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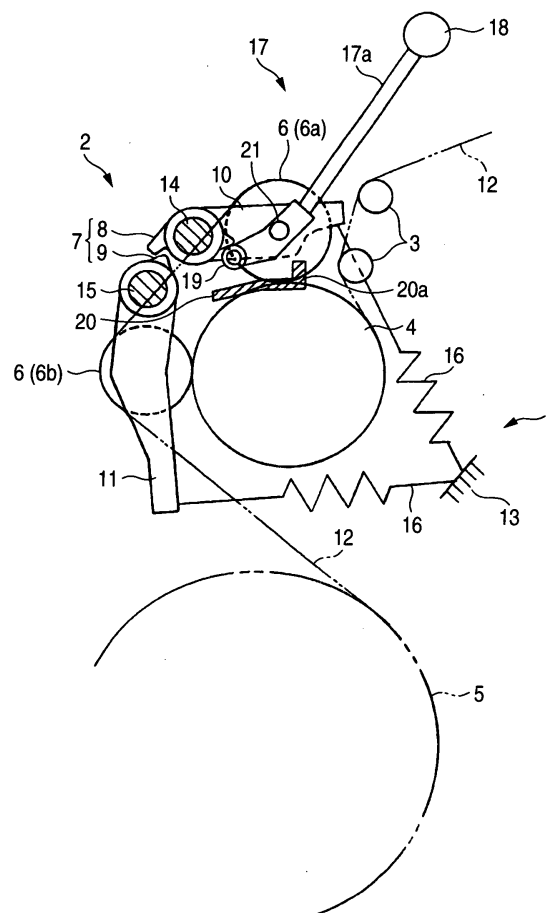
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(54) **Press roller apparatus for weaving machine**

(57) In a press roller apparatus (2) including two or more press rollers (6) disposed so as to be contactable with and separatable from a surface roller (4). Between one press roller (6) and the other roller (6), there is interposed a transmission member (7). The transmission member (7) transmits the separating movement of one press roller (6) from the surface roller (4) to the other press roller (6) to thereby separate the other press roller from the surface roller (4).

FIG. 1



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a press roller apparatus for a weaving machine which, when carrying out a warp winding operation (a woven fabric winding operation) or the like, is used to separate two or more press rollers from a surface roller at the same time.

[0002] JP-A-10-110356 (Japanese Patent Application Publication Number: Hei10-110356) discloses a winding press roller apparatus for a weaving machine. According to this winding press roller apparatus for a weaving machine, two or more press rollers are pressure contacted with a surface roller. Using this winding press roller apparatus, an operator carries out a warp winding operation (a woven fabric winding operation), that is, connects the warp to a woven fabric on the winding roller side, inserts the woven fabric through a winding passage and guides the sheet-shaped warp, in order to insert the woven fabric through the winding passage; and, in this operation, the operator operates an operation lever for each of the press rollers to thereby separate the respective press rollers from the surface roller.

[0003] However, in the case of the above-cited technology, to separate all of the press rollers, the operation lever must be operated for each of the press rollers, which takes time and labor to separate all the press rollers.

SUMMARY OF THE INVENTION

[0004] Accordingly, it is an object of the invention to be able to separate two or more press rollers from a surface roller simultaneously with simple means and in a short time.

[0005] In attaining the above object, according to the invention, there is provided a press roller apparatus (2), for a weaving machine, comprising: a surface roller (4); two or more press rollers (6) disposed contactably with and separatably from the surface roller (4); and a transmission member (7) disposed between one press roller (6) and the other press roller (6), and transmitting the separating movement of one press roller (6) from the surface roller (4) to the other press roller (6) for separating the other press roller (6) from the surface roller (4).

[0006] The respective press rollers (6) are swingably mounted on a frame (13) by two or more press levers (10, 11), and the transmission member (7) is composed of elements (8 · 9, 25 · 26, 33 · 34) engageable with each other to thereby transmit the swinging movement of one press roller (6) as the swinging movement of the other press roller (6) through their mutual engagement. The transmission member (7), preferably, may be composed of an engaging portion and a portion to be engaged which can be rotated about their respective rotary shafts. And, in the engaging portion and the portion to be engaged, preferably, there may be formed one or

more securing portions separated from the rotary shafts in the radial direction of the rotary shafts and extending in the radial direction of the rotary shafts, thereby being able to maintain the engagement between the respective securing portions of the engaging portion and the portion to be engaged during the separating operation of one press roller (6) from the surface roller (4).

[0007] Of the two or more press levers (10, 11), any one of the press bars (10, 11) can be swung by operating a lift-up lever (17). Also, on one of the press levers (10, 11) and the frame (13), there is rotatably mounted the lift-up lever (17) and, by rotating the lift-up lever (17), while it is in part contacted with the other, the respective press rollers (6) can be separated from the surface roller (4).

[0008] The lift-up lever (17) includes: a lift-up bar (17a) rotatably supported on the press lever (10); and a roller (19) rotatably mounted on the lift-up bar (17a) and a fixed wall (20) fixed to the frame (13) is fixed at a position where it can be contacted with the roller (19). Or, the lift-up lever (17) includes: a lift-up bar (17a) rotatably supported on the frame (13) by an eccentric pin (23); and a cam (22) mounted so as to be rotatable integrally with the lift-up bar (17a); and the press lever (10) includes a lift-up lever receive portion (24) fixed to the press lever (10) at a position contactable with the cam (22). Or, the lift-up lever (17) may be composed of a lift-up bar (17a) rotatably supported on the rotary shaft (14) of the press bar (10), and the transmission member (7) is composed of elements (25 · 26, 33 · 34) which are mounted on the rotary shaft (14, 15) of the press levers (10, 11) and can be engaged with each other.

