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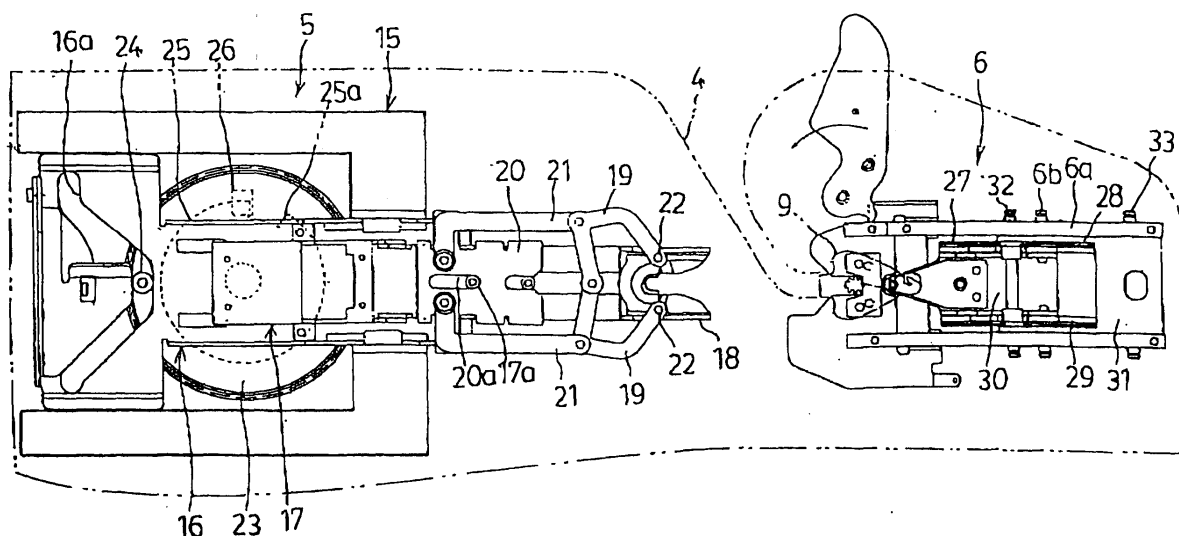
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(54) **Bag binding machine**

(57) A press-bonding device (6) is constituted by a base plate (27), a release plate (28), a die plate (29) and a press plate (30), and a downward ultrasonic type oscillator (30a) is provided in a tip portion of the press plate. The four plates carries out one cycle for descending and ascending through the longitudinal reciprocating motion of a shifter (31), and a binding piece is inserted

and interposed between the base plate and the die plate with right and left leg portions overlapped so that a dowel is formed by means of a punch and a hole. Then, the press plate descends and the tip end face of the ultrasonic type oscillator comes in contact with the dowel of the binding piece (9) so that the two leg portions of the binding piece are welded.

FIG. 3



Description

Background of the Invention

1. Field of the Invention

[0001] The present invention relates to a bag binding machine for binding a resin bag for packing foods by means of a binding piece made of a resin, and more particularly to a bag binding machine in which holding force of the binding piece is enhanced.

2. Description of the Related Art

[0002] For example, the present applicant has proposed a bag binding machine (Japanese Patent Unexamined Publication Hei. 10-114308) for automatically fastening a binding piece formed of a resin plate to a binding portion of a bag in order to rapidly and reliably bind an opening of the bag made of a resin which accommodates goods such as fruits and vegetables or bread.

[0003] The bag binding machine has such a structure that one cycle from the feeding operation of the binding piece to the fastening operation thereof is automatically carried out. When the binding portion of the bag is inserted into a guide groove for inserting the bag, which is formed from one of side surfaces of a frame to a central part thereof, the binding piece formed of a portal resin sheet is externally fitted in the binding portion of the bag through a feeding mechanism. Consequently, both leg portions of the binding piece are crossed each other and are press-bonded (fixed by pressure) through a binding piece press-bonding device (pressure fixing device).

[0004] The binding piece press-bonding device (which will be hereinafter referred to as a press-bonding device) has such a structure that three plates, that is, a release plate, a die plate and a press plate are overlapped on a base plate and are opened or closed by means of a cam mechanism.

[0005] An upward punch is provided on the base plate and a hole corresponding to the punch is formed on the die plate. The die plate and the base plate interpose the right and left leg portions of the binding piece which are overlapped by a feeding device. Thus, a dowel is drawn through the punch and the hole to couple the leg portions. Then, the upper press plate descends to crimp the dowel through a crimping pin. Thereafter, each plate is opened and the release plate pushes up the binding piece to be removed from the punch. Thus, a press fixing operation for one cycle is completed.

