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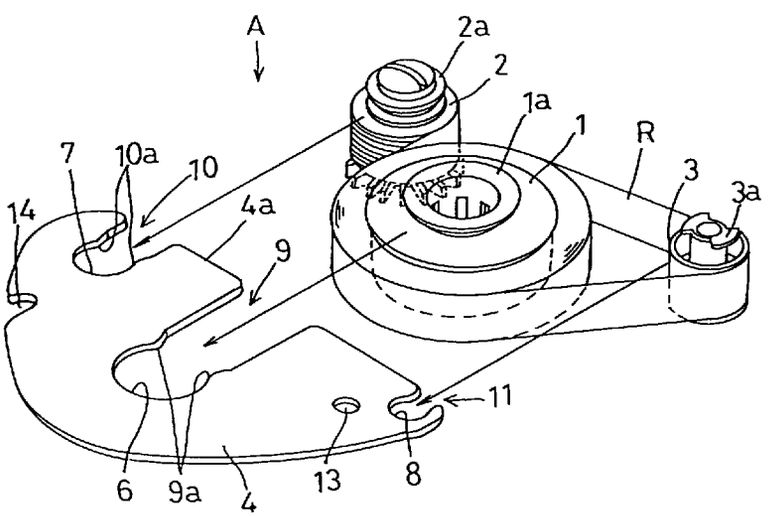
(54) Film transfer apparatus

(57) A film transfer apparatus includes a feed core (1) and a take-up core (2) between and about which there is entrained a transfer ribbon (R) including on one side thereof a transfer film, a transfer head (3) for transferring, by pressing, the transfer film of the transfer ribbon (R) fed from the feed core (1) on to a transfer target surface, a holder (4) to which the feed and take-up cores (1,2) and the transfer head (3) are attached, a transfer ribbon cassette including the holder (4), and a casing detachably mounting the transfer ribbon cassette. Each of the respective cores (1,2) is rotatably supported, via one end thereof in the direction of ribbon width, to the holder (4). The transfer head (3) is also supported, via one end thereof in the ribbon width direction, to this holder (4). The casing includes core support portions for rotatably supporting the respective cores and a head support portion for supporting the transfer head (3), when the holder (4) is attached to the casing.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to a film transfer apparatus including a transfer ribbon cassette detachably attached to a casing, the cassette having a feed core and a take-up core between and about which there is entrained a transfer ribbon including on one side thereof a transfer film such as a letter correction film, a bonding adhesive film, an ornamental coloring film or the like, and a transfer head for transferring, by pressing, the transfer film of the transfer ribbon fed from the feed core on to a transfer target surface, with the feed and take-up cores and the transfer head being attached to a holder.

2. DESCRIPTION OF THE RELATED ART

As shown in Fig. 12, a holder 06 of a transfer ribbon cassette 07 to be detachably attached to a casing (not shown) is constructed as a box-like member including a pair of right and left plate members 04, 04 fixedly connected with each other via spacers 05 with a predetermined distance therebetween corresponding to the ribbon width. And, the opposed ends of a feed core 02, a take-up core 03 and of a transfer head 01 in the ribbon width direction are supported respectively between the two plate members 04, 04.

With the transfer ribbon cassette 07 having the above-described construction, when an entire ribbon R entrained between the feed core 02 and the take-up core 03 has been used up, this used ribbon cassette is replaced by a new transfer ribbon cassette, and only the casing incorporating such components as the coupling mechanism for the two cores 02. 03 is used repeatedly.

Further, in the case of this conventional film transfer apparatus, the three elements, i.e. the feed core 02, the take-up core 03 and the transfer head 01 are supported via respective both ends thereof to the box-like holder 06. Hence, a lot of material is needed for the manufacture of this holder 06. Besides, this holder 06 per se needs to be composed of a great number of elements, and also the assembly of the feed core 02, take-up core 03 and the transfer head 01 to the holder 06 is rather troublesome. For these reasons, the manufacture cost of the transfer ribbon cassette 07 is high, thus inviting increase of running costs of the film transfer apparatus.

The present invention attends to the above-described state of the art, and its object is to provide a film transfer apparatus of lower running costs than the convention, through an ingenious arrangement in the supporting construction of the feed core, take-up core and the transfer head.

SUMMARY OF THE INVENTION

For accomplishing the above object, according to the present invention, a film transfer apparatus includes a transfer ribbon cassette detachably attached to a casing, the cassette having a feed core and a take-up core between and about which there is entrained a transfer ribbon including on one side thereof a transfer film, and a transfer head for transferring, by pressing, the transfer film of the transfer ribbon fed from the feed core on to a transfer target surface, with the feed and take-up cores and the transfer head being attached to a holder; wherein each of said respective cores is rotatably supported, via one end thereof in the direction of ribbon width, to said holder; said transfer head is supported, via one end thereof in the ribbon width direction, to said holder; and said casing includes core support portions for rotatably supporting the respective cores and a head support portion for supporting the transfer head.

With the above-described construction, the casing includes the core support portions for the two cores and the head support portion for the transfer head. Accordingly, even if the holder per se only temporarily supports the cores and the head only via the respective one-side ends thereof, the cores and the head may be reliably supported when this holder is attached to the casing. Therefore, it is unnecessary to construct the holder as a box-like member for supporting the cores and the transfer head via the two ends thereof respectively.

As a result, it becomes possible to simplify the construction of the holder per se of the film transfer ribbon cassette. Further, this simplified construction serves to reduce the material cost, facilitate the manufacture and also to improve the efficiency of the assembly operations of the two cores and the transfer head. Consequently, the running costs may be reduced, in comparison with the conventional construction.

According to one aspect of the invention, the holder is constructed as a plate-like member which defines a feed core holding bore, a take-up core holding bore and a transfer head holding bore for loosely holding the respective one end of the cores and of the transfer head in the ribbon width direction.

In the case of this construction, the construction requires only that the holder be formed like a plate-like member which defines the respective holding bores. Then, as compared with a further construction in which the holder includes at one side thereof boss portions as projections for supporting the respective one-side ends of the cores and transfer head, the above construction of the holder is more simple.

According to a still further aspect of the invention, the holder is formed by e.g. an injection molding process. In this case, the cavity of the mold may be very simple, such that the manufacture cost of the mold may be advantageously reduced.

According to a still further aspect of the invention, the holding bores are opened to the outside along a same direction relative to an outer peripheral edge of the

holder so as to allow engagement and disengagement of the cores and transfer head from the outer peripheral edge of the holder.

In this case, the assembly operations of the two cores and the transfer head to the respective holding bores of the holder may be facilitated, since the respective holding bores are opened in the same direction and the assembly operations may be effected simply by press-fitting of the cores and head from the outer peripheral edge of the holder.

Consequently, the efficiency of assembly operations of the cores and head to the holder may be further facilitated. And, this is advantageous also when the assembly operations are to be effected in an automated manner.

