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(54) Device for attaching removable elements to a machine.

(57) Device for attaching removable elements to a machine, consisting of two parts forming a detachable seating for the removable element (3) and a fastening (17) operating in conjunction with these parts, characterized in that said fastening (17) essentially consists of a support (21) attached to a first part (18) of said parts; a first arm (22) which is attached to the second part (19) of the above-mentioned parts by means of a first hinge point (23); a second arm (24) which is attached to the first arm (22) by means of a second hinge point (25), at a distance (L1) from the first hinge point (23), and which has a part (26) to which the second arm (24) can clutch behind the support (21); and means which make it possible for the second arm (24) to move freely along said support (21) when the seating is opened.

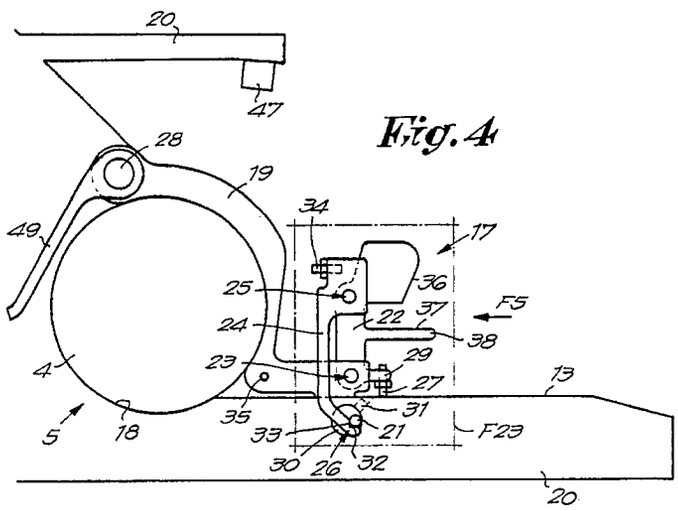

Fig. 4

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This invention concerns a device for attaching removable elements to a machine. In general, the device can be applied to all kinds of machines, but it is meant in the first place for attaching elements in textile machines, such as the attaching of beams, for example warp beams or cloth beams, warp stop motions, harness guides and similar in weaving machines.

It is known that in weaving machines the warp beam, the cloth beam, the warp stop motion, the harness guides and a number of other components can be attached to either side of the frame of the weaving machine by means of attaching parts such as shaft ends.

Traditional devices for attaching elements such as a beam in a weaving machine consist, as is known, of two bearing blocks in which the beam can be applied by its respective ends, whereby the bearing blocks are closed by means of hingeable bearing lids. The bearing lids are clamped to the bearing blocks by means of fastenings consisting of bolts. These fastenings have the disadvantage that in the case of manual operation tools are required and that attaching or loosening these fastenings takes relatively much time.

The known devices of the type mentioned above also have the disadvantage that they are not suitable for automatically applying, respectively removing, a beam from its seating.

The present invention concerns a device for attaching removable elements to machines, such as a warp beam or a cloth beam in weaving machines, which does not have the disadvantages mentioned above, in other words, which is provided of fastenings which can be opened and closed manually or automatically without the use of tools.

The invention particularly concerns a device whereby the fastenings can be automatically opened and closed when applying and removing the removable element by means of a transporting machine.

Transporting machines for transporting removable elements, in particular for supplying full warp beams and empty cloth beams, and for removing empty warp beams and full cloth beams from the weaving machines, are generally known. A number of examples are described in the US 3 675 686, WO 88 09405 and DE 3 708 598.

In order to realize the aims mentioned above, the invention concerns a device for attaching removable elements to a machine, consisting of two parts which form a detachable seating for a removable element and a fastening which operates in conjunction with these parts, characterized in that this fastening essentially consists of a support fixed to the first of the parts mentioned above; a first arm which is attached to the second part of the parts mentioned above by means of a first hinge point; a second arm which is attached to the first arm by means of a second hinge point, at a certain distance from the first hinge point, and which has a part to which the second arm can clutch behind the support; and means which allow the second arm to move freely along the support mentioned above when the seating is opened.