BRIEF DESCRIPTION OF THE DRAWING

[0009]

Fig. 1 is a side view of the main portions of a first embodiment of a press roller apparatus for a weaving machine according to the invention;

Fig. 2 is a plan view of the main portions of the first embodiment of a press roller apparatus for a weaving machine according to the invention;

Fig. 3 is a perspective view of part of a press lever portion of a second embodiment of a press roller apparatus for a weaving machine according to the invention;

Fig. 4 is a side view of the main portions of a third embodiment of a press roller apparatus for a weaving machine according to the invention;

Fig. 5 is a plan view of part of the third embodiment of a press roller apparatus for a weaving machine according to the invention;

Fig. 6 is a side view of the main portions of a fourth embodiment of a press roller apparatus for a weaving machine according to the invention;

Fig. 7 is a side view of the main portions of a fifth embodiment of a press roller apparatus for a weaving machine according to the invention;

ing machine according to the invention; and,
Fig. 8 is a side view of the main portions of a sixth embodiment of a press roller apparatus for a weaving machine according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

(First Embodiment)

[0010] Fig. 1 and Fig. 2 show a winding apparatus 1 for a weaving machine and a press roller apparatus 2 for a weaving machine according to the invention which is incorporated into the winding apparatus 1 for a weaving machine. In these figures 1 and 2, the winding apparatus 1 for a weaving machine, at the winding position of a woven fabric 12 which has been woven, includes two expansion rollers 3 having a larger width than the weaving width and parallel to each other, a surface roller 4, a winding roller 5, and two or more press rollers 6 (a first press roller 6a and a second press roller 6b) disposed so as to be contactable with and separable from the surface roller 4. The woven cloth 12 is wound sequentially around the expansion rollers 3, surface roller 4, first press roller 6a and second press roller 6b, and is finally wound around the outer periphery of the winding roller 5.

[0011] And, in order to be able to separate the first press roller 6a and second press roller 6b serving as the two or more press rollers 6 disposed so as to be contactable with and separable from the surface roller 4 from the surface roller 4, the press roller apparatus 2 for a weaving machine according to the invention includes two projection portions 8 and 9 serving as a transmission member 7 which is used to transmit the movement of the first press roller 6a to the second press roller 6b. These projection portions 8 and 9 are formed respectively in the boss portions of a first press lever 10 and a second press lever 11 which respectively support the first and second press rollers 6a, 6b rotatably. By the way, in the case of the structure shown in Figs. 1 and 2, the boss portions of the first and second press levers 10 and 11 are respectively an engaging portion and a portion to be engaged, while the projection portions 8 and 9 are respectively single securing portions which are respectively formed in the engaging portion and the portion to be engaged.

[0012] The expansion roller 3, surface roller 4 and winding roller 5 are rotatably supported on a pair of right and left frames 13 of the winding apparatus 1 for a weaving machine. Also, the first and second press rollers 6a and 6b are rotatably mounted respectively on a pair of right and left press levers 10 and a pair of right and left press levers 11; and, they are rotatably supported on the frames 13 through fixed shafts 14, 15 and are energized toward the surface roller 4 by a tension spring 16 to thereby press the woven fabric 12 against the surface roller 4.

[0013] On the pair of right and left first press levers

10, there are rotatably mounted their respective lift-up levers 17 by pins 21. Each of the lift-up levers 17 is composed of a lift-up bar 17a, a grip portion 18 and a roller 19. In other words, the lift-up lever 17 is disposed axially with the rotary shaft of the first press roller 6a and, on the end portion of the lift-up lever 17 that extends on the opposite side with respect to the grip portion 18, there is disposed the roller 19 as part of the lift-up lever 17; and, as the lift-up bar 17a is rotated counterclockwise in Fig. 1, the roller 19 is allowed to rotate and move along the upper surface of a fixed wall 20 fixed to the frame 13. By the way, the pair of right and left lift-up bars 17a can be connected together by a connecting member 17b as the need arises and can be both rotated at the same angle.

[0014] The right-side upper surface of the fixed wall 20 in Fig. 1 is situated inside the rotation locus of the roller 19 about the pin 21. Therefore, as the lift-up bar 17a is rotated counterclockwise, the pair of right and left first press levers 10 are lifted up and rotated counterclockwise, so that they are rotated in a direction to separate the first press roller 6a from the surface roller 4.

[0015] Also, in the boss portion of the first press roller 6a and in the boss portion of the second press roller 6b, there are respectively formed the projection portions 8 and 9 as the transmission member 7 in such a manner that the projection portions 8 and 9 can be engaged with each other. Thanks to this, the movements (rotational movements) of the pair of right and left first press levers 10 can be transmitted to the pair of right and left second press levers 11 through the engagement between the projection portions 8 and 9.

[0016] In Fig. 1 and Fig. 2, in case where two operators or one operator rotates the pair of lift-up bars 17a counterclockwise in Fig. 1 simultaneously, firstly, the respective rollers 19 are contacted with their corresponding fixed walls 20 and are further moved along the upper surfaces of the fixed walls 20. With these movements of the rollers 19, the first press lever 10 and the first press roller 6a formed integral with this lever 10 are rotated counterclockwise about the fixed shaft 14 against the tensile force of the tension spring 16, so that the first press roller 6a is separated from the surface roller 4. By the way, the operation force at this time is set small according to the principles of the lever.