According to a still further aspect of the invention, the holder having the respective holding bores is formed by a plate punching process.

In this case, in comparison with the further case where the holder is formed by an injection molding process, it is easier to reduce the manufacture equipment costs such as of the mold.

As a result, through the reduction of the manufacture equipment costs such as of the mold for forming the holder, the reduction of the running costs may be further promoted.

Preferably, the holder may be formed of a plate made of paper or pulp.

In this case, since the holder is formed of a plate made of paper or pulp, it is possible to employ such advantageous manufacturing method as the punching. This construction has the further advantages of allowing direct printing on the surface of the holder and of allowing reduction of a resin material to be used for forming the transfer ribbon cassette.

Consequently, through the combined effect due to the possibility of employment of advantageous manufacturing method and unnecessity of separately providing a label or the like printed with the product name, model name or the like of the ribbon cassette, the running costs may be still further reduced. This construction has yet another advantage of restricting the amount of combustion heat and toxic gas generation when the transfer ribbon after its use is disposed of by incineration.

Further and other objects, features and effects of the invention will become more apparent from the following more detailed description of the embodiments of the invention with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of a film transfer ribbon cassette,

Fig. 2 is a horizontal section showing a condition in which the transfer ribbon cassette is detached from a casing,

Fig. 3 is a horizontal section showing a condition in which the transfer ribbon cassette is attached to the casing,

Fig. 4 is a vertical section showing the condition in which the transfer ribbon cassette is attached to the casing,

Fig. 5 is a front view showing a condition in which the casing is opened,

Fig. 6 is a perspective view showing an in-use condition,

Fig. 7 is a perspective view showing a holder according to a further embodiment,

Fig. 8 is a section view showing a condition in which the holder of Fig. 7 and a feed core are being assembled to each other,

Fig. 9 is a perspective view showing a holder according to a still further embodiment,

Fig. 10 is a section view showing a condition in which the holder of Fig. 9 is loosely engaged with the feed core,

Fig. 11 is an exploded perspective view showing a still further embodiment, and

Fig. 12 is a perspective view showing the prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of a film transfer apparatus relating to the present invention will now be described in details with reference to the accompanying drawings.

Figs. 3 and 4 show a film transfer apparatus including a transfer ribbon cassette A detachably attached in a casing C made of resin. In the transfer ribbon cassette A, as shown in Figs. 1 and 2, a transfer ribbon R having on one side thereof a bonding adhesive film D (see Fig. 6) as an example of a transfer film is entrained, with the adhesive layer D being oriented to the outer side, between a feed core 1 made of resin and a take-up core 2 made of resin through a transfer roller 3 made of resin as an example of a transfer head for transferring, by pressing, the adhesive film D of the ribbon R on to a transfer-target surface B. And, these cores 1, 2 and the transfer roller 3 are supported to a holder 4 formed by punching of a flat plate of coated paper as an example of a plate member made of paper material.

The cores 1, 2 and the transfer roller 3 respectively and integrally include cylindrical rotary shafts 1A, 2A, 3A. Further, on outer peripheral faces of the respective rotary shafts 1A, 2A, 3A at the one-side end thereof, there are integrally formed flange portions 1a, 2a, 3a forming annular grooves to be used for attachment to the holder 4.

The holder 4, as shown in Fig. 5, has an outer shape extending approximately along an inner periphery of the casing C in which the holder is to be attached. Further, a feed core holding bore 6, a take-up core holding bore 7 and a transfer roller holding bore 8 are defined, in the form of circular holes, through this holder 4 for rotatably holding the one-side ends of the cores 1, 2 and the transfer roller 3, respectively, with the holder being fitted therethrough into annular grooves formed between the respective flanges 1a, 2a, 3a and the respective end

faces 1b, 2b, 3b of the cores 1, 2 and of the transfer roller 3.

The feed core holding bore 6 has a diameter which is smaller than the maximum outer diameter of the flange portion 1a of the feed core 1 and which is larger than the outer diameter of the annular groove thereof.

Further, the take-up core holding bore 7 has a diameter which is smaller than the maximum outer diameter of the flange portion 2a of the take-up core 2 and which is larger than the outer diameter of the annular groove thereof. The transfer roller holding bore 8 has a diameter which is smaller than the maximum outer diameter of the flange portion 3a of the transfer roller 3 and which is larger than the outer diameter of the annular groove.

The respective holding bores 6, 7, 8 co-extensively define, as cutouts, a feed-core guide passage 9, a take-up core guide passage 10 and a transfer roller guide passage 11, with the passages 9, 10, 11 extending substantially in parallel with each other along the respective holding bores 6, 7, 8 and one side edge 4a of the outer periphery of the holder 4. Hence, the respective holding bores 6, 7, 8 are opened to the outside in the same direction relative to the outer peripheral edge of the holder 4.

The feed core guide passage 9 has a passage width which is substantially same as the diameter of the feed core holding bore 6. In this guide passage 9 at a portion thereof adjacent the holding bore 6, the holder 4 integrally forms opposing projections 9a projecting into the passage thereby to render the passage width at this portion narrower than the outer diameter of the annular groove of the feed core 1.

Like the feed core guide passage 9, the take-up core guide passage 10 too has a passage width which is substantially same as the diameter of the take-up core holding bore 7. In this guide passage 10 at a portion thereof adjacent the holder bore 7, the holder 4 integrally forms opposing projections 10a projecting into the passage thereby to render the passage width at this portion narrower than the outer diameter of the annular groove of the take-up core 2.

Then, when the respective cores 1, 2 are pressed, by a pressing force over a predetermined magnitude, into the core holding bores 6, 7 along the plate face of the holder 4 while sliding the annular groove formed between one end face 1b and the flange portion 1a of the feed core 1 and the annular groove formed between one end face 2b and the flange portion 2a of the take-up core 2 along the feed core guide passage 9 and the take-up core support passage 10 respectively, then, the passage width between the opposing projections 9a is extended by its pressed-contact with the outer peripheral face of the annular groove of the feed core 1 and also the passage width between the opposing projections 10a is extended by its pressed-contact with the outer peripheral face of the annular groove of the take-up core 2, thereby to allow engagement of the respective rotary shafts 1A, 2A into the holding bores 6, 7. As a result, the respective cores 1, 2 are loosely and rotatably held by the holder 4 via the respective one-side ends thereof.

When the cores 1, 2 are loosely held by the holder 4, the respective projections 9a, 10a substantially restore their original shapes due to their own resilience. Accordingly, unless the cores 1, 2 are subjected to a force beyond a predetermined magnitude in the withdrawing direction, inadvertent withdrawal of each core 1, 2 from the holder 4 may be effectively prevented.