[0006] The bag binding machine couples both leg portions of the binding piece through the dowel formation and the dowel crimping. If oil, water or dust sticks to the surface of the binding piece made of a resin plate, the coupling force of a dowel portion is deteriorated due to a reduction in frictional force. Therefore, when external

force is applied, both leg portions might be loosened. In this point of view, there are technical problems to be solved for enhancing the coupling force of the binding piece to prevent unexpected drop-out, and the invention has an object to solve the problems.

Summary of the Invention

[0007] In order to achieve the object, the invention provides a bag binding machine for externally fitting a binding piece to be a portal plate made of a synthetic resin in a binding portion of a bag, pressing and crossing both leg portions of the binding piece in a closing direction, and forming a dowel in a crossing portion of the leg portions by means of a punch and a die, thereby press-bonding the binding piece,

[0008] wherein a welding machine such as an ultrasonic type oscillator or a heating wire type heater is provided above a punch mechanism portion through an elevating mechanism and is caused to abut on the dowel formed by means of the punch and the die, thereby welding the dowel portion.

Brief Description of the Drawings

[0009]

Fig. 1 is a perspective view showing a bag binding machine,

Fig. 2 is a front view showing a binding piece,

Fig. 3 is a plan view showing a feeding device and a press-bonding device in the bag binding machine, Figs. 4(a) and 4(b) are views illustrating a step of press-bonding the binding piece,

Figs. 5(a) and 5(b) are views illustrating a step of press-bonding the binding piece, which are subsequent to Figs. 4(a) and 4(b),

Figs. 6(a) and 6(b) are views illustrating a step of press-bonding the binding piece, which are subsequent to Figs. 5(a) and 5(b),

Fig. 7 is a view illustrating a step of press-bonding the binding piece, which is subsequent to Figs. 6(a) and 6(b),

Figs. 8(a) and (b) show the flexing shape of the binding piece which is caused by the feeding device, (a) being a plan view and (b) being a front view,

Fig. 9(a) is a partial sectional view showing the shape of a dowel formed at a throttling step,

Fig. 9(b) is a partial sectional view showing the dowel welded at a next welding step, and

Fig. 10 is a front view showing the binding state of a bag.

Detailed Description of the Preferred Embodiments

[0010] An embodiment of the invention will be described below in detail with reference to the drawings. Fig. 1 shows a bag binding machine 1. A binding piece

magazine portion 2 is provided on the right side in the drawing, and accommodates a roll of binding pieces which are coupled like a belt. A table portion 3 protruded leftward from the binding piece magazine portion 2 is provided with a planar L-shaped guide groove 4 which advances from an intermediate portion of the right and left on a front face to an inner part and is then deflected leftward. A feeding device 5 of the binding piece is provided in the right part of the guide groove 4 and a press-bonding device 6 is provided in the left part of the guide groove 4.

[0011] A cutter device 7 is provided behind the press-bonding device 6. When an arm portion 7a rotatable in a horizontal direction which is pivotally attached to the upper surface of the table portion 3 is rotated toward this side (frontward in Fig. 1) and the guide groove 7b in the front portion of the arm portion 7a is caused to correspond to the guide groove 4 of the table portion 3, a cutter blade (not shown) slidable in a forward and backward directions in the arm portion 7a interlockingly with a binding operation cuts the excessive portion of the upper end of the bound bag.

[0012] The feeding device 5, the press-bonding device 6 and the cutter device 7 are driven by means of one motor (not shown) through a reduction gear mechanism, a cam and a link mechanism. A trigger lever 8 is pivotally attached to the left side of the guide groove 4. The tip portion of the trigger lever 8 is extended rightward across the guide groove 4. When the opening of the bag is bound and the bag is inserted into the inner part of the guide groove 4, the trigger lever 8 is pushed by the bag and is rotated so that the trigger switch (not shown) in the table portion 3 is turned on to activate the motor.

[0013] As shown in Fig. 2, a binding piece 9 is a resin plate formed to have an almost portal shape, and an inner gear shaped drop-out preventing click portion 11 is formed in the base portion on the inside of left and right leg portions 10. Both leg portions 10 are provided with a hole 12 for engaging a pin of an arm of a feeding device 5 which will be described below. A groove 13 to be deflected forward from an outer side surface to the inside is formed in the tip part of the leg portion. Thus, a hook portion 14 is formed. A belt-shaped integral molding obtained by coupling a large number of binding pieces 9 in a line is wound like a roll and is mounted on the binding piece magazine portion 2 of the bag binding machine 1.

[0014] Fig. 3 shows the arrangement of the feeding device 5 and the press-bonding device 6. As shown in Fig. 3, a carrier 16 is engaged longitudinally slidably with a carrier guide 15 provided on the base of the bag binding machine 1. The carrier 16 advances toward the press-bonding device 6 and binding piece 9 is externally fitted in the so that the press fixing device 6 fastens the binding piece 9 attached to the bag.