The invention has the advantage that, when the seating is opened, the fastening does not hamper the seating in its opening, as a result of which the device is very suitable for attaching removable elements which must be automatically applied to and removed from the machine.

According to a preferred embodiment, the device according the invention also makes use of a transporting machine which can operate in conjunction with a fastening and which offers the advantage that an exact positioning of the transporting machine in relation to the fastening is not necessary.

In order to better explain the characteristics of the invention, by way of example only and without being limitative in any way, the following preferred embodiments are described with reference to the accompanying drawings, where:

- fig. 1 shows a schematic representation of a weaving machine and a transporting machine which have been equipped with a device according to the invention;
- fig. 2 shows a schematic view according to arrow F2 in fig. 1, whereby the beam is present in the transporting machine;
- fig. 3 shows the ends of the guides on the weaving machine for inserting the beam;
- fig. 4 shows the part indicated in fig. 1 by F4, to a greater scale;
- fig. 5 shows a view according to arrow F5 in fig. 4;
- figs. 6 to 8 show the clamping operation of the fastening in fig. 4, for various positions;
- figs. 9 to 12 show various positions of the device in fig. 4 during the automatic removal of the beam;
- fig. 13 shows a cross-section according to line XIII-XIII in fig. 12;
- fig. 14 shows a position of the device in fig. 4, during the removal of the beam;
- figs. 15 to 18 show various positions of the device in fig. 4, during the automatic appliance of the beam;
- figs. 19 to 21 show three variants of the device according to the invention;
- fig. 22 shows the device in fig. 21 in another position;
- fig. 23 shows a variant of the part indicated by F23 in fig. 4;
- fig. 24 shows a variant of the part in fig. 23;
- figs. 25 to 27 show three other variants of the

device according to the invention;

fig. 28 to 29 show a variant of the device according to the invention, in two different positions;

figs. 30 and 31 show another variant, also in two different positions.

Fig. 1 shows a schematic representation of a weaving machine 1 and a transporting machine 2 for applying and/or removing an element, in this case a warp beam 3. The warp beam 3 hereby has, as is known, fastening parts, in this case shaft ends 4, which are each attached in a device, in this case a bearing 5, on either side in the frame of the weaving machine 1 respectively.

The above-mentioned transporting machine 2 consists, as is known, of a movable frame 6 which can be moved through the weaving room by means of a controlled drive 7, such as a motor. In order to transport a beam, this machine has two arms 8, provided with recesses 9, in which the beam can be applied. The arms 8 can be moved both horizontally and vertically by means of drives 10 and 11, which for example consist of drive cylinders. The drives 7, 10 and 11 are controlled by means of a control unit 12.

The weaving machine 1 has, as is shown in figs. 2 and 3, guides 13 over which the warp beam 3 can be rolled into the bearings 5. In order to anticipate deviations in the positioning of the transporting machine 2 in relation to the weaving machine 1, on the one hand the guides 13 have been provided with bevels 14 and 15 near their free ends at their inside and upper surface, and on the other hand positioning rings 16 have been applied on the warp beam 3.

As is shown in fig. 4, the devices 5 essentially consist of two parts which are to be interconnected by means of a fastening 17, and which form a seating for the above-mentioned element, in this case the warp beam 3, whereby at least one part is movable, such that the seating can be opened and closed. The first part consists of a bearing block 18 and the second part of a hingeable bearing lid 19 operating in conjunction with it. The fastenings 17 each essentially consist of a support 21 attached to the first part, in this case to the frame 20 of the weaving machine 1; a first arm 22 which is attached to the free end of the second part, in this case the bearing lid 19, by means of a first hinge point 23; a second arm 24 which is attached to the first arm 22 by means of a second hinge point 25, at a distance L1 from the first hinge point 23, as indicated in fig. 6, and which has a part 26 to which the second arm 24 can clutch behind the support 21. The first arm 22 also has a stop 27 which operates in conjunction with the frame 20, for example with the upper surface of one of the guides 13.

