in the transportation system for the ink donor film and the supply roll for the ink donor film.

From US—A—4204 668 there is also known a paper transportation mechanism for a recording apparatus which automatically supplies regular paper one sheet after another from a paper tray but which also permits introduction of paper manually if the use of different paper is desired, for example differently colored or sized paper. However, this transportation mechanism is likewise complicated and requires complicated control for paper transportation, since a common feed roll is employed for selective delivery of either manually supplied paper or paper from the paper tray. Also, since the operator of the apparatus must actuate a switch for paper changeover, his erroneous operation may result in unnecessary recording.

A further conventional recording sheet transporting mechanism according to US—A—3756 586 for use in a facsimile apparatus recorder or a copier has been such that recording sheets stacked in a superimposed fashion on a paper tray are automatically fed one by one, and when it is desired to use recording sheets different in color and/or size from each other, such recording sheets must be manually fed one by one. In such a transporting mechanism, a passage for transporting the manually-fed recording sheets to a recording portion is provided separately from a passage for transporting the recording sheets automatically fed from the sheet tray. Position detecting means for sensing the passing of recording sheets are provided in respective passages, so as to perform registration, i.e. adjust the positions of respective recording sheets so that an image can be recorded consistently in a predetermined portion on the recording sheet.

Such a position detecting mechanism, how-

ever, comprises position detecting means consisting of as many micro-switch actuators as there are recording-sheet transporting passages. To this end, a large space is required, resulting in an increased size of the mechanism as well as an increased manufacturing cost of the mechanism.

In thermosensitive image recorders, there has also been a disadvantage that it was necessary to peel off the recording paper from the heat-sensitive ink sheet by hand after completion of the recording.

Also conventional thermosensitive image recorders have been complex in structure and comparatively large in size requiring a considerable space for installation.

Still further, it has been customary for the power supply unit to adversely affect the recording operation in a thermosensitive recording printer.

In view of the above, it is the primary object of this invention to provide a heat transfer recording apparatus which can prevent the formation of any 'wrinkle' on the ink donor film and is capable to prevent any skew of the ink donor film.

According to the invention, the above mentioned object is achieved in that said transport system, in order to bring said donor film and recording medium into contact with one another at a point prior to said recording station, includes a donor film guide mechanism in the travelling path of said donor film between said film source and said point of contact, said donor film guide mechanism including at least one roller around which said donor film passes and after which said recording medium is superimposed upon said film at a location before said recording station, said at least one roller including a stress absorbing roller in contact with said donor film and having an axis of rotation substantially perpendicular to the direction of film travel and supported in such a way that the angle of inclination of this axis of rotation can be varied.

According to one embodiment of the invention, the heat transfer recording apparatus comprises a paper transportation control system which permits selective supply of two kinds of paper by a common feed roll without requiring any switch actuation by the operator. The transporting mechanism of this apparatus is also equipped with plural recording sheet transporting passages, wherein a position detecting means for use in registration is used in common to the plural sheet transporting passages.

In the heat transfer recording apparatus of the invention, the recording paper, after the recording operation, can be obtained in a peeled-off form from the heat recording medium. Furthermore, a sensor is provided which detects the presence of manually supplied paper and a retard roll the rotation of which is controlled in response to the output of the sensor to transport manually supplied paper, while the retard roll also has its original function of paper separation.

A single optical path passes desired points on plural sheet passages, which desired points are so determined that the time necessary for transporting a recording sheet from the point on one passage to the recording portion is equal to the time necessary for transporting a recording sheet from the point on the other passage to the recording portion, and the position of a recording sheet is detected by whether or not the recording sheet intersects this optical path.

Further, the heat recording medium is made to change its path abruptly at a location after the recording operation occurs, thus making it difficult for the recording paper to follow, and a guide member is disposed close to the heat recording medium to engage the leading edge of the recording paper and separate it.

A recording device according to the present invention includes a paper supply and a paper discharge mechanism and a recording or copying mechanism compactedly arranged in a housing, while a power supply unit and an electrical control circuit unit are accommodated in a separate housing. With this arrangement, it is possible to do copying work on a desk. To this end, the paper supply and the paper discharge mechanism are positioned in an upper portion of the recording machine not only to minimize the space which the machine takes up on the desk, but also to provide convenience for repair. With the power supply in a separate housing, recording operations can be effected without being adversely affected by the generated heat.

Breif Description of the Drawings

The invention will be more clearly understood with reference to the following description in conjunction with the accompanying drawings in which:

Fig. 1 is a schematic view of a conventional heat transfer recording apparatus employing a composite roll of ink donor film and recording paper;

Fig. 2 is a schematic side view of a heat transfer recording apparatus according to this invention employing separate donor film and recording paper sources;

Fig. 3 is a side view of a stress-absorbing roller which may be used in the configuration of Fig. 2;

Fig. 4 is a schematic side view illustrating the essential components of a recording paper transport system according to the present invention capable of automatically switching between recording paper from a reservoir and recording paper which is manually inserted;

Fig. 5 is a schematic side illustration of essential components of a thermosensitive image recording apparatus having two different recording paper supply paths wherein a single detection element is provided for both of the supply paths;

Fig. 6 is a schematic side view of a compact recording apparatus according to a first embodiment of this invention;

Fig. 7 is a side illustration for explaining the operation of the recording station in a thermosensitive image recorder;

Fig. 8 is a schematic side view of a variation of the recording apparatus illustrated in Fig. 6; and

Fig. 9 is a perspective view of the recording apparatus illustrated in Fig. 8.

Detailed Description of the Invention

Fig. 2 schematically shows a portion of a heat transfer recording apparatus embodying this invention. The apparatus includes a supply roll 7 for an ink donor film 5 on which the film is wound to form a roll 8. The ink donor film 5 is withdrawn from the roll 8, and guided by a guide roll 9 in a different direction shown by an arrow A. The film then passes through the area of contact between a back roll 10 and a thermal head 11, and the area of contact between the back roll 10 and a drive roll 12, and about a guide roll 13, and is wound on a take-up roll 14.

The recording paper 4 is withdrawn by a pair of feed rolls 15 and 16 from a paper source (not shown) which is different from that for the ink donor film 5, and travel in the direction of the arrow A at a speed which is equal to that at which the ink donor film 5 travels. The leading edge of the paper 4 contacts the ink surface of the ink donor film 5 in the region where the film 5 leaves the guide roll 9 (Fig. 2). The paper 4 and the ink donor film 5 are superposed on each other, and enter the recording station defined by the back roll 10 and the thermal head 11.

In the recording station, the thermal head 11 applies heat selectively to the surface of the ink donor film 5, whereby ink is selectively transferred to the surface of the recording paper 4 sandwiched between the ink donor film 5 and the back roll 10 for recording information thereon by heat transfer. Then, the recording paper 4 travels along the common tangential line of the back roll 10 and the drive roll 12 (in the direction of an arrow B), and is separated from the ink donor film 5.

In the heat transfer recording apparatus as hereinabove described, the ink donor film 5 is always directed by the guide roll 9 in the direction of the arrow A for entry into the recording station, even after the roll 8 of the ink donor film has reduced its diameter with the progress of the recording operation. Thus, the recording paper 4 and the ink donor film 5 are always superposed on each other without involving any undue force; therefore, there is no fear of any 'wrinkle' being formed in the recording station.

If desired, the absence of wrinkles can be further assured by using a stress absorbing roller as the roller 9 in Fig. 2, as will be explained with reference to Figs. 2 and 3.

The supply roll 7 has an outer periphery shown by solid line 7A at the very beginning of operation, and has a gradually decreasing diameter as the ink donor film 5 is delivered to the recording station. The supply roll 7 comprises a roll of ink donor film 5 wound about a paper tube. Since there may occur some unevenness in the manner in which the film is wound about the paper tube, or an error in the positioning of the paper tube relative to the apparatus, it is pratically impossible to maintain the surface of the ink donor film 5 in parallel to the axis of the back roll 10. Whenever the ink donor film 5 ceases to be in parallel to the axis of the back roll 10, it imparts a force to either end of the stress absorbing roll unit 9, so that the ends of the roll unit 9 are raised or lowered in a direction which is perpendicular to the surface of the film 5.