[0017] In Fig. 1, when the roller 19 moves beyond the vertical line of the pin 21 and further to the right side thereof and is thereby contacted with a stopper portion 20a formed integral with the fixed wall 20, the pair of right and left lift-up bars 17a are locked between the fixed wall 20 and stopper portion 20a. Due to this, even in case where the operator releases his or her hand from the lift-up bar 17a, the rotational movement of the first press roller 6a about the fixed shaft 14 against the tensile force of the tension spring 16 is maintained, so that the first press roller 6a remains separated from the surface roller 4.

[0018] Also, with the rotational movement of the first

press lever 10 in the counterclockwise direction, the projection portion 8 formed integral with the first press lever 10 is engaged with the projection portion 9 to thereby rotate the second press lever 11 clockwise. The second press lever 11, while it is rotated clockwise about the rotary shaft 15, separates the second press roller 6b from the surface roller 4 at the same time as the first press roller 6a. In this manner, due to the cooperative relation between the projection portions 8 and 9 caused by the operation of the lift-up bar 17a, the first and second press rollers 6a and 6b are rotated about the rotary shaft 15 and are thereby separated from the surface roller 4.

[0019] In this manner, when carrying out the woven fabric winding operation, the two press rollers 6 (the first and second press rollers 6a and 6b) are separated from the surface roller 4 due to the operation of the pair of lift-up bars 17a, so that the woven fabric 12 can be inserted into the winding passage easily. Also, according to the principles of the lever based on the position of the contact point between the roller 19 and fixed wall 20, the position (fulcrum) of the pin 21 and the ratio (fulcrum) of the operation position with respect to the lift-up bars 17a, the operator is able to operate the lift-up bars 17a with a small force. By the way, in case where the two tension springs 16 are previously removed as the need arises in the above separation executing time, the operator can operate the lift-up bars 17a with a further smaller force.

[0020] When returning the press rollers 6 (first and second press rollers 6a and 6b) after completion of the woven fabric winding operation, the lift-up bars 17a may be rotated in the opposite direction. Due to this return operation, the press rollers 6 (first and second press rollers 6a and 6b) are returned to their respective original positions at the same time and are contacted with the woven fabric 12 in the winding passage to thereby press the woven fabric 12 against the surface roller 4.

[0021] As described above, in case where the pair of right and left lift-up bars 17a are connected together by the connecting member 17b and thus can be both rotated at the same angle, there can be obtained an advantage that the pair of right and left lift-up bars 17a can be rotationally operated by a single operator. By the way, in this embodiment, the lift-up bars 17a are disposed respectively on the two ends of the first press roller 6a; however, in case where the right and left first press levers 10 can be cooperatively operated, the lift-up bar 17a may be disposed on only one of the two ends. Further, the lift-up lever 17 (lift-up bars 17a) may also be rotated using an actuator such as an air cylinder instead of manpower. The above structure can be applied also to all of the following embodiments as much as possible.

(Second Embodiment)

[0022] Fig. 3 shows a second embodiment in which the projection portion 8 of the transmission member 7 is

not disposed in the first press lever 10 but is disposed in the rotary shaft 14 which is formed integral with the first press lever 10. By the way, in correspondence to this, the projection portion 9 is not disposed in the second press lever 11 either, but can be disposed in a rotary shaft 15 formed integral with the second press lever 11. As in this embodiment, not only the projection portions 8 and 9 may be disposed in the rotary shafts 14 and 15 as the transmission member 7 but also gears or the like may be mounted on both of the rotary shafts 14, 15 to thereby transmit the swinging movement of the first press roller 6a to the second press roller 6b.

(Third Embodiment)

[0023] Fig. 4 and Fig. 5 show a third embodiment in which the first press lever 10 is operated using a cam mechanism. In the embodiment shown in Figs. 1 and 2, the lift-up lever 17 is mounted on the first press lever 10. On the other hand, in the present embodiment, the lift-up lever 17 is rotatably mounted on the frame 13 by the eccentric pin 23 of a cam 22 and, in the first press lever 10, there is formed a lift-up bar receive portion 24 which can be contacted with the cam 22 having an elliptic shape. In this manner, the eccentric pin 23 is always held in its regular position and, in this position, the outer peripheral surface of the cam 22 is contacted with the lift-up bar receive portion 24.

[0024] When the lift-up bar 17a is rotated counterclockwise in Fig. 4, the cam 22 is rotated about the eccentric pin 23 and thus, at a large lift position (an outer peripheral surface position greatly distant from the eccentric pin 23), lifts up the lift-up lever receive portion 24 and the first press lever 10 formed integral therewith to thereby separate the first press roller 6a from the surface roller 4. At the then time, similarly to the above-mentioned embodiment, the first press lever 10, during its rotation process, rotates the second press lever 11 clockwise through the engagement between pawl-shaped projection portions 8 and 9 to thereby separate the second press roller 6b from the surface roller 4. By the way, the cam 22 can also be replaced with a lever and a roller disposed on the leading end thereof. In the embodiments shown in Figs. 3 and 4 as well, similarly to the embodiment shown in Figs. 1 and 2, the respective boss portions of the first and second press levers 10 and 11 are used as their respective engaging portion and portion to be engaged; and, the projection portions 8 and 9 are respectively single securing portions which are formed in their associated engaging portion and portion to be engaged.