Hereby the whole has been arranged such that in the situation whereby the second arm 24 clutches behind the support 21, the first hinge point 23 is situated between the support 21 and the second hinge point 25, whereby, as will be further described below, the whole passes a dead centre by the movement of the second hinge point 25, as a result of which the bearing lid 19 in its closed position is clamped to the bearing block 18, and whereby the stop 27 mentioned above keeps the whole in a taut situation, and this in a position whereby the first hinge point 23 is situated just over the dead centre.

As is also indicated in fig. 4, the bearing lid 19 is attached to the frame 20 in a rotatable manner by means of a hinge point 28.

The stop 27 mentioned above preferably consists of an adjusting bolt which is screwed into a projection 29 on the first arm 22, and which operates in conjunction with the upper surface of the guide 13 concerned.

The support 21 mentioned above protrudes sideways from the guide 13 concerned. As is shown in fig. 4, the position of the support 21 can be adjusted, as it is applied eccentrically to a rotary cylinder 30 in the frame 20, which can be fixed in a desired angle position by means of a clamping screw 31.

The above-mentioned part 26 of the second arm 24 has a recess, with an upper surface 32 and a lateral surface 33, whereby the upper surface 32 makes contact with the bottom side of the support 21, and the lateral surface 33 with the side of this support 21.

According to the invention, the fastening 17 also has means which allow the second arm 24, when the fastening 17 is opened, to be detached from the support 21 such that when the bearing lid 19 is opened, the second arm 24 can move freely along the support 21 mentioned above. These means consist of a stop 34, which, as is shown in fig. 4, is formed of an adjusting bolt which makes up part of the second arm 24. The stop 34 is moved such that it makes contact with the bearing lid 19. The function of this stop 34 is further explained in this description.

Moreover, on the bearing lid 19 a second stop 35 is applied for the second arm 24, the aim of which will also become apparent from the description.

The device also has means which allow the first arm 22 to be turned round the first hinge point 23 in either one or the other direction, in order to get the whole across the above-mentioned dead centre in either one of the other direction. In the embodiment as shown in fig. 4 these means consist of supporting planes 36 and 37 on which a pressure can be exerted. The first supporting plane

36 is situated along the side of the first arm 22, near the second hinge point 25, while the second supporting plane 37 is formed by the upper surface of a second projection 38 on the first arm 22. The projections 29 and 38 may form a whole, however.

It is clear that the hinge points 23 and 25 can be formed in various ways. As is shown in fig. 5, the first arm 22 can be turned round a shaft 39 which extends between two flanges 40 of the bearing lid 19. The second hinge point 25 is made such that the second arm 24 hangs sideways next to the guide 13 concerned.

It is clear that the fastenings 17 are made identical along both sides of the weaving machine.

The working of the device is explained below by means of various positions shown in the figures.

Fig. 4 shows the device in the situation whereby the warp beam 3 is located in the device 5, and the fastening 17 is in its locked position.

The clamping operation of the fastening 17 is shown schematically in figs. 6 to 8. In fig. 6 the arms 22 and 24 are in a position whereby the upper surface 32 of the part 26 just makes contact with the support 21, without however providing a clamping force. The distance L2 between the second hinge point 25 and the support 21 is shorter than the sum of the above-mentioned distance L1 between the two hinge points 23 and 25, and the distance L3 between the hinge point 23 and the support 21. The straight line X going through the hinge points 23 and 25 hereby is at an angle M in relation to the straight line Y going through the hinge point 23 and the support 21.

The second arm 24 is made flexible such that it can be transformed flexibly. In the embodiment shown this is realized because it is made in a U-shape and out of spring steel, whereby the second hinge point 25 and the part 26 are situated near the ends of the legs 41 and 42 of the U-shape.