Fig. 3 illustrates the principle of the stress absorbing roll unit 9. The unit 9 utilizes the principle of a balancing toy. It comprises a roll 9A, a shaft 9B on which the roll 9A is rotatably supported, a member 9C for supporting the shaft 9B, and a pin 20 which supports the supporting member 9C rotatably on a projection 21 of the frame of the apparatus. If the ink donor film 5 is subjected to any stress when it is travelling, the supporting member 9C is tilted about the pin 20 in the direction in which the stress has been applied. As a result, the unit 9 immediately absorbs the stress acting on the ink donor film 5, and prevents formation of any wave on the film surface. The pin 20 may advantageously be connected to the roll unit somewhat loosely, so that the roll 9A may also be displaced to some extent in the direction of travel of the ink donor film 5 for appropriate removal of any stress acting on the film in the direction of its travel.

It is thus possible to provide a highly reliable heat transfer recording apparatus which permits recording of information by heat transfer without any problem, even with normal errors in the installation of the ink donor film transport system.

Fig. 4 illustrates essential components of a copying device according to the present invention which is capable of automatically selecting either recording paper from a reservoir or recording paper which is manually inserted. This apparatus includes a paper tray 30 from which cut paper 31 is automatically supplied, and a manual paper inlet 32 through which paper is manually supplied into the apparatus.

If the operator of the apparatus pushes a start button (not shown) without supplying any paper through the manual paper inlet 32, a feed roll 34 begins to rotate clockwise in the direction of an arrow A. The feed roll 34 and a retard roll 35 are positioned opposite to each other in the vicinity of the paper outlet 30*a* of the paper tray 30. The retard roll 35 is in contact with the feed roll 34, but a one-way clutch (not shown) prevents rotation of the retard roll 35 when the

feed roll 34 is rotating clockwise.

If sheets of paper at the bottom of the stack of paper 31 in the paper tray 30 are delivered out of the paper outlet 30*a* by means of a feed mechanism (not shown) only one of them is fed between the feed roll 34 and the retard roll 35 by virtue of the function of the retard roll 35. Then, the paper 21 is guided along a guide plate 36, and passes through a narrowed path 37, as shown by a solid line. A light emitting element 38 and a light receiving element 39 are positioned on the opposite sides of the path 37, and detect the leading edge of the paper 31. After the lapse of a predetermined short time, a drive roll 12 begins rotation, and a back roll 10 is driven thereby, whereby an ink donor sheet 5 having one surface coated with a hot-melt solid ink begins to travel in the direction of an arrow B.

The paper 31 joins the ink donor sheet 5 when the former has passed through the path 37. The paper 31 is sandwiched between the back roll 10 and the ink donor sheet 5, and passes along the top of a thermal head 11 in which a heater is provided. The thermal head 11 selectively supplies heat to the ink donor sheet 5 in accordance with pictorial information, whereby molten ink is transferred onto the paper for recording information thereon.

The paper having information recorded thereon continues to be sandwiched between the back roll 10 and the ink donor sheet 5, and is transported with the ink donor sheet 5 until it is separated from the ink donor sheet 5 when the latter makes a sharp turn about the drive roll 12. Then, the paper is discharged from the apparatus along a path shown by a broken line 24.

If the operator supplies paper through the manual paper inlet 32, and pushes the start button, a photocoupler 25 provided between the manual paper inlet 32 and the retard roll 35 detects the presence of manually supplied paper 31 (broken line). In response thereto, the feed roll 34 begins to rotate counterclockwise or in the direction of an arrow C. The retard roll 35 is thereby driven, and begins to rotate clockwise or in the direction of an arrow D.

The retard roll 35 is in contact with a guide 36 positioned thereabove, and maintains a predetermined amount of pressure therebetween. Thus, if the retard roll 35 starts rotation in the direction of the arrow D, the paper 31 is guided along the broken line by the guide 36, and fed forward into the path 37. The manually supplied paper is thereafter transported in the same manner as the paper from the paper tray 30, and no description of the subsequent operation is necessary.

The embodiment of Fig. 4 utilizes a single light emitter 38 and light receiver 39 at a position where the paths of the automatic and manually supplied paper paths coincide. However, it is sometimes necessary to position the detector further upstream, and this may be troublesome if the paper paths are separated by dividers, or guides. Fig. 5 illustrates a modification of the device of Fig. 4 wherein a single detector monitors two different paper paths.

The recorder of Fig. 5 uses a dual passage system consisting of a first passage along which a recording paper fed from a casette (a paper tray) 30 is transported to a recording station and a second passage along which a recording sheet manually fed through a manual sheet inserting opening 32 by an operator is transported to the recording station. The first passage extends from a recording sheet outlet 30A in the cassette 30 via contacting portion 40 between a feed roll 34 and a retard roll 35 and a space defined by lower paper guides 42 to terminate at a recording station 11A in which the heating elements of thermal head 11 contact an ink donor film 5. The second passage extends from a space defined by a photosensor 25 and a discharged sheet tray 41 via a contacting portion 42 between the retard roll 35 and the discharged sheet tray 41 and a space defined by the upper paper guides 43 to terminate at the recording station 11A. In the recording station 11A, a recording paper 31 from one of the transporting passages is pressed against the heating elements of the thermal head 11 through the medium of the ink donor film 5, by means of the back roll 10.

Four through-holes 47 are provided in the lower paper guides 42 and the upper paper guides 43 at desired points which are so determined that the time necessary for transporting a recording sheet from the point on one passage to the recording station is equal to the time necessary for transporting a recording sheet from the point on the other passage to the recording station. A light emitting element 38 for emitting a light ray 48 is disposed above these through-holes and a light receiving element 39 is disposed below these through-holes.

In operation, let us assume that an operator has pressed a start button for starting the recording operation, and no recording sheet is fed into the sheet inlet 32. The feed roll 34 starts rotating in a direction of arrow A. Although the retard roll 35 is maintained in pressure-contact with the feed roll 34, the retard roll remains inoperative by the action of a one-way clutch (not shown). In this situation, when a recording paper stacked in a superposed fashion in the cassette 30 is fed from the recording paper output 30A in the cassette by a feed mechanism (not shown), the recording paper is caused to travel from the contacting portion 40 forward, under the operation of the feed roll 34. When the leading edge of the recording paper comes to the through-holes in the lower paper guides 42, the optical path 48 is intersected by the paper, and the light receiving element detects the leading edge of the recording paper. After the lapse of only a short period of time, the back roll 10 starts rotating in

the direction of arrow B, and the ink donor film 5 is caused to travel.

At this instant, the recording paper is joined with the ink donor film 5, and the recording paper passes the contacting portion 11A, as the paper is held between the back roll 10 and the ink donor film. Heat is selectively applied through the donor film to the recording paper from the thermal head 11 according to picture information, whereby an image is thermally transferred to the recording paper. The recording paper is thereafter separated from the ink donor film 5, travels in the direction of arrow C, and is delivered to the tray 41.

When an operator presses a start button while a recording paper is inserted into the sheet inlet 32 above the cassette 30, the photosensor 25 detects the presence of the recording paper. The feed roll 34 starts rotating in a direction of arrow D. The retard roll 35 follows the rotation of the feed roll 34, thus rotating in the direction of arrow E, thereby transporting the recording paper from the contacting portion 42 forward. The recording paper travels downward along the upper paper guides 43. When the leading edge of the recording paper arrives at the through-holes in the paper guides 43, the light receiving element 39 detects the recording paper. The controlling operation in the succeeding steps is the same as those described above. The machine will thus work identically in either mode as long as the elapsed time to the recording station from the detection point in each passage is the same.

Fig. 6 illustrates a compact desk-top copying machine according to this invention. The printer is comprised of a recording station 11A for carrying out heat transfer recording at a position where a thermal head 11 and a back roll 10 comes into contact, a travelling mechanism for delivering the recording paper 31 piled on a cassette 30, or paper fed manually from a manual paper feeding port 32, into a catch tray 41 through said recording station 11A, a travelling mechanism for delivering a heat recording medium i.e. a heat-sensitive ink donor film 5 from a feed roll 8 through said recording section 11A to recover on a take-up roll 14, a photo-emitting element 38 and a photo-receiving element 39 detecting the recording paper in front of said recording station 11A, a control circuit 54 controlling the operation of both of said travelling mechanisms upon the detection of the recording paper, and other parts.