[0015] A binding piece guide 17 attached longitudinally slidably onto the carrier 16 of the feeding device 5 has upper and lower cases, and a gap between the upper

and lower cases is a convex binding piece passage (having a convex section). The front part (on the left in the drawing) of the binding piece guide 17 is provided with a binding piece table 18 analogous to the binding piece 9, and the binding piece 9 to be supplied forward through the binding piece passage is exposed onto the binding piece table 18.

[0016] A pair of right and left C-shaped binding arms 19 are pivotally attached coaxially behind the binding piece table 18, and a longitudinally slidable arm shifter 20 attached behind the binding arm 19 and the binding arm 19 are coupled through a link 21. A pin 22 is vertically protruded from the tip portion of the binding arm 19. The pin 22 is engaged with the hole 12 provided on both sides of the binding piece 9 shown in Fig. 2. Moreover, a pin 17a fixed to the binding piece guide 17 is engaged with a groove 20a provided on the arm shifter 20.

[0017] A main gear 23 having a large diameter is provided under the carrier 16. A crank roller 24 provided in the vicinity of the outer edge of the main gear 23 is engaged with a cam groove 16a formed in the rear part of the carrier 16. The main gear 23 is coupled to the motor through reduction gears (not shown) provided in plural stages.

[0018] A well-known ratchet type feed pawl mechanism (not shown) utilizing a rocking pawl is provided between the carrier 16 and the binding piece guide 17, which is not shown. A feed pawl pivotally attached to the binding piece guide 17 is engaged with the carrier 16 and the binding piece guide 17 is pushed by the carrier 16 and advances together with the carrier 16. When the binding piece guide 17 advances by a constant distance, it abuts on a stopper and is stopped and the feed pawl is removed from the carrier 16. Consequently, the carrier 16 and the arm shifter 20 further advance so that a pair of right and left binding arms 19 are pushed by the arm shifter 20 and are rotated in a closing direction.

[0019] A disk 25 provided with a notch 25a is fitted in the shaft of the main gear 23, and a light emitting portion and a light receiving portion in a photo-interrupter 26 fixed to a frame (not shown) are opposed vertically with the outer edge portion of the disk 25 interposed therebetween. The photo-interrupter 26 is connected to a motor control portion (not shown). The motor control portion controls a position where the carrier 16 is to be stopped based on the output of the photo-interrupter 26.

[0020] The press-bonding device 6 fixes a base plate 27 to the lower portion of a press-bonding device frame 6a, and a lower release plate 28, an intermediate die plate 29 and an upper press plate 30 are pivotally attached to a fixing shaft 6b provided on the pressure-bonding device fixing frame 6a. The tip portions of the four plates 27, 28, 29 and 30 have almost angular plane shapes. As shown in Fig. 4(a), a punch 27a protruded upward is provided in the tip portion of the base plate 27 and a hole 29a corresponding to the punch 27a is formed on the die plate 29. A groove 28a for preventing

an interference with the punch 27a is formed on the tip of the release plate 28, and an ultrasonic type oscillator 30a is provided downward in the tip portion of the press plate 30.

[0021] A longitudinal slot 31a is formed on right and left (longitudinal on a paper in Figs. 4(a) and 4(b)) side plates of a shifter 31 provided above the press plate 30, and two shifter shafts 32 and 33 are provided before and after the slot 31a. A longitudinal guide groove is formed on the press-bonding device frame (which is not shown in Figs. 4 (a) and 4(b)) before and after the fixing shaft 6b, the fixing shaft 6b penetrates through the slot 31a of the shifter 31, and the shifter shafts 32 and 33 in the front and rear portions of the shifter 31 are engaged with the guide groove of the press-bonding device frame, respectively. The shifter 31 is longitudinally slidable. The shifter 31 is coupled to a crank mechanism of a driving mechanism through a lever and a link (not shown) and carries out one cycle operation for advance and retreat.

[0022] The upper edge portions of the right and left side plates of the three plates, that is, the release plate 28, the die plate 29 and the press plate 30 are provided with a cam surface for elevating them. The shifter shafts 32 and 33 of the shifter 31 are slid over the cam face of each of the plates, thereby carrying out the elevating operations corresponding to the shapes of the cam faces, respectively.

[0023] The cam face of the press plate 30 is constituted by a horizontal face and an upward slant face 30b provided in front thereof. The cam face of the die plate 29 has the shape of a valley including a horizontal face and upward slant faces 29b and 29c provided before and after the horizontal face. The cam face of the release plate 28 is provided with an angular slant face 28b in the rear portion of the horizontal face.

[0024] Next, the operation of the bag binding machine 1 will be described. When a resin bag having fruits and vegetables is inserted into the guide groove 4 shown in Fig. 1 with an upper end opening thereof bound by hands, the trigger lever 8 is pushed by the bag and is rotated and then turns on a trigger switch in the table portion 3 so that the motor is activated.