As a result, when the first arm 22 is turned according to arrow P until the two hinge points 22 and 25 are in line with the support 21, the second arm 24 is stretched, as a result of which a situation as shown in fig. 7 comes about. Hereby the whole is located in a so-called dead centre. The second arm 24 hereby has a length L4 between the second hinge point 25 and the support 21, which is greater than the above-mentioned length L2.

When the turning according to arrow P is continued, the whole is pulled over the dead centre as a result of the clamping force exerted by the second arm 24. However, the motion is restrained by the stop 27, such that, as is shown in fig. 8 the distance L5 thus obtained between the second hinge point 25 and the support 21 is even greater than the above-mentioned distance L2. In other words, the straight line X is now situated on the other side of the straight line Y, and both straight lines now make an angle N smaller than the above-mentioned angle M. As a result, the bearing lid 19 is held in its closed position by a well-defined clamping force.

Automatic removal of the warp beam 3, by means of the transporting machine 2, is done as shown consecutively in figs. 9, 10, 11, 12 and 14.

According to the invention, to this end press elements such as taps 43, which operate in conjunction with the supporting planes 36 and 37 of the fastenings 17, have been applied to the sides of the arms 8.

According to fig. 9, the arms 8 are presented to the weaving machine by moving them to the warp beam 3 according to a direction V. The arms 8 are hereby located on such a height that the erect parts 44, which bound the recesses 9 at the front ends of the arms 8, can pass underneath the shaft ends 4. The taps 43 are hereby located at the height of the respective supporting planes 36.

When the taps 43 come into contact with the supporting planes 36, the first arms 22 are pulled over the dead centre, which creates a situation as shown in fig. 10.

When the arms 8 are moved further, the arms 22 turn further round their hinge points 23 and the upper surfaces 32 of the parts 26 of the arms 24 are detached from the supports 21, as a result of which a situation is created whereby only the lateral surfaces 33 of the parts 26 are in contact with the supports 21, and this under influence of their own weight. When the arms 8 are moved even further, the stops 34 make contact with the bearing lids 19, which creates a situation as shown in fig. 11.

The further moving of the arms 8 of the transporting machine 2 according to the direction V results in the first arm 22 of each of the fastenings 17 turning further round the first hinge point 23, in particular as shown in fig. 12. In each of the fastenings 17 the second hinge point 25 hereby exerts a force on the second arm 24. Due to the fact that the stop 34 is in contact with the bearing lid 19 and the fact that the stop 34, in relation to the hinge point 25, is situated opposite the hinge point 23, the arms 24 will turn round their hinge points 25 according to arrow A. The lateral surfaces 33 of the part 26 are hereby detached from the supports 21. When the arms 8 are moved further still, a position is obtained as shown in fig. 12, whereby the second arm 24 can pass freely along the support 21 when the bearing lid 19 is opened. The stop 34 hereby causes the fastenings 17 to open, this because of the movement of the arms 8, and is transferred to the arms 24 through the arms 22 and the hinge points 25. It is clear that to this end the above-mentioned means, in particular the stop 34, must be situated such that the arm 24 is turned in

a direction opposite to that of the arm 22.

It must be noted that in the first hinge point 23 means are provided which ensure that the first arm 22 turns with a certain friction in relation to the bearing lid 19, with the aim to prevent the second arm 24 from turning back by its own weight in the opposite sense of arrow A. As shown in figs. 5 and 13, these means consist for example of clamping elements which are situated between the flanges 40 and the first arm 22, which are formed, for example, of O-rings 45.

Next, the arms 8 from the situation in fig. 12 are moved vertically upward until the bottom sides 46 of the recesses 9 are situated at a short distance underneath the shaft ends 4. Then, as shown in fig. 14, the arms 8 are moved back into the transporting machine 2, as indicated by arrow W. As a result, the warp beam 3 is pulled out of the bowl-shaped bearing blocks 18 and subsequently rolled off over the guides 13. As is also shown in fig. 14, the bearing lids 19 hereby tilt open automatically, whereby the stops 35 prevent the arms 24 of the respective fastenings 17 to drop.