The feeding of the recording paper to the recording station 11A will first be described, and is similar to that described with reference to Figs. 4 and 5. It is assumed that a starting button (not shown) for commencement of the recording operation is pushed while no recording paper is inserted into the manual paper feeding port 32. At this time, a sensor 25 consiting of an optical detector or a microswitch, for example, does not detect any manually inserted recording paper, and the control circuit 54 therefore operates an automatic paper feed. Thus, the control circuit 54 rotates the first motor 57 which causes rotation of a paper delivery roll 58 contacting the lowest layer of the recording paper 31 piled in the cassette 30 and also rotates a paper feed roll 34 disposed near the outlet of the cassette 30 both being rotated in a clockwise direction. At this time, a retard roll 35 contacting the paper feed roll 34 does not follow the clockwise rotation of the paper feed roll 34 due to operation of one-way clutch (not shown) but instead remains substantially stationary. Accordingly, even when a plurality of recording papers have been delivered at one time by the paper delivery roll 58, the retard roll will block the upper sheets and the recording paper will be delivered sheet by sheet from between the paper feed roll 34 and the retard roll 35 owing to the function of the retard roll 35.

The recording paper thus delivered advances, being guided by guide plates 62, 63 and joins with the heat sensitive medium 5 near the back roll 10. Both are conveyed to the recording section 11A with the recording paper being held between the peripheral surface of the back roll 10 and the heat recording medium 5.

On the other hand, when it is desired to use a recording paper having a different size from that of the rated recording paper in the cassette 30, such as exceedingly long recording paper or envelopes, or post cards, the operator inserts the recording paper through the manual paper feeding inlet 32 and pushes the start button. In this case, the sensor 25 for manual operation detects the existence of the recording paper so that the control circuit 54 starts the operation of the manual paper feeding. Thus, the control circuit 54 rotates the paper feed roll 34 in a counterclockwise direction while stopping the rotation of the paper delivery roll 58. The retard roll 35 follows the rotation of the paper feed roll 34 when the latter rotates in this direction, and the retard roll 35 therefore rotates in a clockwise direction. The retard roll 35 contacts the lower surface of the catch tray 41 disposed thereabove with a predetermined pressure, and feed the recording paper forwardly with its rotation. The recording paper thus delivered forwardly advances, being guided by the guide plates 62, 63 and is conveyed to the recording section 11A after joining with the heat recording medium 5.

The position detecting mechanism is similar to that described above with reference to Figs. 4 and 5. In the pair of the guide plates 62, 63, holes 62A, 63A are formed at optional positions where the conveying times of the recording paper from either source to the recording section 11A becomes respectively equal, and a photo-emitting element 38 and a photo-receiving element 39 are arranged face to face on a line connecting these holes. Accordingly, when the recording paper is delivered from the cassette 30, or through the manual paper feed

port 32, and the leading edge of the recording paper reaches a position at which the light ray emitted by the photo-emitting element 38 is interrupted, the photo-receiving element 39 detects the leading edge of the recording paper. The control circuit mentioned above starts counting time from this moment, and rotates the second drive motor 64 at a later time when the leading edge of the paper and the heat recording medium 5 join together. Consequently the take-up roll 14 and a drive roll 12 are driven, and the heat recording medium 5, passed around stress absorbing roll 9, guide roll 67, back roll 10, drive roll 12 and guide 68, commences to travel. As a result, after the heat transfer recording of the recording paper is carried out at the recording section 11A, the recording paper is conveyed up to the contact point of the back roll 10 and the drive roll 12.

The heat recording medium 5 changes its direction abruptly along the periphery of the drive roll 12 at a time point at which it has passed said contact point. The recording paper being unable to follow the heat recording medium 5, is peeled off therefrom. Since the tip end of the guide 69 is disposed close to the periphery of the drive roll 12, transfer of the recording paper in the direction of guide roll 68 is prevented even if the peeling is affected only at the leading edge of the recording paper, whereby the recording paper can be positively separated from the heat recording medium 5. The recording paper thus separated from the heat recording medium 5 is guided by a guide 69 and is discharged outside of the apparatus by a discharging feed roll 71 contacting therewith, and is received in the catch tray 41.

On the other hand, the photo-receiving element 39 detects the rear end of the recording paper at a time slightly before the rear end of the recording paper reaches the recording section 11A. At this stage, the control circuit 54 stops the rotation of the first drive motor 57. After a preset time has passed and at a time point where the rear end of the recording paper has been peeled from the heat recording medium 5, the control circuit stops the travelling of the heat recording medium 5. In the case where recording is to be effected continuously, a signal for commencement of automatic feed of the recording paper can be generated in accordance with the detection signal at the rear end of each sheet of recording paper.

In this printer, as shown in Fig. 7, the recording paper 31 and the heat recording medium 5, in which a heat-sensitive solid ink layer 52 has been formed on the base paper 51, are overlapped near the recording section in such a manner that the solid ink layer 52 comes in contact with the recording paper, and heat is supplied to the heat recording medium 5 selectively in accordance with picture information from a heat-generating resistor 11B of the thermal head 11. Thus, the ink 52A melted or sublimated is transferred onto the recording paper 31, while the ink 52B maintained in a solid state is caused to remain on the heat recording medium 5.

In the recording section 11A, in order to carry out the heat transfer recording efficiently, the back roll 10 is pressed against the heat-generating resistor 11B through the recording paper 31 and heat recording medium 5. Accordingly, if pressing is effected in a state that waving is produced in the recording medium 5, wrinkles are produced on the heat recording medium in the recording section 11A and it may not be possible to obtain a satisfactory heat transfer recording. Since the thickness of the heat recording medium 5 is usually 20 microns or less, stress applied in the width direction of the heat recording medium 5 becomes non-uniform if there is a positional error in the travelling system, and this increases the possibility of forming wrinkles.

The stress absorbing roll 9 and a brake mechanism shown in Fig. 6 are mechanisms for preventing the formation of the wrinkles. In the stress absorbing roll 9, as described more fully with reference to Figs. 2 and 3, the inclination of the roll contacting with the heat recording medium 5 is made variable, whereby the non-uniform stress can be absorbed. In the brake mechanism 78, a tension is applied on the heat recording medium 58 by restraining the rotation of the feed roll 8, thus helping to prevent the generation of waving and wrinkles on the heat recording medium 5.

In this printer, the diameters of the feed roll and the take-up roll are successively varied with the use of the heat recording medium 5. In order to keep the take-up speed of the take-up roll 14 constant notwithstanding these diameter changes, the take-up roll 14 is driven through a slip clutch (not shown) whereby the rotating speed thereof reduces in accordance with the increase in its diameter. In addition, a belt (not shown) is passed through the back roll 10 and the discharge feed roll 71, so that the driving mechanism is more simplified than a conventional apparatus where the discharge feed roll 71 is driven through a separate driving source.

Assuming that the printer described above utilizes a heat-generating element having an applied power of 0.64 W, and 8 dots/mm, and the recording time of 1 line scanning is set to 2.6 ms, it is possible to obtain a recording (reflection) density of 1.4 or more, which corresponds to a recording of 10 sheets in 1 minute with A4 JIS with a scanning of 7.7 dots/mm.

The embodiment of Figs. 8 and 9 is similar to that of Fig. 6. In Fig. 8, the reference numeral 81 designates a housing, 82 a set of rubber legs of the housing, 5 an ink donor sheet which is driven in the direction of the arrows. The reference numeral 11 designates a thermal head assembly to which video signals for each line on an original document to be copied are supplied from the exterior of the housing 81 as is known

in the art. Designated at 85 is an automatic paper supply tray in which a stack of about 250 sheets of copying paper are placed, and at 86 is an automatic paper supply guide having on the underside thereof a pair of feed rollers 58, 34 rotatable at an equal speed for feeding sheets of copying paper one by one downwardly to the right. A slot 32 is disposed at an intermediate portion of the guide 86 so that an extra sheet of copying paper can be inserted by hand from the slot 32 for extra copying while the automatic copying operation is being carried out. Designated at 41 is a tray into which copied sheets of paper are discharged.