The transfer roller guide passage 11 has a passage width which is slightly smaller than the diameter of the transfer roller holding bore 8. Then, when the annular groove between the one end face 3b and the flange portion 3a of the transfer roller 3 is pressed into the transfer roller holding bore 8 by a force over a predetermined magnitude along the plate face of the holder 4 relative to the guide passage 11, the passage width is extended by its pressed-contact with the outer peripheral face of the annular groove of the transfer roller 3, thereby to allow introduction of the rotary shaft 3A into the transfer roller holding bore 8. As a result, the transfer roller 3 is loosely and rotatably held by the holder 4 via the one end thereof.

When the transfer roller 3 is loosely held by the holder 4, the passage width of the transfer roller guide passage 11 substantially restores its original shape or width to the resilience of the holder 4 per se. Accordingly, unless the transfer roller 3 is subjected to a force beyond a predetermined magnitude in the withdrawing direction, inadvertent withdrawal of the roller 3 from the holder 4 may be effectively prevented.

Incidentally, a corner portion between the one peripheral edge 4a of the holder 4 and each of side edges forming the respective guide passages 9, 10, 11 is chamfered in the form of arc, so that the each of the guide passages 9, 10, 11 has an increasing passage width toward the one side edge 4a of the holder 4. Thus, these chamfered portions are constructed as introduction guide portions for guiding introduction of the rotary shafts 1A, 2A, 3A of the cores 1, 2 and transfer roller 3 into the respective guide passages 9, 10, 11.

The holder 4 further defines a through hole 13 and a cutout groove 14 for respectively engaging two projections 12 formed on the casing C so as to fix the holder 4 in position relative to the casing C in the direction of plate face of the holder 4. Further, the casing C includes a window 15 for allowing visual confirmation of a remaining amount of unused transfer ribbon R wound about the feed core 1 through the feed core guide passage 9 when the holder 4 is attached in the casing C.

As shown in Figs. 2 through 5, the casing C consists of a main case portion C1 and a cover case portion C2 which are connectable to each other in the ribbon width direction. A plate-like interconnecting portion between these two case portions C1, C2 is formed thin to provide a pivotable hinge 16 via which the case portions C1, C2 are pivotable relative to each other.

Inside the main case portion C1, there are formed a feed core support portion 20 including a tubular shaft 18 and a feed-core support shaft 19 rotatably mounting this tubular shaft 18, a take-up core support portion 23 comprising a take-up core support shaft 21 and a head sup-

port portion 25 comprising a transfer roller support shaft 24 having a projection 24a at a leading end. Then, when the holder 4 is attached to the casing C, the rotary shaft 1A of the feed core 1 is mounted on the tubular shaft 18 to be rotatable therewith, the rotary shaft 2A of the take-up core 2 is rotatably mounted on the take-up core support shaft 21 and the rotary shaft 3A of the transfer roller 3 is rotatably mounted on the transfer roller support shaft 24.

The feed core tubular shaft 18 integrally forms a large gear 26 and the take-up core 2 integrally forms a small gear 27. Then, a gear coupling mechanism 28 is provided for associating rotation of the feed core 1 and rotation of the take-up core 2 with each other through meshing of these gears 26, 27 such that the used transfer ribbon R is taken up about the take-up core 2 in association with feeding of the ribbon R by the rotation of the feed core 1.

Further, for assuring reliable winding of the used transfer ribbon R, the gear diameters 26, 27 of the gear coupling mechanism 28 are set in such a manner that the take-up core 2 provides a ribbon take-up speed faster than a ribbon feed speed provided by the feed core 1 even when the winding diameter of the ribbon R becomes small relative to the feed core 1. Moreover, an excessive tension produced due to the difference between the ribbon feed speed and the ribbon take-up speed is intermittently absorbed by slippage between the large gear 26 of the feed core and the small gear 27 of the take-up core. More particularly, when a meshing force beyond a predetermined magnitude is applied between a tooth 26a of the large gear 26 and a tooth 27a of the small gear 27 from the excessive tension on the transfer ribbon R, the tooth 27a of the small gear 27 capable of elastic deformation becomes elastically deformed in the meshing-releasing direction (to the downstream side in the rotational direction of the small gear 27), such that the meshing between the teeth 26a, 27a is released to break the force transmission between the gears 26, 27. This arrangement constitutes a slip mechanism for intermittently absorbing the difference between the ribbon feed speed and the ribbon take-up speed.

Incidentally, a member denoted with a reference numeral 30 comprises a contact piece formed integrally with the main case portion C1 and adapted for contacting a lower face (the side face facing the main case portion C1) of the holder 4 to prevent flexion thereof toward the main case portion C1 when the holder 4 is attached to the casing C.

As shown in Figs. 4 and 5, on the outer peripheral faces of the two case portions C1, C2, there are respectively formed lock elements 31, 32 for locking these case portions C1, C2 at the mutually closed position. In the condition shown in Fig. 4, the locking may be released by moving the lock elements 31, 32 relative to each other in a direction for opening the case portions C1, C2.

Next, mounting and dismounting operations of the film ribbon cassette A will be described.

As illustrated in Fig. 2, the casing C is opened and the projections 12 formed on the main body portion C1 are fitted into the through hole 13 and the cutout groove 14 of the holder 4. With this, while the transfer ribbon cassette A is fixed in position relative to the main case portion C1, the respective cores 1, 2 are mounted, from the free ends thereof, onto the tubular shafts 18, 19 and the transfer roller 3 is mounted on the support shaft 24 of the head support portion 25. This completes mounting of the transfer ribbon cassette A to the main body portion C1.

From the above condition, when the cover case portion C2 is closed, the leading end of the rotary shaft 2A of the take-up core 2 becomes exposed to the outside of the casing C through a through hole 35 defined in this cover case portion C2 and also the projection 24a formed on the leading end of the support shaft 24 is inserted into a through hole 36 defined in the cover case portion C2, whereby the support shaft 24 is held and supported via the opposed ends thereof between the two case portions C1, C2.

Incidentally, the rotary shaft 2A of the take-up core 24 defines a single line of operation groove, such that by rotating the rotary shaft 2A with a coin, a minus driver or the like a slack portion of the film transfer ribbon R may be forcibly wound about the take-up core 2.

When the ribbon cassette A is attached to the casing C, the support shaft 24 is supported via the opposed ends thereof. Thus, when the transfer roller 3 is subjected to a relatively large pressing force in the radial direction, elastic deformation hardly occurs in this support shaft 24, whereby the shaft 24 may reliably support the rotating transfer roller 3 to a predetermined posture.

As shown in Fig. 6, with the film transfer apparatus of the present invention having the transfer ribbon cassette A attached to the casing C, in association with rotation of the transfer roller 3 with the adhesive film D of the transfer ribbon R being pressed against the transfer-target surface B, the feed core 1 is rotated to feed the film transfer ribbon R, so that the adhesive film D is transferred on to the target surface B and the used ribbon R is taken up about the take-up core 2.

After the entire ribbon R has been used, the lock elements 31, 32 are released from the locked state to allow the cover case portion C2 to be pivotably opened relative to the main case portion C1. Then, the used ribbon cassette A is dismounted from the main case portion C1 to be replaced by a new ribbon cassette having an un-used film transfer ribbon R wound on its feed core 1.