[0025] When the main gear 23 is rotated by the motor, the carrier 16 and the binding piece guide 17 are pushed by the crank roller 24 shown in Fig. 3 and are moved forward. Since the binding piece on the head of the coupling type binding piece 9 is engaged with the pin 22 of the binding arm 19, it advances together with the binding piece guide 17 and is externally fitted in the binding portion of the bag. When a pressing member attached to the upper surface of the binding piece guide 17 presses and holds a binding piece subsequent to a head binding piece and a pair of right and left binding arms 19 pivotally attached to the binding piece guide 17 are rotated in a closing direction to cross both leg portions of the head binding piece 9, the coupling portion of the head binding piece is necessarily pulled forward (in the direction of the press-bonding device). Therefore, the coupling por-

tion is torn and cut.

[0026] Then, the feed pawl of the binding piece guide 17 is removed from the carrier 16 and the binding piece guide 17 is stopped in a position where the front portion of the plate of the press-bonding device 6 enters both leg portions of the binding piece 9. Consequently, the carrier 16 and the arm shifter 20 further advance. Thus, the right and left binding arms 19 pivotally attached to the binding piece guide 17 are rotated in the closing direction to cross both leg portions of the head binding piece 9. Thus, the binding piece 9 is elastically deformed like a funnel as shown in Figs. 4(a) and 5(b). At this time, the leg portions of the binding piece 9 are provided between the die plate 29 and the release plate 28 in the press-bonding device 6 as shown in Fig. 4(a).

[0027] When the shifter 31 starts to advance, the rear shifter shaft 33 of the shifter 31 gets on the angular slant face 28b in the rear portion of the release plate 28 and the front portion of the release plate 28 is raised so that the release plate 28 and the die plate 29 interpose the binding piece 9 therebetween as shown in Fig. 4(b).

[0028] As shown in Fig. 5 (a), subsequently, the front shifter shaft 32 of the shifter 31 gets on the front slant faces 29b and 30b of the die plate 29 and the press plate 30 to cause the front portions of the three plates 28, 29 and 30 to descend. First of all, the die plate 29 causes the binding piece 9 to come in contact with the punch 27a of the base plate 27 with pressure. Thus, a dowel is formed on the binding piece 9 by means of the punch 27a and the hole 29a of the die plate 29.

[0029] Next, the press plate 30 descends slightly later than the die plate 29. As shown in Fig. 5(b), the tip end face of the ultrasonic type oscillator 30a comes in contact with the dowel of the binding piece 9 to heat the top face of the dowel and to weld two leg portions. Fig. 9(a) shows the shape of a dowel D formed by the punch 27a and the hole 29a, and Fig. 9 (b) shows a state in which the dowel D is welded by the ultrasonic type oscillator 30a.

[0030] Subsequently, the shifter 31 gets into a retreating step. As shown in Figs. 6(a) and 6(b), the rear shifter shaft 33 gets on the rear slant face 29c of the die plate 29 and the angular slant face 28b of the release plate 28 to lift the front portions of the three plates 28, 29 and 30. At this time, the front portion of the release plate 28 is lifted more greatly than the punch 27a of the base plate 27, thereby removing the leg portion of the binding piece 9 from the punch 27a.

[0031] As shown in Fig. 7, the rear shifter shaft 33 of the shifter 31 gets over the angular slant face 28b of the release plate 28 so that the front portion of the release plate 28 descends and returns to a standby position for engagement with the punch 27a of the base plate 27. Consequently, the die plate 29 is separated from the release plate 28 and a worker pulls down the bag (not shown). Consequently, the binding piece 9 is pulled down together with the bag from the table portion 3 of the bag binding machine. Fig 10 shows a state in which

the binding piece 9 is fastened to a bag B.

[0032] The feeding device 5 gets into a returning step after a welding step in Fig. 5 (b), in which when the carrier 16 retreats by a constant distance, the guide feed pawl of the binding piece guide 17 is engaged with the carrier 16. Consequently, the binding piece guide 17 retreats integrally with the carrier. When the standby position shown in Fig. 3 is reached, the motor is stopped through the detection of the disk 2 and the photo-interupter 26.

[0033] The invention is not restricted to the embodiment but various changes can be made without departing from the scope of the invention, for example, a heater having a heating wire is used in place of the ultrasonic type oscillator. It is a matter of course that the invention spreads into the modifications.

[0034] As described above, in the bag binding machine according to the invention, the right and left legs of the binding piece are crossed and press-bonded (fixed by pressure) through dowel formation, and the dowel portion is then heated and welded by means of the heater. Therefore, even if moisture or oil sticks to the binding piece, the binding piece can be fastened firmly. Consequently, it is possible to eliminate the drawback that the binding piece is loosened by unexpected external force during transportation of articles such as packed vegetables or display thereof.