(Fourth Embodiment)

[0025] Fig. 6 shows a fourth embodiment in which means for engaging the transmission member 7 is composed of a pair of gears 25 and 26 which can be engaged with each other. The lift-up lever 17 (lift-up bar

17a), first press lever 10 and gear 25 can be rotated integrally with each other about the rotary shaft 14. Also, the gear 26 is meshingly engaged with the gear 25 and can be rotated about the rotary shaft 15 integrally with the second press lever 11. In the case of the example shown in Fig. 6, the gears 25 and 26 are used as an engaging portion and a portion to be engaged; and, gear teeth formed in the respective gears 25 and 26 provide two or more securing portions.

[0026] In case where the lift-up bar 17a is rotated counterclockwise in Fig. 6, the first press lever 10 and first press roller 6a are separated from the surface roller 4 and, in linking with this, due to the meshing engagement between the gears 25 and 26, the second press lever 11 and second press roller 6b are also separated from the surface roller 4. By the way, the gear 25 and first press lever 10 as well as the gear 26 and second press lever 11 may not be formed as separate parts, but the associated sets of gears and press levers may be formed as integral parts. In case where the press rollers 6a and 6b are fixed in a state where they are separated from the surface roller 4, for example, there may be formed penetration holes in the first press lever 10 and second press lever 11; also, in the portions of the frame 13 that correspond to the penetration holes formed in the first and second press levers 10 and 11 in a state where the press rollers 6a and 6b are separated from the surface roller 4, there are also formed penetration holes; and, single securing pins may be penetrated through the above two penetration holes to thereby fix the press rollers 6a and 6b.

(Fifth Embodiment)

[0027] Fig. 7 shows a fifth embodiment in which, in the embodiment shown in Fig. 1, in order to hold the winding roller 5, there is additionally disposed a third press roller 27, this third press roller 27 is supported by a third press lever 29, and, through the cooperative operation between a projection portion 30 serving as the transmission member 7 of the second press lever 11 and a projection portion 31 serving as the transmission member 7 of the third press lever 29, the third press lever 29 is shifted in the separating direction. By the way, the third press lever 29 is rotatably supported in its regular position by a rotary shaft 28 fixed to the frame 13.

[0028] As in the description with reference to Fig. 1, while the first and second press rollers 6a and 6b are separated from the surface roller 4 through the operation of the lift-up bar 17a, since the movement of the second press lever 11 at the then time is transmitted to the third press lever 29 due to the cooperative operation relation between the projection portion 30 and projection portion 31 respectively serving as the transmission members 7, the third press roller 27 is separated from the winding roller 5 at the same time as the first and second press roller 6a and 6b and third press lever 29. By the way, as the woven fabric 12 is wound around the

winding roller 5, the projection portions 30 and 31 are separated from each other and are thereby out of meshing engagement with each other; however, since these projection portions 30 and 31 are used when carrying out the woven fabric winding operation, that is, they are used in the early stage for winding the woven fabric 12 around the winding roller 5, there is caused no problem.

(Sixth Embodiment)

[0029] Fig. 8 shows a sixth embodiment in which, in the embodiment shown in the above-discussed figure 6, instead of the gears 25 and 26 serving as the transmission members 7, there are used projection-shaped and recess-shaped parts to be meshingly engageable with each other, that is, a projection-shaped part 33 and a recess-shaped part 34 to be engaged with the projection-shaped part 33. The projection-shaped part 33 can be rotated about the rotary shaft 14 integrally with the first press lever 10 and lift-up lever 17, whereas the recess-shaped part 34 can be rotated about the rotary shaft 15 integrally with the second press lever 11. The projection-shaped part 33 and recess-shaped part 34 are engaged with each other and, in case where the lift-up bar 17a is rotated counterclockwise, the first press lever 10 and first press roller 6a are respectively separated from the surface roller 4 and, in linking with this, the second press lever 11 and second press roller 6b are also separated from the surface roller 4.

[0030] In the case of the embodiment shown in Fig. 8, the projection-shaped part 33 and recess-shaped part 34 respectively serve as an engaging portion and a portion to be engaged, while a projection portion formed in the projection-shaped part 33 and a recess portion formed in the recess-shaped part 34 serve as securing portions respectively. By the way, the gears 25 and 26 shown in Fig. 6 as well as the projection-shaped part 33 and recess-shaped part 34 shown in Fig. 8 respectively serving as the transmission members 7 can also be applied to the embodiments respectively shown in Figs. 1, 4 and 7. Also, in the case of the embodiment shown in Fig. 8, similarly to the embodiment shown in Fig. 6, in the first press lever 10, second press lever 11 and frame 13, there may be formed penetration holes respectively and, by penetrating single securing pins through these penetration holes, the press rollers 6a and 6b may be fixed in a state where they are separated from the surface roller 4.

[0031] In the aforementioned embodiments of the present invention, in a press roller apparatus for a weaving machine including two or more press rollers disposed so as to be connectable with and separable from a surface roller, since the press roller apparatus includes a transmission member for transmitting the movement of any one of the press rollers to the other press roller and the other press roller is separated from the surface roller in linking with the separating operation of the above-mentioned any one press roller, in case

where any one of the press rollers is separated from the surface roller, the other press roller connected with the present press roller through the transmission member can be separated simultaneously with the present press roller. Thanks to this, two or more press rollers can be separated from the surface roller by an easy method and in a short time, thereby being able to enhance the operation efficiency of the present press roller apparatus.

[0032] In the aforementioned embodiments of the present invention, the two or more press rollers are disposed so as to be swingable and the transmission member, in linking with the swinging movement of the above-mentioned any one press roller, swings the other press roller. Therefore, two or more press rollers can be separated from the surface roller using a simple mechanism.