Next, other embodiments of the invention will be described.

(1) In the foregoing embodiment, the guide passages 9, 10, 11 are formed as cutouts extending between the holding bores 6, 7, 8 and the one side edge 4a of the outer periphery of the holder 4, in order to allow loose insertion and holding of the respective one side ends in the ribbon width direction of the feed core 1, take-up core 2 and the trans-

fer roller 3 into and at the feed core holding bore 6, take-up core holding bore 7 and the transfer roller holding bore 8 of the holder 4. An alternate construction is possible as shown in Figs. 7 and 8. In this, along the the peripheral edge of the respective holding bores 6, 7, 8, there are defined a plurality of slits 35 extending in the radial direction as shown in Fig. 7. Also, the outer peripheral faces of the flange portions 1a, 2a, 3a formed on one side ends in the ribbon width direction of the respective cores 1, 2 and transfer roller are formed as tapered faces 29.

A method of attaching the cores 1, 2 and transfer roller 3 to the respective holding bores 6, 7, 8 in the case of the above construction will be described next. Fig. 8 shows a condition in middle of an attaching operation of the feed core 1 to the feed core holding bore 6. Referring to this figure, when the flange portion 1a of the feed core 1 is pressed into the feed core holding bore 6, the inner peripheral edge of this holding bore 6 is radially extended by being pushed by the tapered face 29, such that, due to the presence of the slits 35, the bore 6 is elastically enlarged to allow passage of the flange portion 1a through the feed core holding bore 6. Then, after this passage of the flange portion 1a through the feed core holding bore 6, the radially extended inner peripheral edge of the feed core holding bore 6 elastically resiles to retain the feed core 1 to the holder 4 to prevent withdrawal of the core from this holder 4.

Incidentally, the flange portions 2a, 3a of the take-up core 2 and the transfer roller 3 have the same construction as the above-described construction of the flange portion 1a of the feed core 1. Hence, attachments of the take-up core 2 and transfer roller 3 to the respective holding bores 7, 8 too may be effected in the same manner as that of the feed core 1 to the feed core holding bore 6.

(2) A still further embodiment will be described next.

In the above further embodiment, the slits 35 are defined along the peripheral edges of the respective holding bores 6, 7, 8. Instead of this, a further construction is possible as shown in Figs. 9 and 10. In this further construction, the holding bores 6, 7, 8 are formed as simple circular through bores as shown in Fig. 9. Whereas, at each one side end in the ribbon width direction of the feed core 1, take-up core 2 and transfer roller 3, there are formed a plurality of stopper pieces 37 which are elastically deformable in the radial direction to be fitted into the respective holding bores 6, 7, 8.

(3) A still further embodiment will be described next.

In the foregoing embodiment, the small gear 27 and the take-up core 2 are formed integrally with each other. And, when the transfer ribbon cassette A is attached to the casing C, the rotary shaft 2A of the take-up core 2 is rotatably mounted on the feed core support shaft 21 constituting the feed core support portion 23 formed integrally within the main case portion C1. Fig. 11 shows an alternate construction. As shown, the small gear 27 and the take-up core 2 are provided as two separate members, the one end of the take-up core 2 in the ribbon width direction is held by the holder 4, and a tubular shaft 38 including the small gear 27 is rotatably mounted on the take-up core support shaft 21 formed integrally in the main case portion C1. So that, the tubular shaft 38 and the take-up core support shaft 21 together constitute the take-up core support portion 23 for rotatably supporting the take-up core 2 when the transfer ribbon cassette A is attached to the casing C.

In this case, inside the rotary shaft 2A of the take-up core 2, there are formed a support shaft bearing bore 39 into which the leading end of the take-up core support shaft 21 is rotatably inserted when the take-up core 2 is supported to the take-up core support portion 23, and four stopper pieces 41 for engagement with an uneven face 40 defined in the outer periphery of the tubular shaft 38 thereby to cause the take-up core 2 to be rotated in unison with the tubular shaft 38.

In this embodiment, the uneven face 40 and the stopper pieces 41 together constitute the slip mechanism. That is, the difference between the ribbon feed speed and the ribbon take-up speed is absorbed through slippage which occurs as a result of release of the engagement between the uneven face 40 and the stopper pieces 41 due to elastic radially extending deformation of the four stopper pieces 41.

As shown in Fig. 11, the casing C consists of the main case portion C1 and the cover case portion C2 which may be detached from each other at the middle position in the ribbon width direction and attached to each other in the ribbon width direction. Further, the transfer roller support shaft 24 constituting the head support portion 25 for rotatably supporting the transfer roller 3 includes two separate parts, i.e. a first support shaft 42 formed integrally with the main case portion C1 and a second support shaft 43 formed integrally with the cover case portion C2.

(4) In the above-described respective embodiments, the transfer film D comprises a pressure-sensitive bonding adhesive film. Yet, the kind of transfer film is not limited thereto. The film may comprise, instead, a letter correction transfer film, an ornamental coloring transfer film and so on. Further, instead of the pressure-sensitive type, the film may be of a heat-sensitive type. In these manners, the type, function and usage of the transfer film are not particularly limited in the present invention.

(5) In the above respective embodiments, the holder 4 is prepared by punching of a flat plate made of paper material such as the coated paper. Instead, the holder may be prepared by punching of a flat plate prepared by solidifying pulp with some binder such as resin, glue or the like. Further alternately,

the holder may be formed by molding of synthetic resin.

(6) In the above respective embodiments, the holder 4 is comprised of a single sheet of coated paper. Instead, the holder may comprise a multi-layered assembly of plural sheets of such coated paper.

(7) In the above respective embodiments, the transfer head 3 comprises the rotatable transfer roller. Instead, the transfer head 3 may be of a stationary type which is not rotated during use. In this case, the transfer head 3 includes, at each end in the ribbon width direction, a shaft projecting in the form of a quadratic prism. And, one of the shafts includes a flange 3a on the outer peripheral face at an axially intermediate position, so that the one end of the transfer head 3 will be held in the transfer head holding bore 8 of the holder 4. Further, at positions where the opposed axial ends of the main case portion C1 and cover case portion C2 are located when the ribbon cassette A is attached to the casing C, there are defined square recesses corresponding to the shape of the leading ends of the two shafts, as the head support portion 25, into which the leading ends of the two shafts are engaged to unrotatably hold the transfer head 3.

(8) In the foregoing embodiment, the feed core 1 and the large gear 26 are formed as two separate elements. Instead, the feed core 1 and the large gear 26 may be formed integrally with each other. In this case, when the transfer ribbon cassette A is detached from the casing C, the large gear 26 is retained by the ribbon cassette A.

(9) In the foregoing embodiment, the feed core 1 and the take-up core 2 are operatively connected with each other via the gear coupling mechanism 28. Instead, the feed core 1 and the take-up core 2 may be operatively connected via a belt coupling mechanism.