Claims

1. A bag binding machine for binding a portion of a bag with a binding piece including leg portions, said bag binding machine comprising:
 - a die;
 - a punch mechanism including a punch to form a dowel on the leg portions of the binding piece together with said die;
 - an elevating mechanism; and
 - a welding machine provided through said elevating mechanism,
 wherein the dowel on the leg portions is formed with both said die and the punch of said punch mechanism after the leg portions of the binding piece are pressed and crossed thereby externally fitting the binding piece in the portion of a bag, and said welding machine is abut on the dowel thereby welding a portion of the dowel.
2. The bag binding machine according to Claim 1, wherein said welding machine includes an ultrasonic type oscillator.
3. The bag binding machine according to Claim 1, wherein said welding machine includes a heating wire type heater.
4. The bag binding machine according to Claim 1, wherein a welding machine is provided above said punch mechanism portion.
5. A bag binding machine for binding a portion of a bag with a binding piece including leg portions, said bag binding machine comprising:
 - a crossing member for crossing the leg portions of the binding piece by pressing the leg portions thereby externally fitting the binding piece in the portion of a bag; and
 - a bonding device for bonding the crossed leg portions of the binding piece, said bonding device including a punch, a die, and a welding machine,
 wherein a dowel is formed on the leg portions with both the die and the punch of said bonding device after the leg portions of the binding piece are pressed and crossed each other thereby externally fitting the binding piece in the portion of a bag, and the welding machine of the bonding device is abut on the dowel thereby welding a portion of the dowel.
6. The bag binding machine according to Claim 5, wherein said bonding device includes:
 - a frame;
 - a fixing shaft;
 - a base plate including said punch;
 - a release plate including a groove for preventing an interference with said punch;
 - an die plate including a hole as said die corresponding to said punch;
 - a press plate on which the welding machine is provided; and
 - a shifter for operating said base plate, said release plate, said die plate, and said press plate, wherein said release plate, said die plate, and said base plate are pivotally attached to said fixing shaft.
7. The bag binding machine according to Claim 5, wherein said crossing member includes a binding arm pivotally provided in order to pressing and crossing the leg portions of the binding piece.
8. The bag binding machine according to Claim 5, wherein said welding machine includes an ultrasonic type oscillator.
9. The bag binding machine according to Claim 5, wherein said welding machine includes a heating wire type heater.
10. The bag binding machine according to Claim 5, further comprising a feeding device for feeding the

binding piece to a position adjacent to the bag.