The operation of the copying machine is as follows: The stacked sheets of copying paper in the automatic paper supply tray 85 are fed downwardly from the lower side of the stack, and the leading edges of the sheets of recording paper comes into contact with the feed roller 58 for further downward movement. Then, the sheets of copying paper pass between the feed rollers 58 and a pinch roller 88, the pinch roller 88 being urged against the periphery of the feed roller to limit the number of the sheets of copying paper to several. Such several sheets of copying paper go downwardly until the leading edges of the sheets of copying paper contact the periphery of the feed roller 34 and then enter between the feed roller 34 and a retard roller 35 rotatable in the same direction as the feed roller 34 and held in contact therewith so that only a single sheet of copying paper can pass. The two feed rollers 58, 34 in this embodiment are driven by a common step motor 91 through a belt.

With continued downward advance of the leading edge of such a single sheet of copying paper, a register sensor 89 is energized and a predetermined time later the motor 90 is energized for feeding the ink donor sheet 5. Such a motor 90 in this embodiment is a step motor for winding the donor sheet 5 from a donor sheet supply reel 8 around a takeup reel 14 via the thermal head assembly 11. Simultaneously therewith, the step motor 91 for feeding paper is de-energized. Thus preparations for copying operation are completed.

As video signals from a host apparatus (not shown), for each line on the document to be copied, are supplied to the thermal head assembly 11, the donor sheet 5 is driven intermittently in a step-like manner for simultaneous line-by-line duplication. The paper to be copied, the paper copied, the ink donor sheet 5, and the donor sheet take-up reel 14 are driven by the common step motor 90.

The paper to be copied is sandwiched between the donor sheet 5 and the periphery of a back roller 10 for printing or copying as it passes the thermal head assembly, and the copied sheet is then discharged into a discharge tray 41 such that the copied or printed side of the copied paper faces upwardly.

When duplication progresses line by line and the trailing edge of the copying paper moves past the register sensor 89, a signal is generated a short time later to terminate the generation of video signals, thus de-energizing the step motor 90. Since the register sensor 89 is spaced a distance from the thermal head, the various drive and recording devices or mechanisms are so controlled that their operation is delayed with respect to signals from the register sensor 89 which senses the leading and trailing edges of the paper to accommodate for the distance between the sensor and thermal head.

In the case where an extra copying operation is necessary during the automatic copying operation, an extra sheet of copying paper is inserted by hand through the slot 32 to interrupt the automatic copying mode of operation. As the leading edge of the extra sheet of copying paper is sensed by a sensor 25, rotation of the feed rollers 58, 34 is stopped.

The extra sheet of copying paper then travels around the retard roller 35 to the thermal head assembly 11, at which time that leading edge of the extra sheet of copying paper is sensed by a sensor 92. The retard roller 35 is driven by either the step motor 91 or a separate step motor (not shown). After arrival at the thermal head assembly 11, the extra sheet of copying paper takes the same course of travel as the normal sheet of copying paper for automatic copying operation. In such an extra copying operation, the leading edge of the extra sheet of copying paper is sensed by a sensor 92.

With the copying machine thus constructed, the paper supply tray, the guide for extra copying paper, and the discharge tray are all arranged in the upper portion of the machine, resulting in a very compact machine having a width substantially equal to the width of copying paper. Further, this arrangement provides utmost convenience for handling and maintenance.

The advantages of the features described above should be easily appreciated. According to each embodiment of this invention, the ink donor film and the recording paper are supplied from different sources of supply as hereinabove described. This arrangement makes it possible to control tension on the ink donor film independently, thereby preventing its 'slackening' more effectively. The guide roll (guide mechanism) provided between the supply roll and the back roll as shown in the embodiment further facilitates the control of tension on the ink donor film. This invention can advantageously prevent 'slackening' of the ink donor film, even if any change in humidity causes the recording paper to contract, since it is only immediately prior to their entry into the recording station that the ink donor film and the recording paper are superposed on each other. Wrinkles are further prevented if moveable stress absorbing roller and/or brake mechanism are provided.

Further, with the use of sensor 25, this invention enables the operator of the apparatus to change over paper without taking any other trouble than furnishing paper. Moreover, despite the provision of both automatic and manual paper paths, the apparatus of this invention is inexpensive, and compact in construction, since the retard roll is utilized for transporting manually supplied paper. Also, with a single detection element serving plural passages, adjustment of the sheet position is simplified and the reliability of the transport mechanism is enhanced while the device is still compact, and less costly.

As described above, the device according to the present invention is compact while still permitting the recording paper and the heat recording medium to travel by respective travelling mechanism whereby heat transfer recording can be carried out simply with any paper including manually fed paper. Furthermore, since means for detecting the position of the recording paper is provided and the operational sequence of the two sets of independent travelling mechanism are controlled in accordance with the detection, it is possible to transport the donor sheet only when recording is required, which reduces the expense considerably.

In addition, since video signals are used as inputs, the machine according to this invention can be used as a printer for the output of a word processor through an interface circuit, a printer for a facsimile device or a printer for hard copy on CRT display apparatus. Furthermore, it can of course be used as a simple copying machine if combined with a reading device.

Claims

1. A heat transfer recording apparatus of the type having a recording station (10, 11; 11A) through which a recording medium (4) and an ink donor film (5) having a heat transfer type ink on one surface thereof are passed through while in contact with one another and wherein said donor film is selectively heated at said recording station to transfer ink from said donor film to said recording medium to thereby record an image, including a first source (8) of said heat transfer type ink donor film, a second source (31; 85) of discrete sheets of said recording medium and a transport system for independently transporting said recording medium and ink donor film to said recording station, characterized in that said transport system, in order to bring said donor film (5) and recording medium (4) into contact with one another at a point prior to said recording station (10, 11; 11A), includes a donor film guide mechanism (9; 67) in the travelling path of said donor film (5) between said film source (8) and said point of contact, said donor film guide mechanism including at least one roller (9) around which said donor film (5) passes and after which said recording medium (4) is superimposed upon said film (5) at a location before said recording station (10, 11; 11A), said at least one roller (9) including a stress absorbing roller (9A, 9B, 9C) in contact with said donor film (5) and having an axis of rotation (9B) substantially perpendicular to the direction of film travel and supported in such a way that the angle of inclination of this axis of rotation can be varied.

2. A heat transfer recording apparatus as defined in claim 2, characterized in that said stress absorbing roller (9A, 9B, 9C) is mounted via a support member (9C) which rotatably supports said stress absorbing roller at either end, said support member (9C) being pivotally mounted substantially at its center so that the axis of said stress absorbing roller (9A) can be inclined in either direction with respect to the plane of said donor film (5) as said film passes said thermal element (11).

3. A heat transfer recording apparatus as defined in claim 1 or 2, characterized in that said stress absorbing roller (9A) is mounted for at least limited movement of its axis in the direction of travel of said donor film (5).

4. A heat transfer recording apparatus as claimed in claim 1, characterized in that said apparatus further includes a paper reservoir (30) for holding recording paper (31) and a manual insertion slot (32) for manually inserting paper, and in that said transport system comprises:

a detector (25) for detecting the presence of manually supplied paper (31);

a feed roll (34) rotating in a first direction for transporting recording paper (31) from said paper tray (30) toward said recording station (10, 11; 11A) when no manually supplied paper is detected and being stationary or rotating in a second direction when manually supplied paper is detected; and

a retard roll (35) contacting said feed roll (34), said retard roll (35) being substantially stationary or rotating against said feed roll (34) during rotation of said feed roll in said first direction to prevent double transportation of paper from said paper tray (30), said retard roll (35) rotating to transport said manually supplied paper only when manually inserted paper is detected. (Fig. 4).

5. A heat transfer recording apparatus as claimed in claim 4, characterized in that said feed roller (34) rotates in said second direction when manually supplied paper is detected and said retard roller (35) is driven by said feed roller (34).

6. A heat transfer recording apparatus as claimed in claim 1, characterized in that said transport system comprises:

a detector (38, 39) for detecting the position of said recording medium at a predetermined location prior to said recording station (10, 11) and

a controller (54) for operating said first and second transport mechanism in accordance with said detection.