(10) In the above respective embodiments, the holder 4 has a contour corresponding substantially to the inner periphery of the casing C. However, the contour of the holder 4 is not limited thereto. The holder may be of any contour as long as this may hold the feed core 1, take-up core 2 and transfer head 3 via respective one side ends thereof.

Further, in the foregoing embodiment, the holder 4 is fixed in position in the direction of plate face thereof, through the engagement between the through hole 13 and the cutout groove 14 of this holder 4 and the two projections of the casing C. Instead, the holder 4 may be fixed in position only through the engagement between the two cores 1, 2 and transfer head 3 of the transfer ribbon cassette A and the two core support portions 20, 23 and head support portion 25 of the casing C.

That is, the construction for fixedly positioning the holder 4 relative to the casing C may vary in many ways.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

Claims

1. A film transfer apparatus including:

a feed core 1 and a take-up core 2 between and about which there is entrained a transfer ribbon R including on one side thereof a transfer film D;

a transfer head 3 for transferring, by pressing, the transfer film D of the transfer ribbon R fed from the feed core 1 on to a transfer target surface B;

a holder 4 to which the feed and take-up cores 1, 2 and the transfer head 3 are attached;

a transfer ribbon cassette A including the holder 4; and

a casing C detachably mounting the transfer ribbon cassette A;

characterized in that

each of said respective cores 1, 2 is rotatably supported, via one end thereof in the direction of ribbon width, to said holder 4; said transfer head 3 is supported, via one end thereof in the ribbon width direction, to said holder 4; and

said casing C includes core support portions 20, 23 for rotatably supporting the respective cores 1, 2 and a head support portion 25 for supporting the transfer head 3, when the holder 4 is attached to the casing C.

2. A film transfer apparatus as defined in claim 1,

characterized in that

said holder 4 is constructed as a plate-like member which defines a feed core holding bore 6, a take-up core holding bore 7 and a transfer head holding bore 8 for loosely holding the respective one end of the cores 1, 2 and of the transfer head 3 in the ribbon width direction.

3. A film transfer apparatus as defined in claim 2,

characterized in that

said holding bores 6, 7, 8 are opened to the outside along a same direction relative to an outer peripheral edge of the holder 4 so as to allow engagement and disengagement of the cores 1, 2 and transfer head 3 from the outer peripheral edge of the holder 4.

4. A film transfer apparatus as defined in claim 2 or 3,

characterized in that

said holder 4 having the respective holding bores 6, 7, 8 is formed by a plate punching process.

5. A film transfer apparatus as defined in any one of claims 1 through 4,
characterized in that
said holder 4 is formed of a plate of paper or pulp.

6. A film transfer apparatus as defined in claim 2,
characterized in that
along a peripheral edge of the respective holding bores 6, 7, 8, there are defined a plurality of slits 35 extending in the radial direction; and outer peripheral faces of flange portions 1a, 2a, 3b formed on one side ends in the ribbon width direction of the respective cores 1, 2 and transfer head 3 are formed as tapered faces 29.

7. A film transfer apparatus as defined in claim 2,
characterized in that
said holding bores 6, 7, 8 are formed as simple circular through bores; and at each one side end in the ribbon width direction of said feed core 1, take-up core 2 and transfer head 3, there are formed a plurality of stopper pieces 37 which are elastically deformable in the radial direction to be fitted into the respective holding bores 6, 7, 8.

8. A film transfer apparatus as defined in any one of claims 1 through 7,
characterized in that
said feed core 1 and said take-up core 2 are rotated in association with each other via a gear coupling mechanism 28 using meshing between a gear 26 formed integrally with a tubular shaft 18 formed in said casing C and a further gear 27 formed integrally with said take-up core 2.

9. A film transfer apparatus including:
a feed core 1 and a take-up core 2 between and about which there is entrained a transfer ribbon R including on one side thereof a transfer film D;
a transfer head 3 for transferring, by pressing, the transfer film D of the transfer ribbon R fed from the feed core 1 on to a transfer target surface B;
a holder 4 to which the feed and take-up cores 1, 2 and the transfer head 3 are attached;
a transfer ribbon cassette A including the holder 4;
a casing C detachably mounting the transfer ribbon cassette A; and
a gear coupling mechanism 28 for operatively connecting the feed core 1 and the take-up core 2 with each other via gear means;
characterized in that
each of said respective cores 1, 2 is rotatably supported, via one end thereof in the direction of ribbon width, to said holder 4; and
said transfer head 3 is supported, via one end thereof in the ribbon width direction, to said holder 4.

10. A film transfer apparatus as defined in claim 9,
characterized in that
said casing C includes core support portions 20, 23 for rotatably supporting the respective cores 1, 2 and a head support portion 25 for supporting the transfer head 3.