[0033] In the aforementioned embodiments of the present invention, any one of the press rollers is swung by operating a lift-up lever and the other press roller is swung in linking with the swinging movement of the above-mentioned any one press roller. Also, according to Claim 4, by rotating the lift-up lever while part of the lift-up lever is contacted with a press lever or a frame, the operator can separate the press roller from the surface roller simply by operating the lift-up lever.

[0034] In the aforementioned embodiments of the present invention, the lift-up lever is composed of a lift-up bar supported so as to be rotatable with respect to the press lever, a roller rotatably mounted on the lift-up bar, and a fixed wall is fixed to the frame (13) at a position where it can be contacted with this roller. Thanks to this, the operation force of the lift-up bar can be reduced and the lift-up bar at its lift-up position can be stabilized.

[0035] In the aforementioned embodiments of the present invention, since a cam mechanism is used, by selecting the shape of a cam, the quantity of separation of the press roller can be set freely.

[0036] In the aforementioned embodiments of the present invention, because the transmission member is mounted on the rotary shaft of the press lever and is composed of elements which can be engaged with each other, the range of the rotation angle of the lift-up lever can be set arbitrarily.

Claims

1. A press roller apparatus (2), for a weaving machine, comprising:

a surface roller (4);
two or more press rollers (6) disposed contactably with and separatably from the surface roller (4); and
a transmission member (7) disposed between one press roller (6) and the other press roller (6), and transmitting the separating movement of one press roller (6) from the surface roller (4)

to the other press roller (6) for separating the other press roller (6) from the surface roller (4).

2. The press roller apparatus (2) according to claim 1, further comprising two or more press levers (10, 11) supporting the respective press rollers (6) swingably to a frame (13), and

wherein the transmission member (7) includes: elements (8 · 9, 25 · 26, 33 · 34) engageable with each other, and transmitting the swinging movement of one press roller (6) to the other press roller (6) as the swinging movement of the other press roller (6) through their mutual engagement.

3. The press roller apparatus (2) according to claim 2, wherein any one of the press levers (10, 11) can be swung by operating a lift-up lever (17).

4. The press roller apparatus (2) according to claim 2 or 3, further comprising a lift-up lever (17) mounted rotatably on one of the press levers (10, 11) and the frame (13); and

wherein the respective press rollers (6) are separated from the surface roller (4) when the lift-up lever (17) is rotated while contacting in part with the other of the press levers (10, 11) and the frame (13).

5. The press roller apparatus (2) according to claim 4, further comprising a fixed wall (20) fixed to the frame (13); and

wherein the lift-up lever (17) includes:

a lift-up bar (17a) supported rotatably on the press lever (10); and

a roller (19) mounted rotatably on the lift-up bar (17a), the fixed wall (20) is fixed at a position where it can be contacted with the roller (19).

6. The press roller apparatus (2) according to claim 4 or 5, wherein the lift-up lever (17) includes:

a lift-up bar (17a) supported rotatably on the frame (13) by an eccentric pin (23); and

a cam (22) mounted so as to be rotatable integrally with the lift-up bar (17a); and

wherein the press lever (10) includes a lift-up lever receive portion (24) fixed to the press lever (10) at a position contactable with the cam (22).

7. The press roller apparatus (2) according to claim 3, 4, 5 or 6, wherein the lift-up lever (17) includes a lift-up bar (17a) supported rotatably on the rotary shaft (14) of the press lever (10); and

wherein the transmission member (7) includes elements (25 · 26, 33 · 34) mounted on the rotary shaft (14, 15) of the press levers (10, 11), and

the elements (25 · 26, 33 · 34) is engageable with each other.

8. The press roller apparatus (2) according to one of the preceding claims, further comprising a press roller for winding roller (27) disposed contactably with and separatably from a winding roller (5) ; and wherein the movement transmitted from one press roller (6) to the other press roller (6) is further transmitted to the press roller for winding roller (27) by the transmission member (7); and wherein when one press roller (6) is separated from the surface roller (4), the other press roller is separated from the surface roller (4), and the press roller for winding roller (27) is separated from the winding roller (5).