7. A thermosensitive image recording device as defined in claim 1 to 6, characterized in that said donor sheet source comprises a donor source roller (7) on which said donor sheet (5) is wound, said recording device further comprising braking means (78) for hindering rotation of said donor source roller (7, 8) to thereby increase tension in said donor sheet (5) and reduce wrinkles therein.

8. A heat transfer recording apparatus as claimed in claim 6, characterized in that said second transport mechanism includes a donor guide member (12) for abruptly changing the direction of said second path after said recording station (10, 11; 11A), said recording device further comprising a separator guide member (69) close to said one surface of said donor sheet in the vicinity of said donor guide member (12) for engaging the leading edge of said recording paper (31) to prevent said recording paper from following said second path. (Fig. 6).

9. A heat transfer recording apparatus as claimed in claim 1 or 6, characterized in that said control means (54) maintains said second transport mechanism (34, 35) disabled until a first predetermined period of time after a leading edge of said recording paper (31) has been detected by said means for detecting (38, 39), and again disables said second transport mechanism a second predetermined time after a trailing edge of said recording paper (31) has been detected by said means for detecting (38, 39).

10. A heat transfer recording apparatus as claimed in claim 9, wherein recording paper can be forwarded to said recording station along either of at least first and second different passages (40; 42) characterized by said detector including a single detection means (38, 39) for detecting the presence of a recording sheet (31) at a first position in said first passage and for detecting the presence of a recording sheet (31) at a second position in said second passage (Fig. 5).

11. A heat transfer recording apparatus as claimed in claim 10, characterized in that the time required for a recording paper (31) to pass from said first position to said recording station (10, 11; 11A) and the time required for a recording paper (31) to pass from said second position to said recording station are substantially the same.

12. A heat transfer recording apparatus as claimed in claim 11, characterized in that said first and second passages are defined at least in part by respective guide members (36; 43) having apertures (47) therein, and said single detection means (38, 39) comprises a light emitting element (38) for emitting light along an optical path passing through said apertures (47) and traversing each of said first and second passages and a light receiving element (39) for detecting recording paper position in accordance with the presence or absence of received light (Fig, 5 and 6).

13. A heat transfer recording apparatus as claimed in any one of claims 1 or 2, 4 through 6, 8 or 10 through 12, characterized in that:

said recording medium source is a recording paper reservoir (30) which extends obliquely onto a housing (81) from the top thereof;

said ink donor sheet source is a donor source roll (8) disposed in said housing (81) beneath said reservoir (30);

said recording station (10, 11; 11A) includes a back roller (10) adjacent the lower end of said reservoir (30) for passing said recording paper (31) and donor sheet (5) past a thermal element (11) for image recording; and

said recording apparatus includes a discharge tray (41) disposed above said reservoir (30), said discharge tray (41) receiving said recording paper (31) with its recorded side facing upwardly after passing through said recording station (Fig. 6 and 8).

14. A heat transfer recording apparatus as claimed in claim 13, characterized in that a slot (31) for inserting manually supplied paper is formed between said reservoir (30) and said discharge tray (41).

15. A heat transfer recording apparatus as claimed in claim 14, characterized in that a power supply for said apparatus is disposed outside of said housing (81).

Patentansprüche

1. Aufzeichnungsgerät unter Verwendung von Wärmeübertragung, mit einer Aufzeichnungsstation (10, 11; 11A) durch die ein Aufzeichnungsmedium und ein Tintengeberband (5) mit einer mit Wärme übertragbaren Tinte auf seiner Oberfläche hindurchgeführt wird, wobei das Medium und das Band miteinander in Kontakt kommen und wobei das Geberband selektiv an der Aufzeichnungsstation beheizt wird, so daß Tinte von dem Geberband auf das Aufzeichnungsmedium übertragen wird, um ein Abbild aufzuzeichnen, mit einem ersten Spender (8) für das Tintengeberband des Wärmeübertragungstyps, mit einem zweiten Spender für einzelne Aufzeichnungsmediumblätter und mit einem Transportsystem um das Aufzeichnungsmedium und das Tintengeberband unabhängig zu der Aufzeichnungsstation zu fördern, dadurch gekennzeichnet, daß das Transportsystem, um das Geberband (5) und das Aufzeichnungsmedium (4) miteinander an einer Stelle vor der Aufzeichnungsstation (10, 11; 11A) in Kontakt zu bringen, einen Geberbandführungsmechanismus im Verlaufsweg des Geberbandes (5) zwischen dem Bandspender (8) und dem Kontaktpunkt umfaßt, wobei der Geberbandführungsmechanismus mindestens eine Rolle (9) aufweist, um welche das Geberband (5) geführt und hinter dem das Aufzeichnungsmedium über das Band (5) an einer Stelle vor der Aufzeichnungsstation (10, 11; 11A) gelegt wird, wobei diese mindestens eine Rolle (9) eine spannungsabsorbierende Rolle (9A, 9B, 9C) um-

faßt, die mit dem Geberband (5) in Berührung steht und eine Drehachse (9B) aufweist, die im wesentlichen senkrecht zur Bandlaufrichtung verläuft und so gelagert ist, daß der Neigungswinkel dieser Drehachse verändert werden kann.

2. Gerät nach Anspruch 1, dadurch gekennzeichnet, daß die spannungsabsorbierende Rolle (9A, 9B, 9C) an einem Träger (9C) befestigt ist, der die Spannungsabsorptionsrolle an beiden Enden drehbar lagert, wobei dieser Träger (9C) im wesentlichen an seinem Mittelpunkt derart schwenkbar aufgehängt ist, daß die Achse der spannungsabsorbierenden Rolle (9A) in beiden Richtungen bezüglich der Ebene des Geberbandes (5) geneigt werden kann, wenn dieses Band durch das Heizelement (5) hindurchtritt.

3. Gerät nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die spannungsabsorbierende Rolle (9A) so befestigt ist, daß mindestens eine begrenzte Bewegung ihrer Achse in Richtung der Bandlaufrichtung des Geberbandes (5) möglich ist.

4. Gerät nach Anspruch 1, dadurch gekennzeichnet, daß das Gerät ferner einen Papieraufnahmebehälter (30) aufweist, um das Aufzeichnungspapier aufzunehmen, sowie einen Schlitz (32) um von Hand Papier einzuführen, und daß das Transportsystem umfaßt:

einen Detektor (25), der das Vorliegen eines von Hand zugeführten Papiers (31) erfaßt,

eine Förderrolle (34), die in einer ersten Richtung dreht, um Aufzeichnungspapier (31) vom Papierbehälter (30) in Richtung der Aufzeichnungsstation (10, 11; 11A) zu fördern, wenn keine manuelle Zufuhr eines Papieres festgestellt wird und die feststeht oder in einer zweiten Richtung dreht, wenn von Hand zugeführtes Papier nachgewiesen wird und

eine Verzögerungsrolle (35), die mit der Zuführrolle (34) in Kontakt steht, wobei die Verzögerungsrolle (35) im wesentlichen stillsteht oder entgegen der Förderrolle (34) dreht, während die Förderrolle sich in der ersten Richtung dreht, um einen Doppeltransport von Papier aus dem Papierbehälter (30) zu verhindern, wobei die Verzögerungsrolle (35) sich nur dann dreht, um von Hand nachgeschobenes Papier zu fördern, wenn von Hand eingeführtes Papier erfaßt wird (Figur 4).

5. Gerät nach Anspruch 4, dadurch gekennzeichnet, daß die Verzögerungsrolle (34) in der zweiten Richtung dreht, wenn von Hand zugeführtes Papier erfaßt wird und daß die Verzögerungsrolle von der Förderrolle (34) angetrieben wird.

6. Gerät nach Anspruch 1, dadurch gekennzeichnet, daß das Transportsystem einen Detektor (38, 39) aufweist, um die Position des Aufzeichnungsmediums an einer vorbestimmten Stelle vor der Aufzeichnungsstation zu erfassen und eine Steuereinheit (54), um den ersten und zweiten Beförderungsmechanismus in Übereinstimmung mit diesem Nachweis zu steuern.