FIG. 1

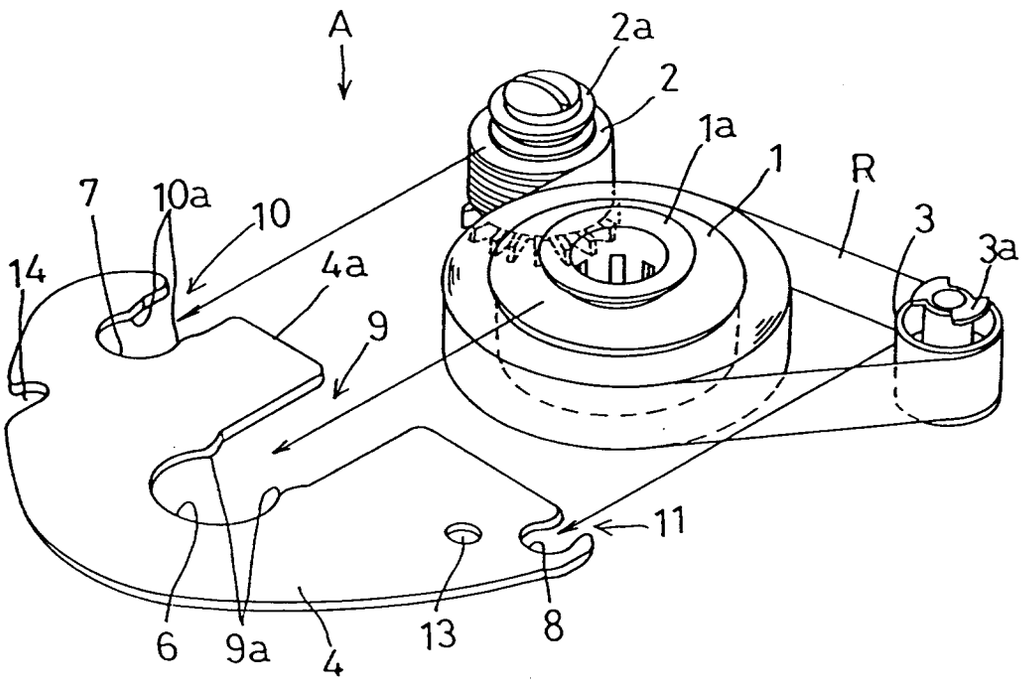

A
2a
2
1a
1
R
3
3a
7
10a
10
14
4a
9
11
6
9a
4
13
8

FIG. 2

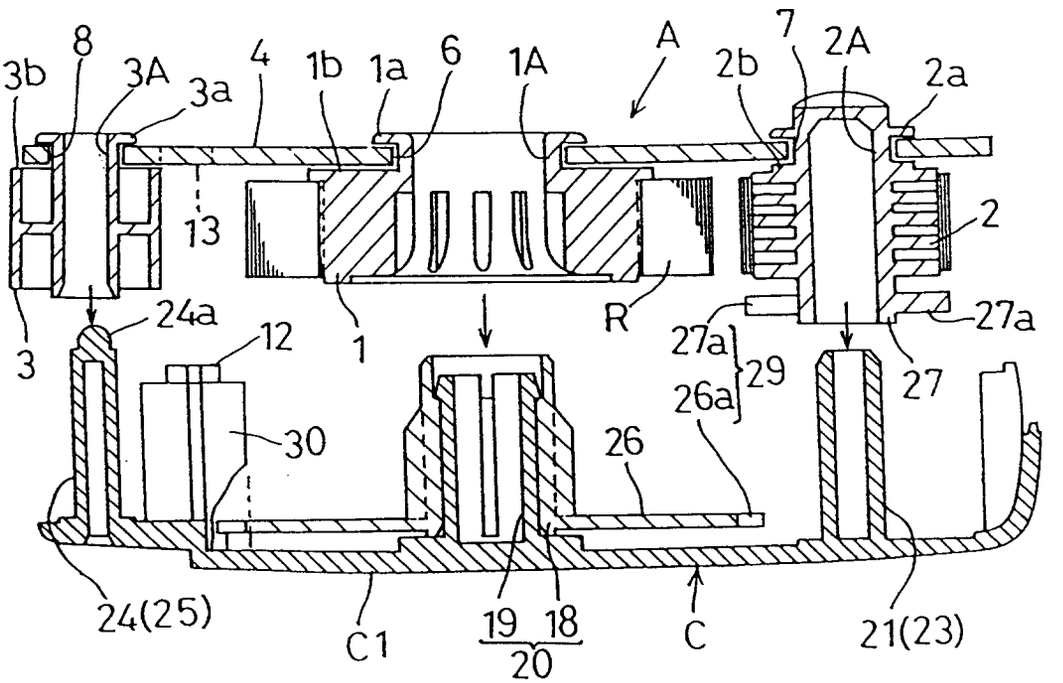

3b
8
3A
3a
4
1b
1a
6
1A
A
2b
7
2A
2a
13
2
24a
12
1
R
27a
27a
29
26a
27
3
30
26
24(25)
C1
19
18
20
C
21(23)

FIG. 3

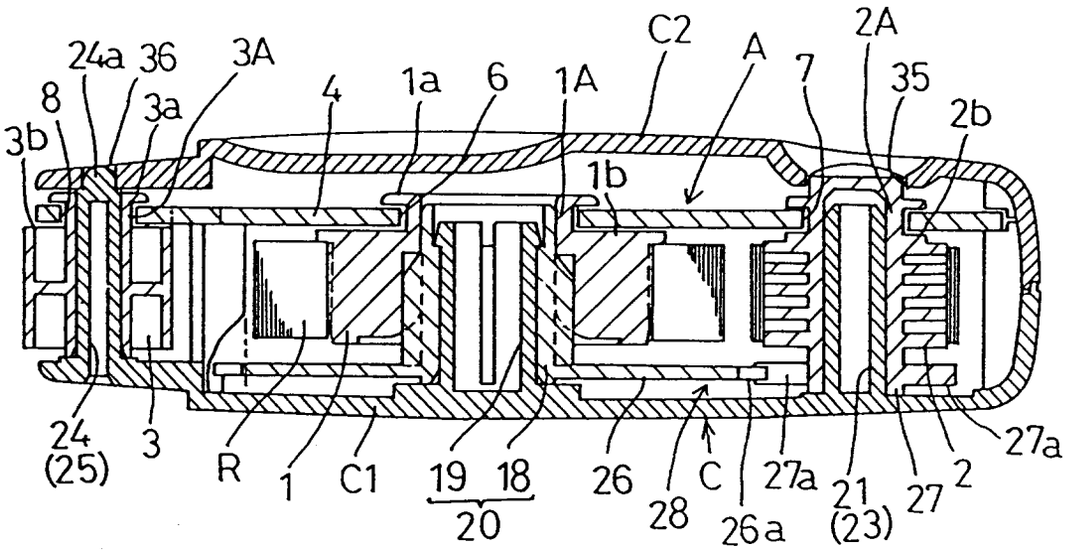

24a
36
3A
8
3a
3b
4
1a
6
1A
C2
A
7
2A
35
2b
1b
24
(25)
3
R
1
C1
19
18
20
26
28
C
26a
27a
21
(23)
27
2
27a