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FIG. 1

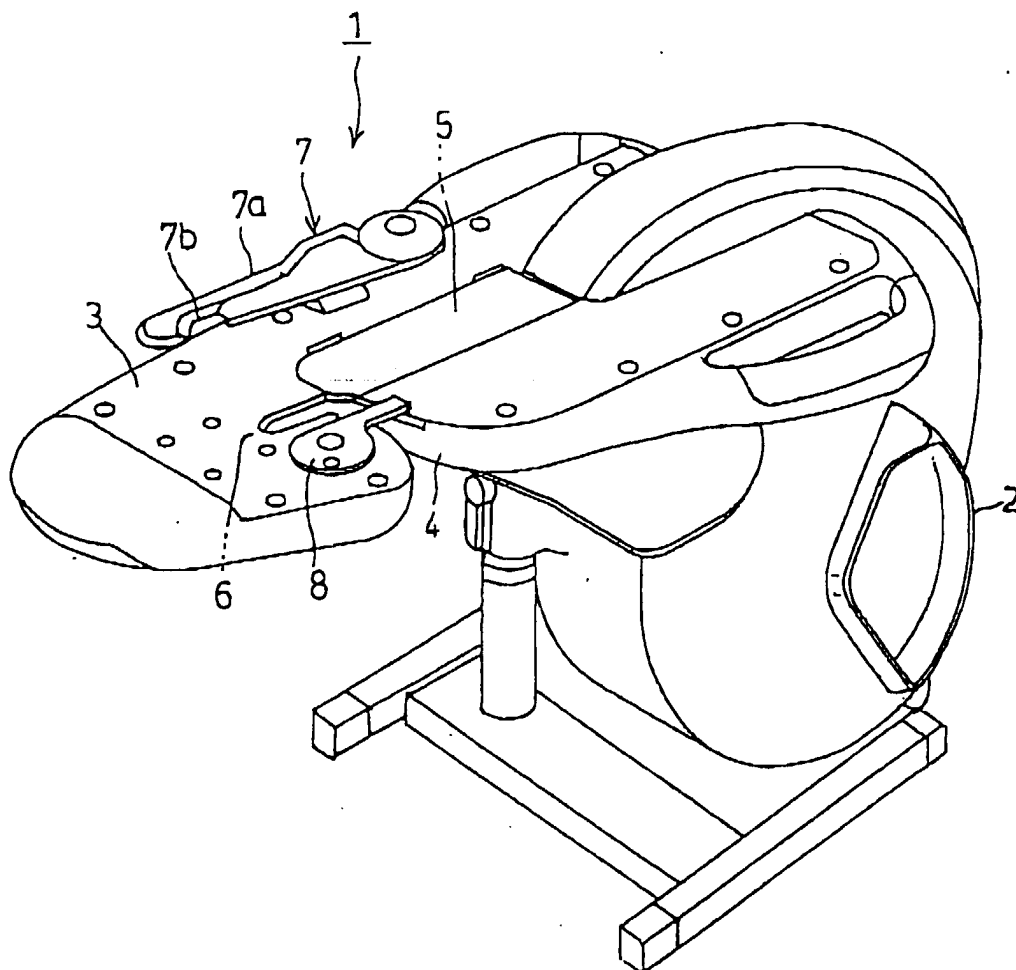


FIG. 2

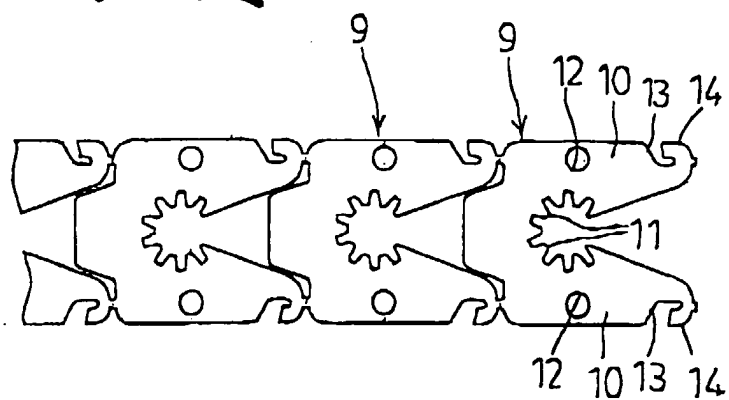


FIG. 3

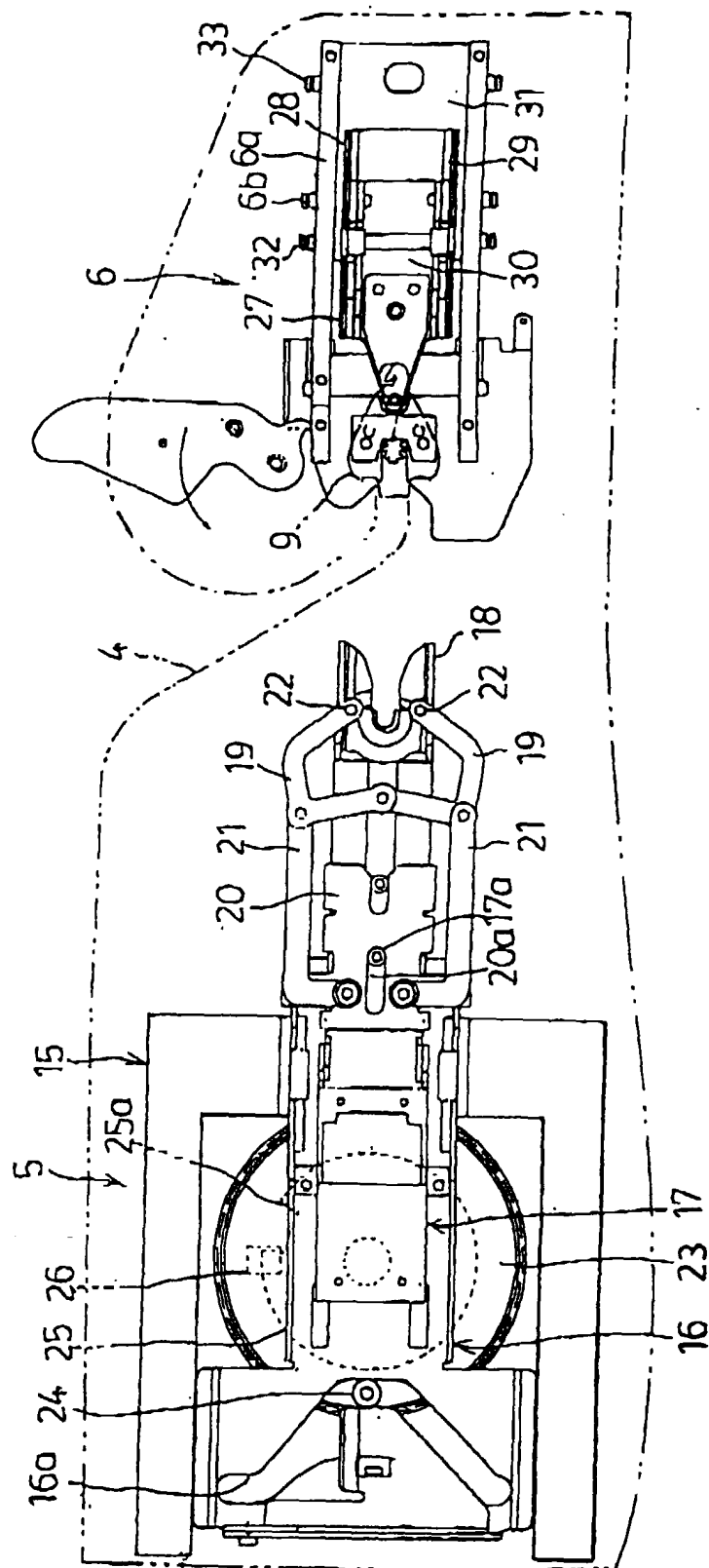


FIG. 4(a)