7. Wärmeempfindliche Bildaufzeichnungsvorrichtung nach den Ansprüchen 1 oder 6, dadurch gekennzeichnet, daß der Geberblattspender eine Geberspenderrolle (7) umfaßt, auf die das Geberblatt (5) aufgerollt ist, und daß die Aufzeichnungsvorrichtung weiterhin eine Bremse (78) umfaßt, um die Drehung der Geberspenderrolle (7, 8) zu stoppen, um somit die Spannung des Geberblattes (5) zu erhöhen und dort eine Faltenbildung zu reduzieren.

8. Gerät nach Anspruch 6, dadurch gekennzeichnet, daß der zweite Fördermechanismus ein Geberführungselement (12) umfaßt, um die Richtung des zweiten Weges hinter der Aufzeichnungsstation (10, 11; 11A) abrupt zu ändern, und wobei die Aufzeichnungsvorrichtung ferner ein Trennführungselement (69) nahe an der einen Oberfläche des Geberblattes in der Nähe des Geberführungselementes (12) aufweist, um die Vorlaufkante des Aufzeichnungspapiers daran zu hindern, auf dem zweiten Weg zu folgen (Figur 6).

9. Gerät nach Anspruch 1 oder 6, dadurch gekennzeichnet, daß die Steuereinrichtung (54) den zweiten Beförderungsmechanismus (34, 35) außer Betrieb hält, bis eine erste vorbestimmte Zeitspanne vergangen ist, nach der die Vorlaufkante des Aufzeichnungspapiers (31) von der Nachweiseinrichtung (38, 39) erfaßt ist und den zweiten Beförderungsmechanismus wiederum eine vorbestimmte Zeitspanne außer Kraft setzt, nachdem die Nachlaufkante des Aufzeichnungspapiers (31) von der Erfassungseinrichtung (38, 39) erfaßt worden ist.

10. Gerät nach Anspruch 9, wobei das Aufzeichnungspapier entweder entlang eines ersten oder eines zweiten verschiedenen Weges (40, 42) zur Aufzeichnungsstation gefördert werden kann, dadurch gekennzeichnet, daß der Detektor eine einzelne Nachweiseinrichtung (38, 39) umfaßt, um die Anwesenheit eines Aufzeichnungsblattes (31) an einer ersten Stelle auf dem ersten Weg und um die Anwesenheit eines Aufzeichnungsblattes (31) an einer zweiten Stelle auf dem zweiten Weg nachzuweisen (Figur 5).

11. Gerät nach Anspruch 10, dadurch gekennzeichnet, daß die Zeitspanne, die das Aufzeichnungspapier (31) benötigt, um von der ersten Stelle zur Aufzeichnungsstation (10, 11; 11A) zu gelangen und die Zeitspanne, die das Aufzeichnungspapier (31) benötigt, um von der zweiten Stelle zur Aufzeichnungsstation zu gelangen, im wesentlichen dieselbe ist.

12. Gerät nach Anspruch 11, dadurch gekennzeichnet, daß der erste und zweite Weg mindestens teilweise von entsprechenden Führungselementen (36; 43) festgelegt wird, die Öffnungen (47) aufweisen, und daß die einzelne Nachweiseinrichtung (38, 39) ein lichtemittierendes Element (38) umfaßt, um Licht entlang eines Lichtweges durch die Öffnung hindurch zu schicken und sowohl den ersten als auch den zweiten Weg durchquert und mit einem Lichtnachweiselement (39), um das Auf-

zeichnungspapier in Abhängigkeit der Anwesenheit oder Abwesenheit von empfangenem Licht festzustellen (Figur 5 und 6).

13. Gerät nach irgendeinem der Ansprüche 1 oder 2, 4 bis 6, 8 oder 10 bis 12, dadurch gekennzeichnet, daß der Aufzeichnungsmediumspender ein Aufzeichnungspapierbehälter (30) ist, der sich schräg von der Oberfläche eines Gehäuses (81) erstreckt, daß der Tintengeberblattspender eine Geberspenderrolle (8) ist, die in dem Gehäuse (81) unterhalb dem Behälter (30) angeordnet ist, daß die Aufzeichnungsstation (10, 11; 11A) am unteren Ende des Behälters (30) eine Rückenrolle (10) umfaßt, um das Aufzeichnungspapier und das Geberblatt (5) über ein Heizelement (11) zur Bildaufzeichnung zu führen und daß das Aufzeichnungsgerät einen Entnahmebehälter (41) hat, der oberhalb des Behälters (30) angeordnet ist, wobei der Entnahmebehälter (41) das Aufzeichnungspapier (31) so aufnimmt, daß die Aufzeichnungsseite nach oben schaut, nachdem sie über die Aufzeichnungsstation geführt worden ist (Figur 6 und 8).

14. Gerät nach Anspruch 13, dadurch gekennzeichnet, daß der Spalt (31) um von Hand Papier nachzulegen, zwischen dem Behälter (30) und dem Entnahmebehälter (41) ausgebildet ist.

15. Gerät nach Anspruch 14, dadurch gekennzeichnet, daß die Spannungsversorgung für dieses Gerärt außerhalb des Gehäuses (81) angeordnet ist.

Revendications

1. Un appareil d'enregistrement à transfert thermique du type comprenant un poste d'enregistrement (10, 11; 11A) à travers lequel on fait passer un support d'enregistrement (4) et un film donneur d'encre (5) qui porte une encre du type à transfert thermique sur l'une de ses faces, pendant qu'ils sont en contact entre eux, et dans lequel ledit film donneur est chauffé sélectivement dans ledit poste d'enregistrement pour transférer de l'encre dudit film donneur audit support d'enregistrement, pour enregistrer ainsi une image, cet appareil comprenant une première source (8) débitant ledit film donneur d'encre du type à transfert thermique, une deuxième source (31; 85) de feuilles séparées dudit support d'enregistrement et un système de transport servant à transporter indépendamment ledit support d'enregistrement et ledit film donneur d'encre jusqu'audit poste d'enregistrement, caractérisé en ce que, pour mettre ledit film donneur (5) et ledit support d'enregistrement (4) en contact entre eux en un point situé en amont dudit poste d'enregistrement (10, 11; 11A), ledit système de transport comprend un mécanisme (9; 67) de guidage du film donneur placé dans le passage de défilement dudit film donneur (5) entre ladite source de film (8) et ledit point de contact, ledit mécanisme de guidage du film donneur comprenant au moins un rouleau (9) sur lequel ledit film donneur (5) passe et en aval duquel ledit support d'enregistrement (4) se superpose audit film (5) en un point placé en amont dudit d'enregistrement (10, 11; 11A), ledit rouleau (9) comprenant un rouleau (9A, 9B, 9C) d'absorption des tensions placé en contact avec ledit film donneur (5) et qui possède un axe de rotation (9B) sensiblement perpendiculaire à la direction de défilement du film et est supporté de telle manière que l'angle d'inclinaison de cet axe de rotation puisse varier.

2. Un appareil d'enregistrement à transfert thermique comme défini dans la revendication 1, caractérisé en ce que le rouleau d'absorption des tensions (9A, 9B, 9C) est monté par l'intermédiaire d'un élément support (9C) qui supporte ledit rouleau d'absorption des tensions à chacune de ses extrémités avec possibilité de rotation, ledit élément support (9C) étant monté pivotant sensiblement en son centre, de sorte que l'axe dudit rouleau d'absorption des tensions (9A) peut s'incliner dans l'un ou l'autre sens par rapport au plan dudit film donneur (5) lorsque ledit film passe sur ledit élément thermique (11).

3. Un appareil d'enregistrement à transfert thermique comme défini dans la revendication 1 ou 2, caractérisé en ce que ledit rouleau d'absorption des tensions (9A) est monté d'une façon qui permet un mouvement au moins limité de son axe dans la direction du défilement dudit film donneur (5).

4. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 1, caractérisé en ce que ledit appareil comprend en outre une trémie à papier (30) destinée à contenir le papier d'enregistrement (31) et une fente d'introduction manuelle (32) permettant d'introduire manuellement le papier et en ce que ledit système de transport comprend: un détecteur (25) destiné à détecter la présence de papier (31) fourni manuellement; un rouleau d'avance (34) qui tourne dans un premier sens pour transporter le papier d'enregistrement (31) de ladite trémie à papier (30) vers ledit poste d'enregistrement (10, 11; 11A) lorsqu'aucun papier fourni manuellement n'est détecté et qui est fixe ou capable de tourner dans un deuxième sens lorsque du papier fourni manuellement est détecté; et un rouleau de freinage (35), placé en contact avec ledit rouleau d'avance (34), ledit rouleau de freinage (35) étant sensiblement fixe ou tournant contre ledit rouleau d'avance (34) pendant la rotation dudit rouleau d'avance dans ledit premier sens pour éviter le transport de feuilles doubles de papier à partir de ladite trémie à papier (30), ledit rouleau de freinage (35) tournant pour transporter ledit papier fourni manuellement uniquement lorsque du papier introduit manuellement est détecté.

5. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 4, caractérisé en ce que ledit rouleau

d'avance (34) tourne dans ledit deuxième sens lorsque du papier fourni manuellement est détecté et en ce que ledit rouleau de freinage (35) est entraîné par ledit rouleau d'avance (34).

6. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 1, caractérisé en ce que ledit système de transport comprend: un détecteur (38, 39) destiné à détecter la position dudit support d'enregistrement en un emplacement prédéterminé situé en amont dudit poste d'enregistrement (10, 11) et un contrôleur (54) destiné à actionner ledit premier et ledit deuxième mécanismes de transport en fonction de ladite détection.

7. Un dispositif d'enregistrement d'images thermosensible comme défini dans la revendication 1 ou 6, caractérisé en ce que ladite source de feuilles donneuses comprend une bobine (7) formant source de donneur sur laquelle ladite feuille donneuse (5) est enroulée, ledit dispositif d'enregistrement comprenant en outre des moyens de freinage (78) destinés à freiner la rotation de ladite bobine (7, 8) formant source de donneur, pour accroître ainsi la tension de ladite feuille donneuse (5) et réduire la formation de plis dans cette feuille.

8. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 6, caractérisé en ce que ledit deuxième mécanisme de transport comprend un élément de guidage du donneur (12) destiné à modifier brusquement la direction dudit deuxième passage en aval dudit poste d'enregistrement (10, 11; 11A), ledit dispositif d'enregistrement comprenant en outre un élément de guidage séparateur (39) proche de ladite première surface de ladite feuille donneuse dans le voisinage dudit élément de guidage (12) du donneur, et destiné à coopérer avec le bord avant dudit papier d'enregistrement (31) pour empêcher ledit papier d'enregistrement de suivre ledit deuxième passage.

9. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 1 ou 6, caractérisé en ce que lesdits moyens de commande (54) maintiennent ledit deuxième mécanisme de transport (34, 35) hors d'action jusqu'à la fin d'une première période prédéterminée qui fait suite à l'instant où le bord avant dudit papier d'enregistrement (31) a été détecté par ledit moyen de détection (38, 39) et met à nouveau hors d'action ledit deuxième mécanisme de transport un deuxième temps prédéterminé après que le bord arrière dudit papier d'enregistrement (31) a été détecté par lesdits moyens de détection (38, 39).

10. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 9, dans lequel le papier d'enregistrement peut être avancé jusqu'audit poste d'enregistrement le long de l'un d'au moins un premier et un deuxième passages différents (40, 42), caractérisé en ce que ledit détecteur comprend un moyen de détection unique (38, 39) pour détecter la présence d'une feuille d'enregistrement (31) en une première position dans ledit premier passage et pour détecter la présence d'une feuille d'enregistrement (31) en une deuxième position dans ledit deuxième passage.

11. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 10, caractérisé en ce que le temps demandé par un papier d'enregistrement (31) pour passer de ladite première position audit poste d'enregistrement (10, 11; 11A) et le temps demandé par un papier d'enregistrement (31) pour passer de ladite deuxième position audit poste d'enregistrement sont sensiblement égaux.

12. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 11, caractérisé en ce que lesdits premier et deuxième passages sont définis au moins en partie par des éléments de guidage respectifs (36; 43) présentant des ouvertures (47) et que ledit moyen de détection unique (38, 39) comprend un élément émetteur de lumière (38) destiné à émettre de la lumière le long d'un trajet optique qui passe à travers lesdites ouvertures (47) et traverse chacun desdits premier et deuxième passages, et un élément récepteur de lumière (39) destiné à détecter la position du papier d'enregistrement en fonction de la présence ou de l'absence de lumière reçue.

13. Un appareil d'enregistrement à transfert thermique comme revendiqué dans l'une quelconque des revendications 1 ou 2, 4 à 6, 8 ou 10 à 12, caractérisé en ce que: ladite source de support d'enregistrement est une trémie à papier d'enregistrement (30) qui s'étend obliquement sur un carter (81) à partir de la face supérieure de ce dernier; ladite source de feuilles donneuses d'encre est une bobine (8) formant source de donneur disposée dans ledit carter (81) au-dessous de ladite trémie (30); ledit poste d'enregistrement (10, 11; 11A) comprend un rouleau d'appui (10) adjacent à l'extrémité inférieure de ladite trémie (30), servant à faire passer ledit papier d'enregistrement (31) et ladite feuille donneuse (5) sur un élément thermique (11) pour effectuer l'enregistrement des images; et ledit appareil d'enregistrement comprend une trémie de sortie (41) disposée au-dessus de ladite trémie (30), ladite trémie de sortie (41) recevant ledit papier d'enregistrement (31) avec sa face enregistrée dirigée vers le haut après sont passage à travers ledit poste d'enregistrement.

14. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 13, caractérisé en ce qu'une fente (31) destinée à introduire le papier fourni manuellement est formée entre ladite trémie (30) et ladite trémie de sortie (41).

15. Un appareil d'enregistrement à transfert thermique comme revendiqué dans la revendication 14, caractérisé en ce qu'une alimentation en puissance prévue pour ledit appareil est disposée à l'extérieur dudit carter.