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FIG. 1

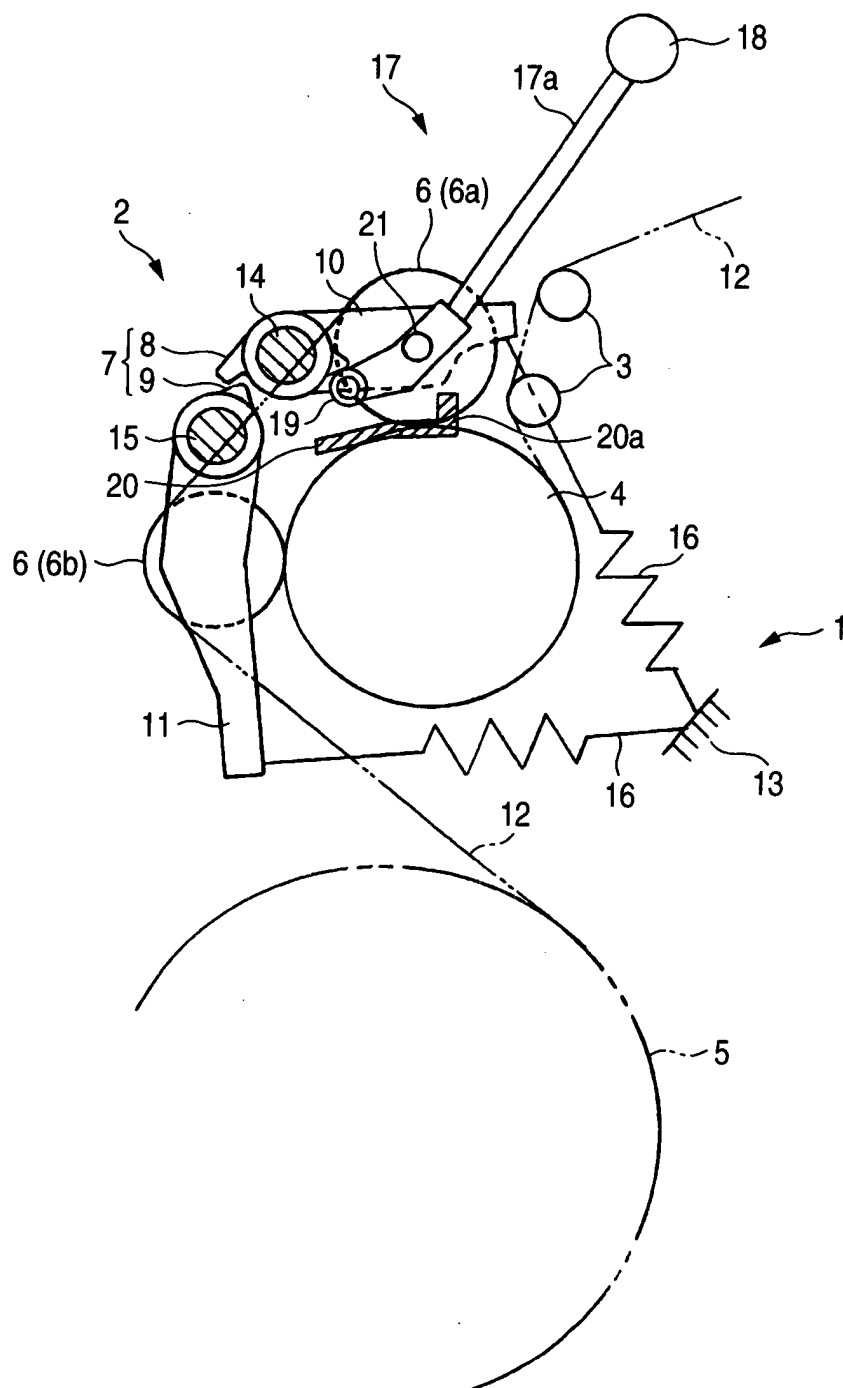


FIG. 2

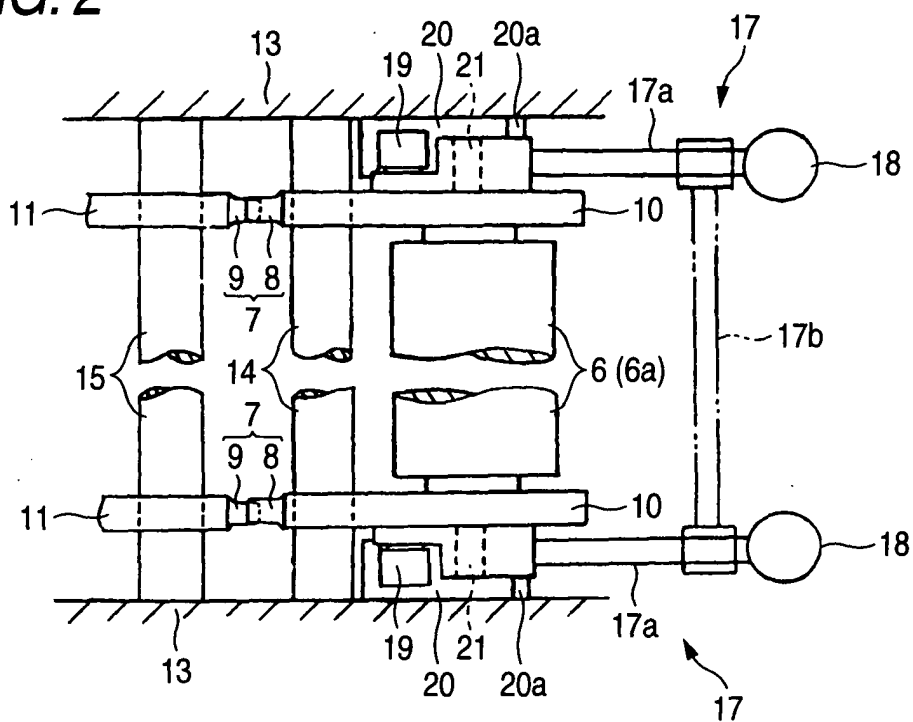