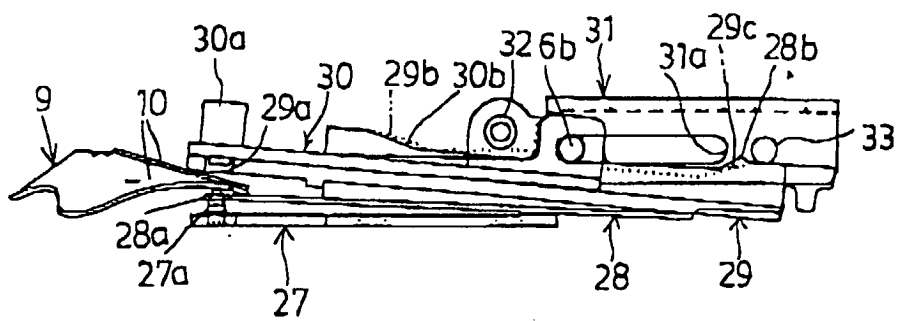


FIG. 4(b)

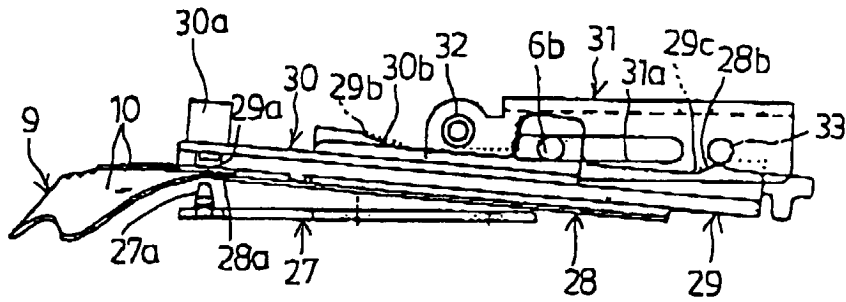


FIG. 5(a)

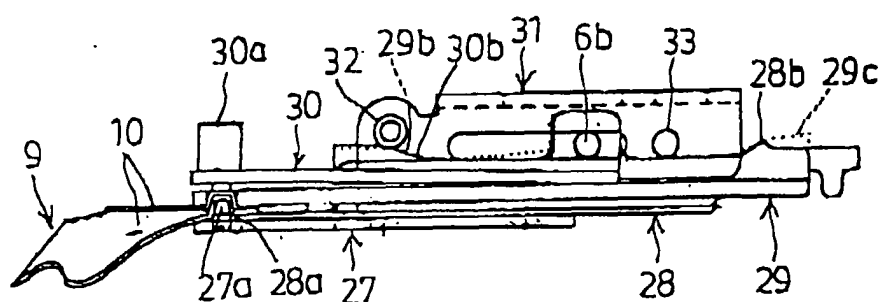


FIG. 5(b)

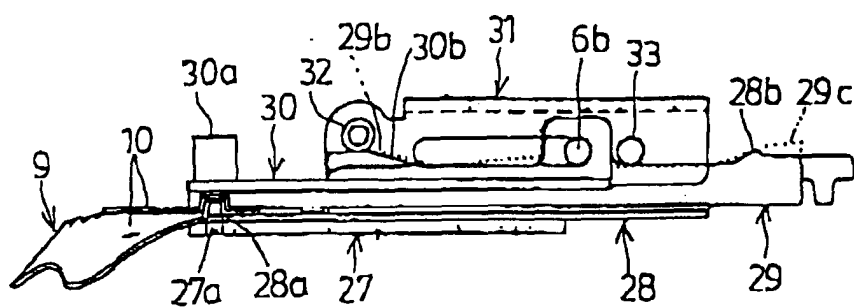


FIG. 6(a)