FIG. 1

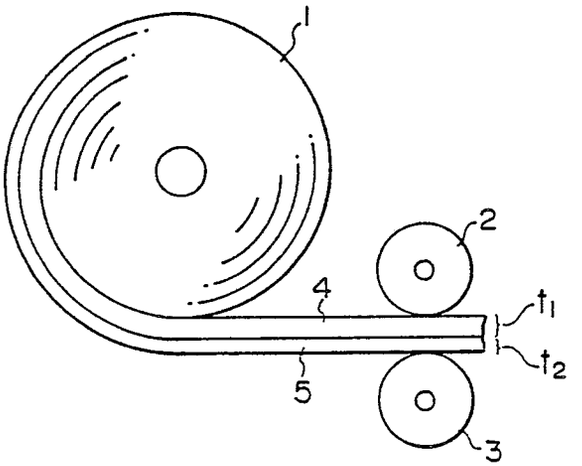


FIG. 2

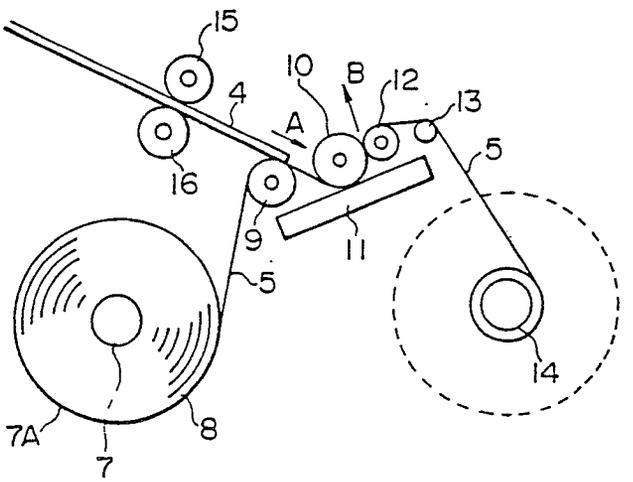


FIG. 3

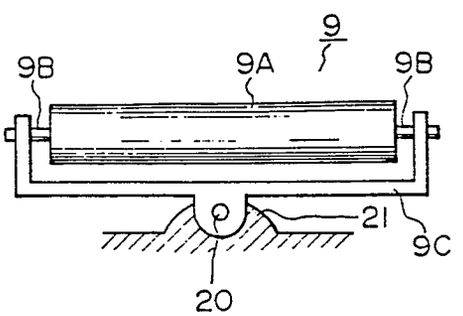


FIG. 4

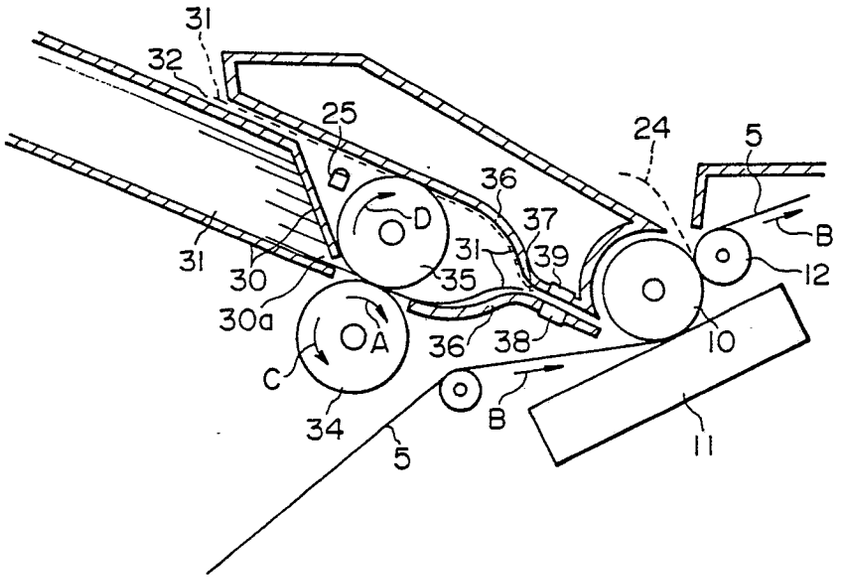

31
32
25
24
5
36
37
D
31
39
B
12
31
30
35
30a
A
36
38
10
C
34
B
11
5

FIG. 5

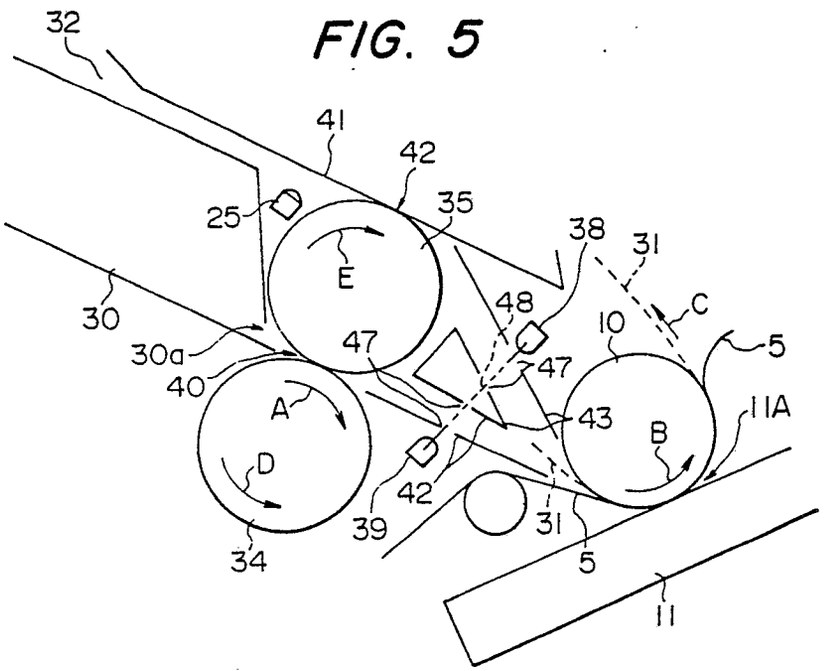

32
41
42
25
35
38
31
E
48
C
30
10
30a
47
47
5
40
A
43
11A
D
42
B
39
31
34
5
11

FIG. 6

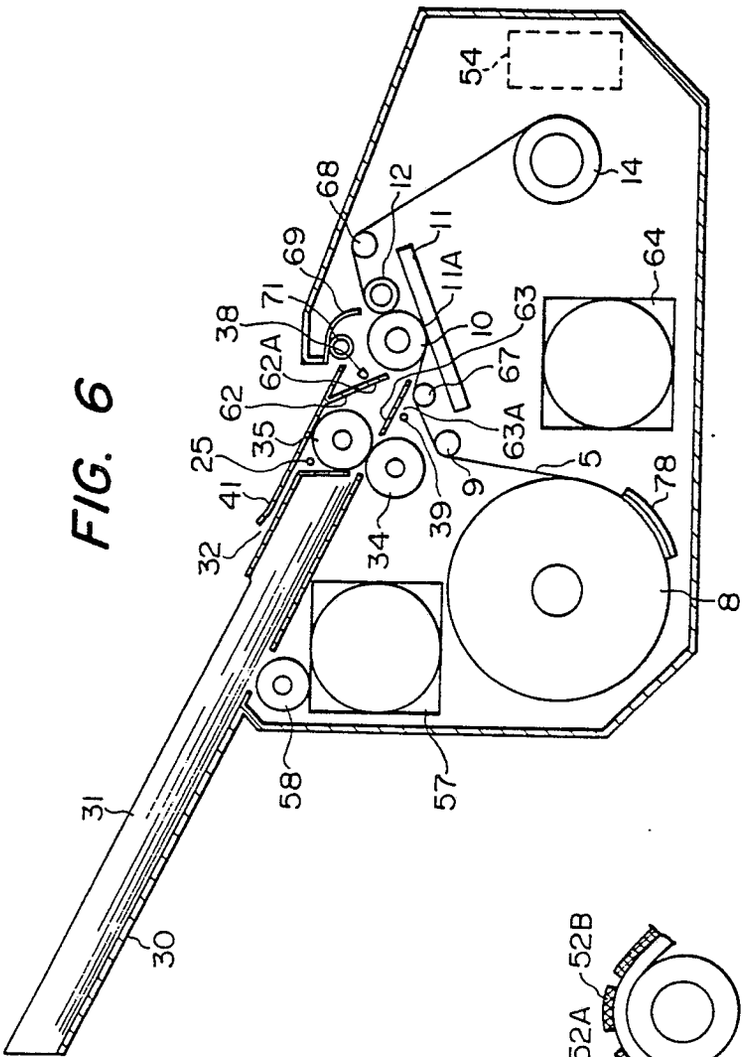

54
14
68
12
11
11A
69
71
38
62A
62
35
25
41
32
34
39
9
10
63
67
63A
64
5
78
8
31
30
58
57

FIG. 7

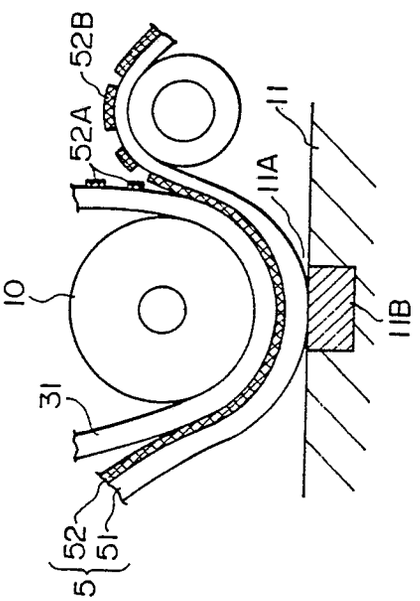

52B
52A
11
11A
11B
10
31
52
51
5

FIG. 9

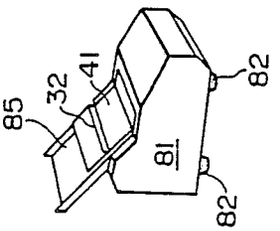

85
32
41
81
82
82

FIG. 8

14
82
5
68
11
12
10
92
41
67
90
35
20
25
9
9C
8
5
89
34
82
86
32
88
91
58
81
85