FIG. 3

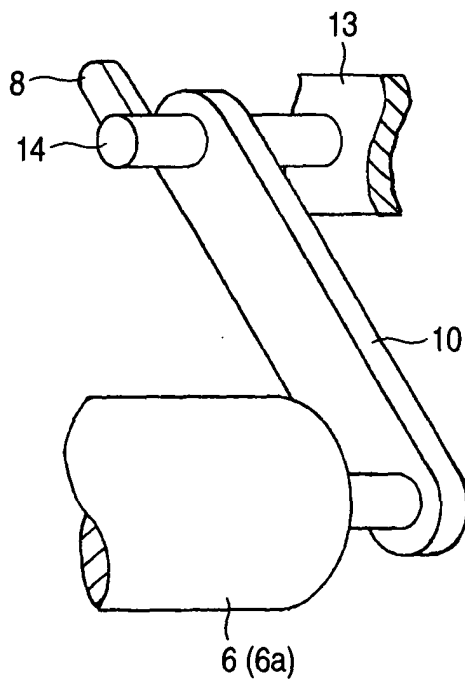


FIG. 4

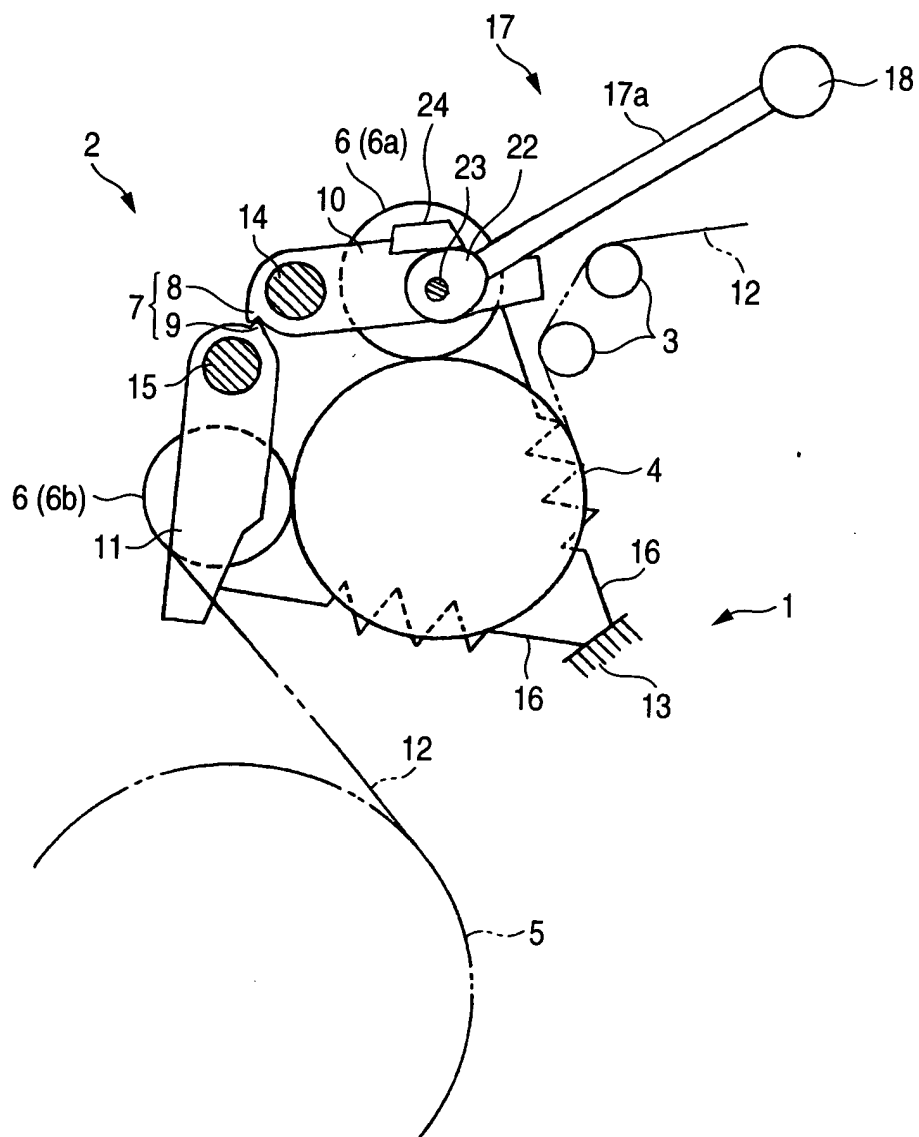


FIG. 5