FIG. 4

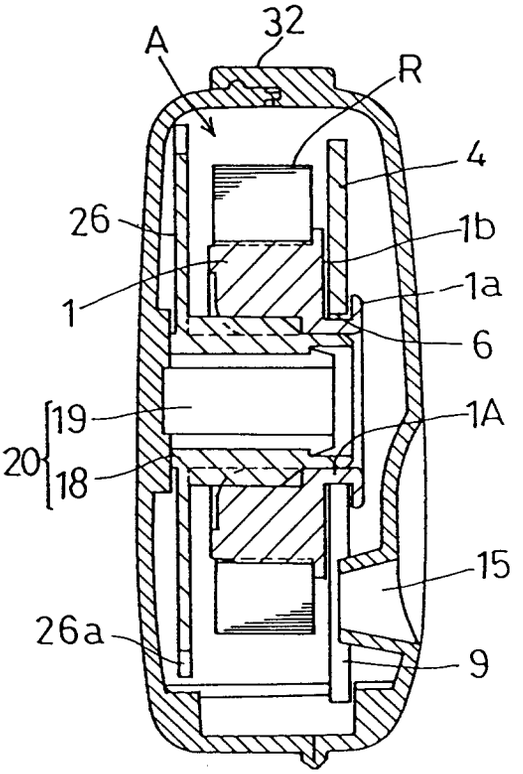

A
32
R
4
26
1b
1
1a
6
19
20
18
1A
15
26a
9

FIG.5

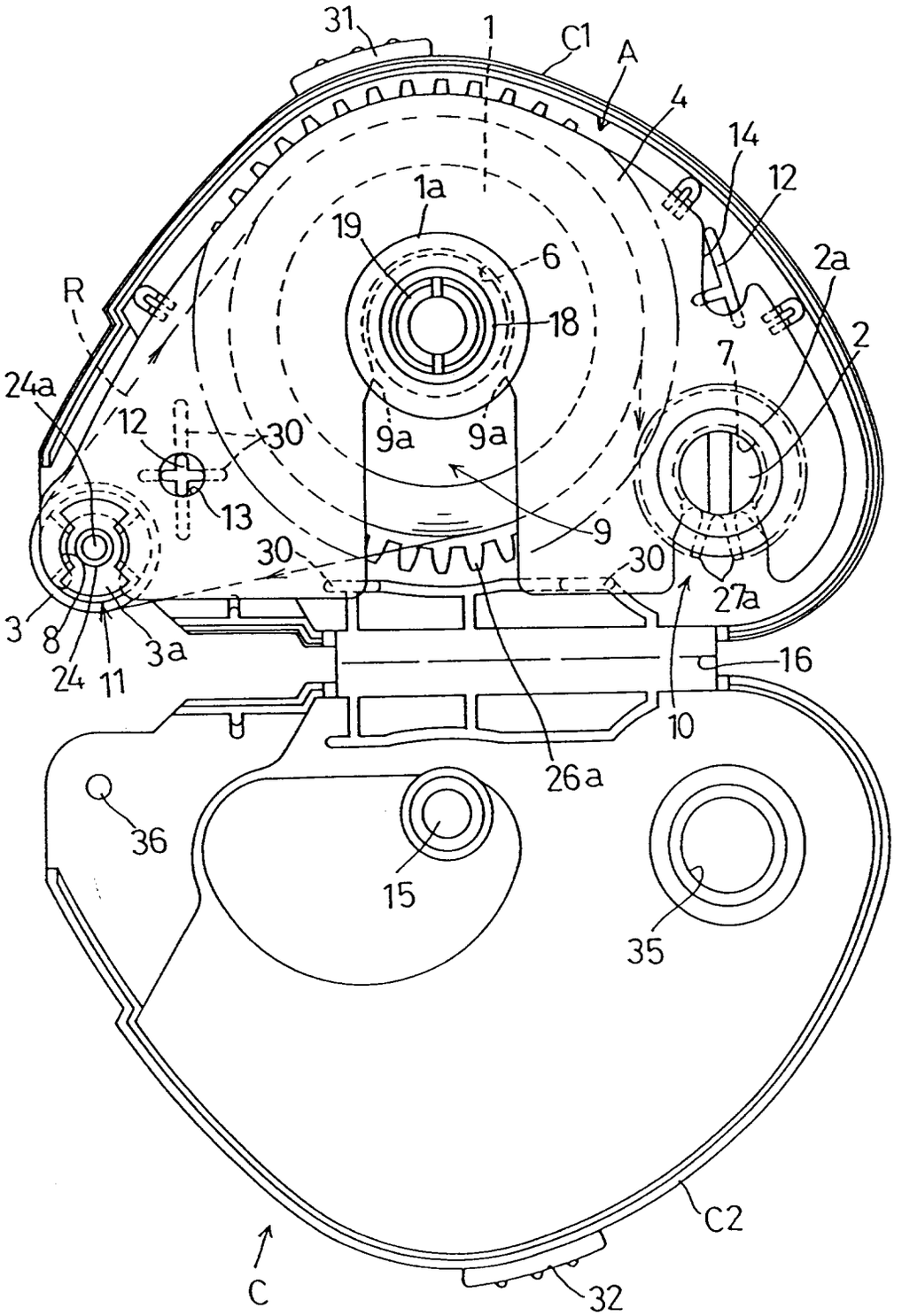

31
1
C1
A
4
14
12
1a
19
6
2a
R
18
2
7
24a
12
30
9a
9a
13
9
30
30
27a
3
8
24
11
3a
16
10
26a
36
15
35
C2
C
32