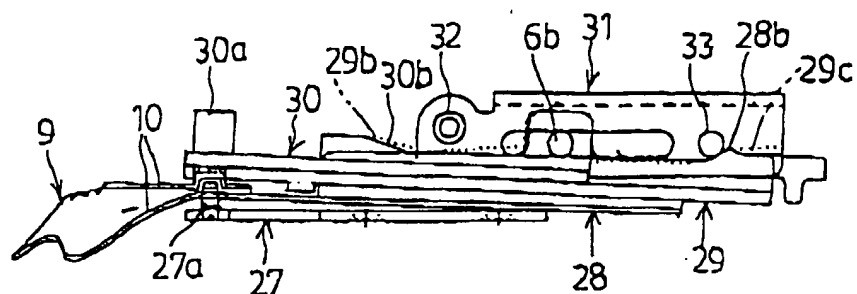


FIG. 6(b)

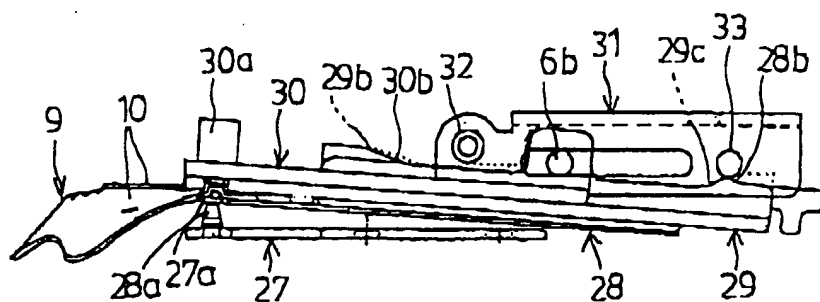
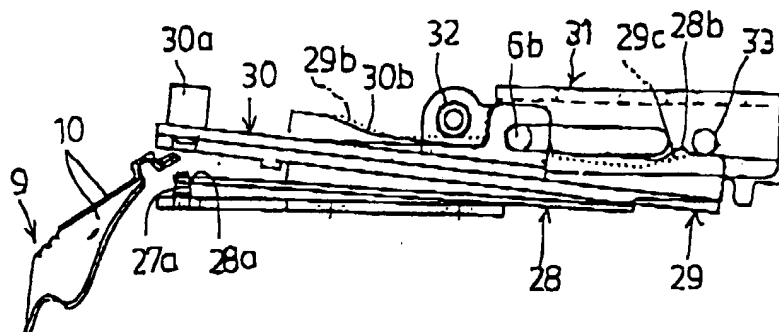


FIG. 7



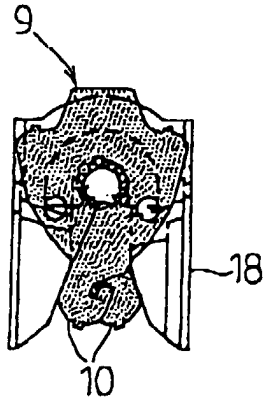


FIG. 8(a)



FIG. 8(b)

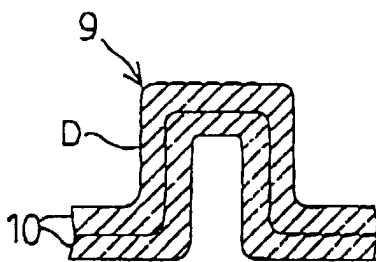


FIG. 9(a)

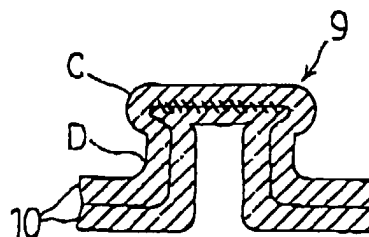


FIG. 9(b)

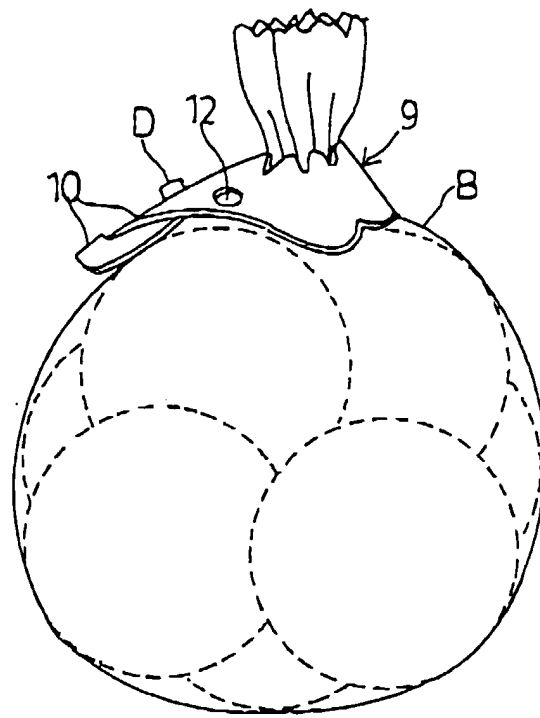


FIG. 10