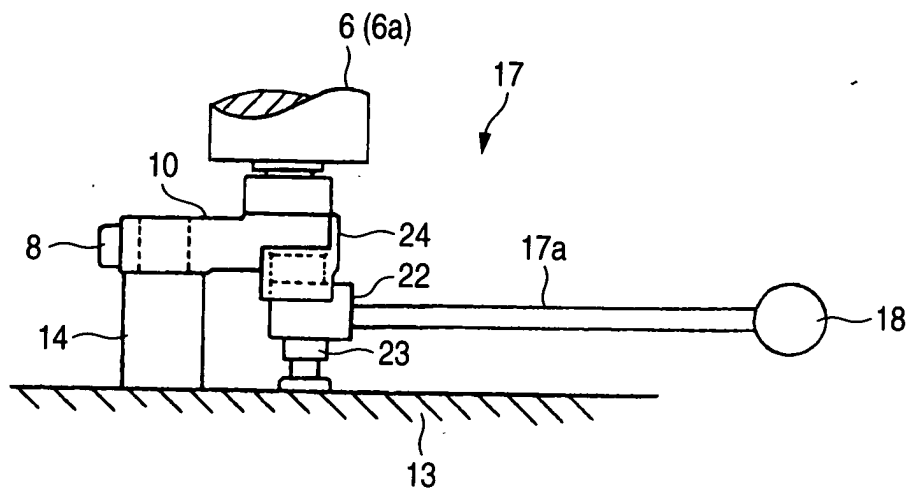


FIG. 6

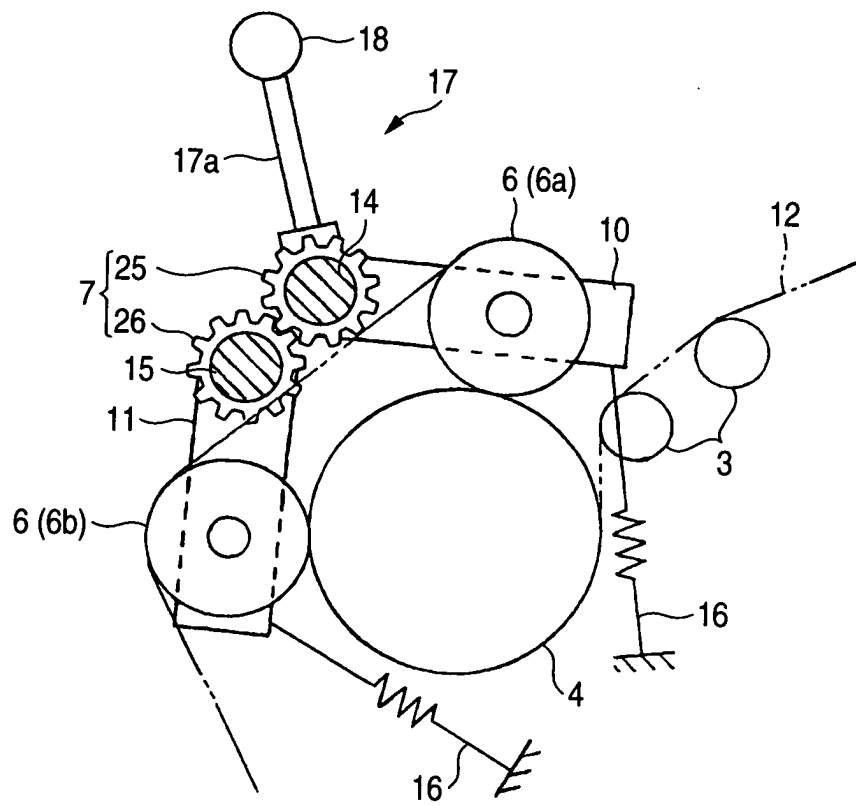


FIG. 7

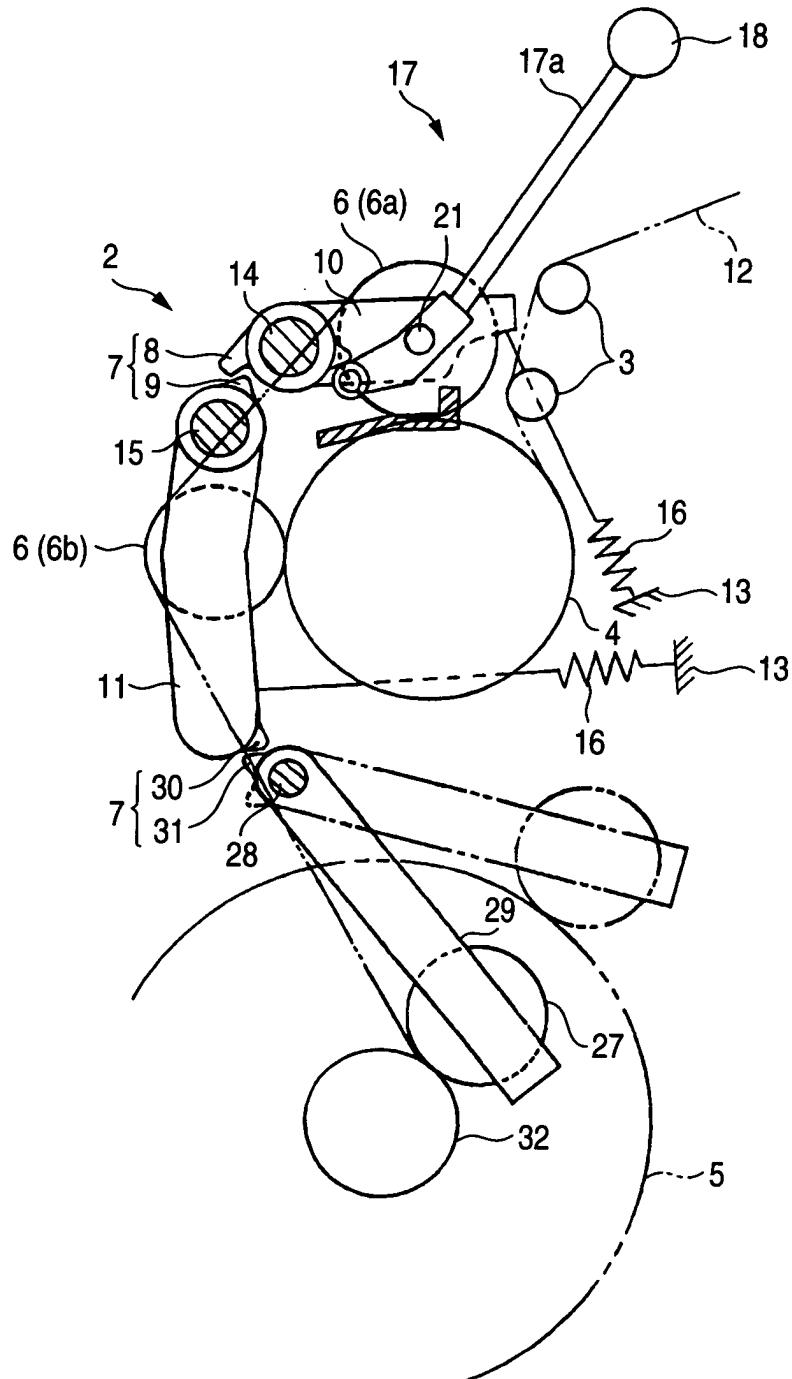


FIG. 8