FIG. 6

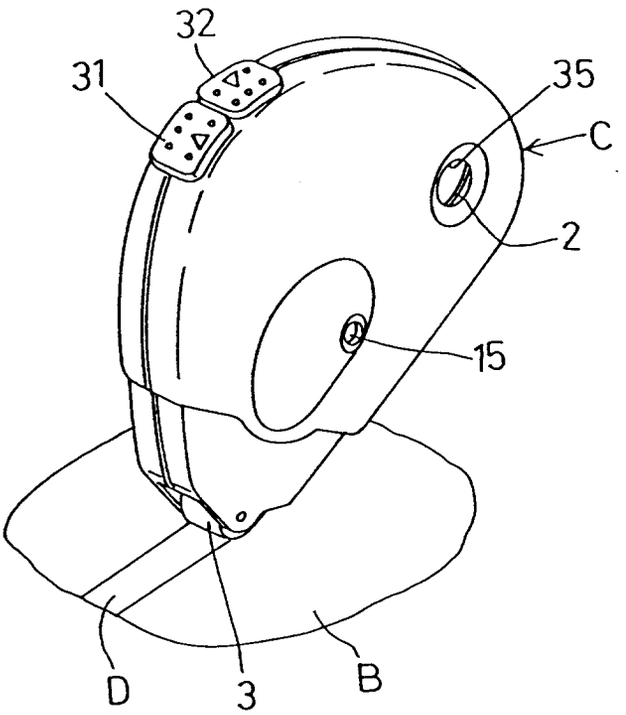


FIG. 7

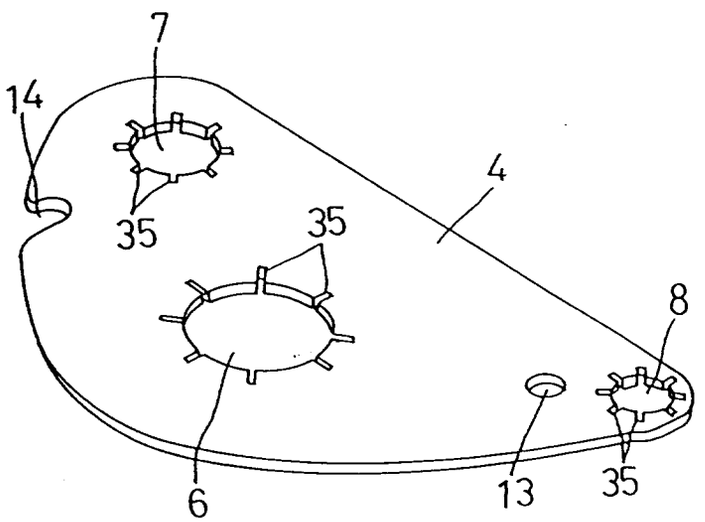


FIG.8

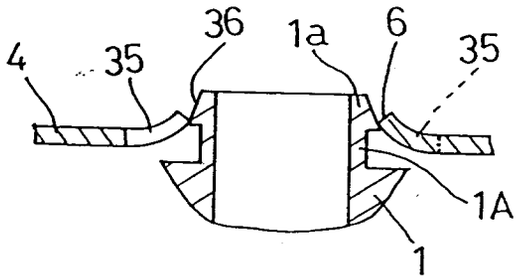


FIG.9

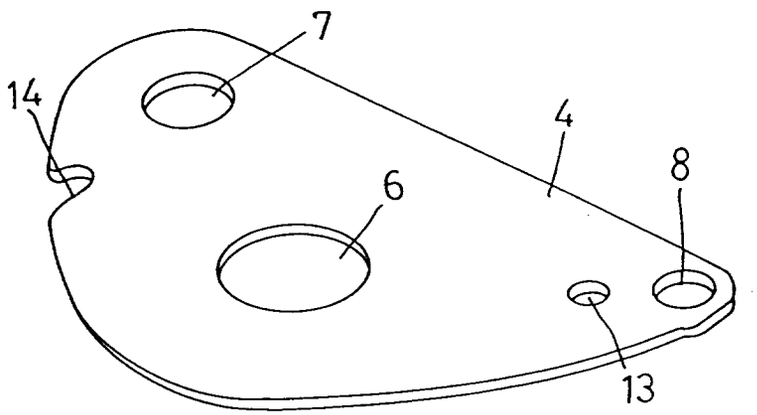


FIG.10

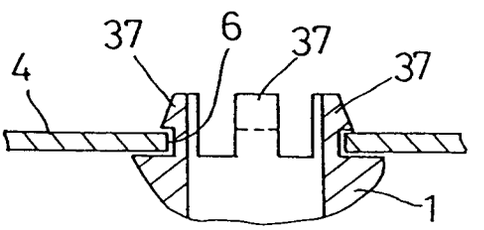


FIG.11

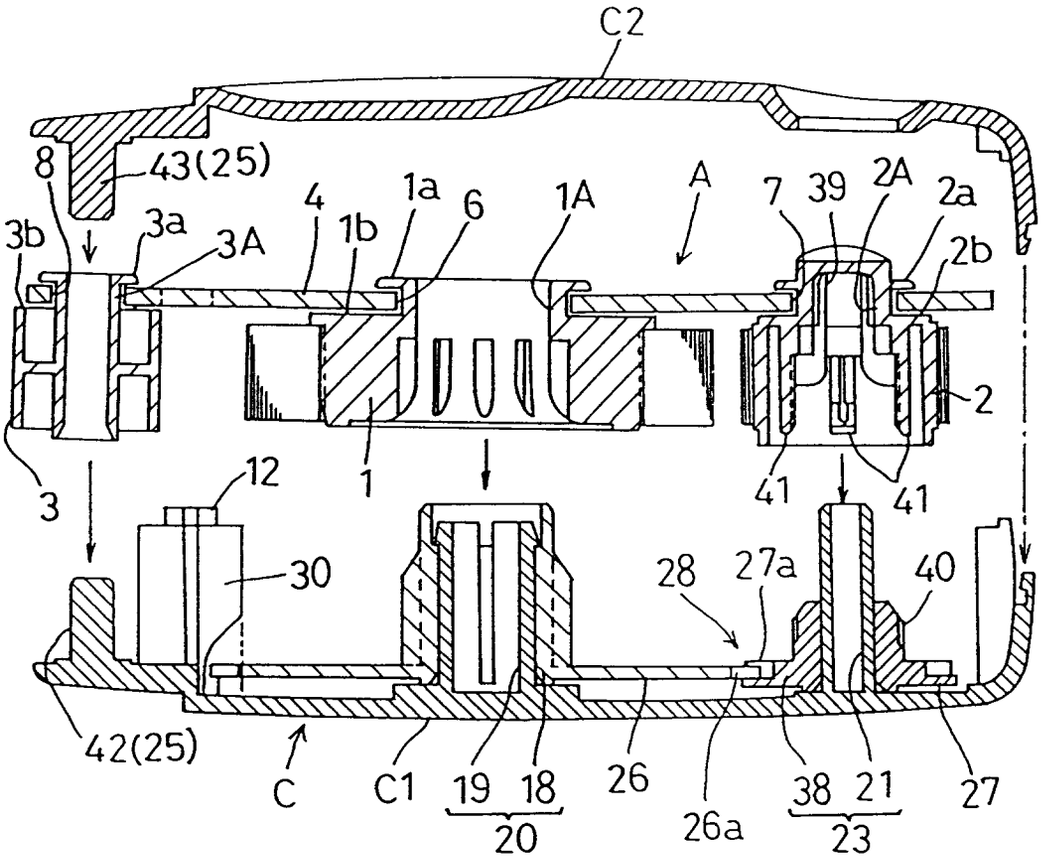
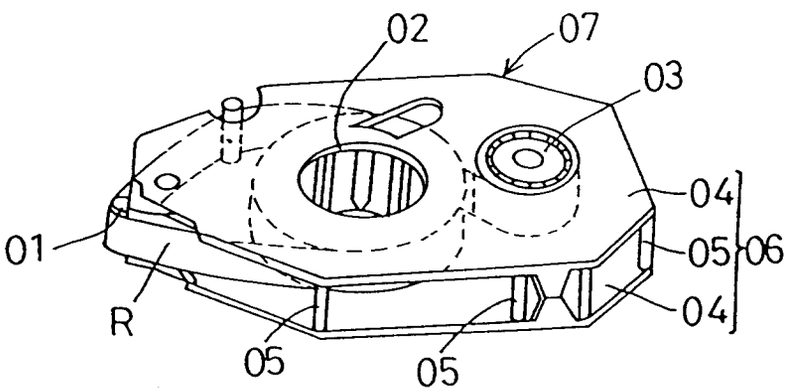

C2
8
43(25)
3b
3a
3A
4
1b
1a
6
1A
A
7
39
2A
2a
2b
2
3
12
1
41
41
30
28
27a
40
42(25)
C
C1
19
18
20
26
26a
38
21
23
27

FIG.12


02
07
03
04
01
05
06
R
04
05
05

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 1938

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
P,X Y	EP-A-0 619 189 (FUJI KAGAKU SHIKOGYO) 12 October 1994 * column 10, line 21 - line 55 * * column 17, line 2 - line 27; figure 1 *	1,2,4, 8-10 3	B41J29/367 B41J32/00
Y	DE-C-42 07 582 (DEUHSEN, WILHELM) 24 June 1993 * figure 2 *	3	
A	DE-A-42 17 295 (TIPP EX GMBH & CO KG) 2 December 1993 * figures 6,7 *	8	
A	EP-A-0 170 222 (TAMAI SHIGERU) 5 February 1986 * figure 1 *	1-10	
A	US-A-4 367 963 (DAUGHTERS JAMES R) 11 January 1983 * column 2, line 5; figure 5 CD *	5	
A	US-A-4 134 693 (CRICKMORE JOHN D ET AL) 16 January 1979 * column 2, line 30 - line 37; figures 1,2 *	1-10	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B41J B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	3 November 1995	Joosting, T

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

& : member of the same patent family, corresponding document

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