It is clear that the warp beam 3 eventually rests on the bottom sides 46 of the arms 8 when the warp beam 3 rolls off the bevels 15. The transporting machine 2 can then remove the empty warp beam 3.

The bearing lid 19 is held up in its opened position by holding means which in the embodiment shown consist of a clamp 47, for example formed by a U-shaped leaf spring which is fixed to the frame 20. These holding means can also consist of a permanent magnet or other holding means.

Applying another warp beam 3 is done as shown in figs. 15 to 18 consecutively.

When applying the new warp beam 3, it is rolled over the guides 13 to the bearing blocks 18, whereby it is pushed on by the sides 48 of the recesses 9, as shown in fig. 15. The arms 8 of the transporting machine 2 are hereby situated at almost the same height as shown in fig. 14. The shaft ends 4 hereby each press onto a stop 49 at the respective fastenings 17, fixed to the bearing lid 19, as a result of which the latter is detached from the clamp 47 and drops, while the warp beam 3 rolls into the bearing blocks 18. It must be noted that the stop 49 is situated in relation to the bearing lid 19 such that the bearing lid 19 already drops before the tap 43 comes in the environment of the bearing lid 19, and naturally such that this stop 49 does not impede the warp beam 3 when the bearing lid 19 is closed. Hereby a situation is created as shown in fig. 16.

By subsequently moving the arms 8 downward according to the vertical direction U as indicated, the taps 43 come into contact with the supporting planes 37, resulting in the first arms 22 turning round the first hinge points 23, such that the stops 34 of the fastenings 17 are detached from the bearing lids 19. As these stops 34 are then no longer in contact with the bearing lid 19, the arms 24 turn round their hinge points 25, this under the influence of their own weight, as a result of which the lateral surfaces 33 of their parts 26 make contact with the supports 21, as shown in fig. 17.

By moving the arms 8 further down, as shown in fig. 18, the fastenings are tightened and pulled over their dead centre, in a manner as shown in figs. 6 to 10, such that the situation of fig. 4 is obtained again. It must be noted hereby that the arms 8 are located lower than in the situation in fig. 9.

It is clear that the stop 34 does not necessarily need to be attached to the second arm 24, but can also make up part of the bearing lid 19, as is shown in fig. 19. Naturally, in this case the distance between the stop 34 and the first hinge point 23 must be greater than the distance between the two hinge points 23 and 25, or in other words, the stop 34 must be situated opposite the first hinge point 23 in relation to the second hinge point 25, such that the second arm 24 is moved in the opposite sense of the first arm 22 due to the movement of the arms 8 of the transporting machine 2.

Fig. 20 shows a variant whereby the stop 34 consists of a tap which is attached to the bearing lid 19 and which clutches to an opening 50 in the second arm 24. The stop 34 is hereby situated in almost the same place as in the embodiment of fig. 19.

Figs. 21 and 22 show yet another embodiment, whereby the stop 34 consists of an arm which can be rotated round a hinge point 51 in relation to the bearing lid 19, and which is pressed against the upper surface 53 of the second arm 24 by means of a spring 52, and which can operate in conjunction with a projection 54 applied to this arm 24. Fig. 21 shows the situation corresponding to the situation in fig. 12. The free end of the stop 34 is hereby pressed into a recess 55 in the above-mentioned upper surface 53. The latter has the advantage that the arms 22 and 24 are held in this position and can only be released from this position by an external force, because on the one hand the contact point of the stop 34 is situated in the recess 55, and on the other hand the second hinge point 25 is situated left of the connecting line between the above-mentioned contact point and the first hinge point 23. It is clear from fig. 21 that the stop 35 and the O-rings 45 are now redundant.

Fig. 22 shows another position corresponding to that of fig. 17. Hereby the hingeable stop 34 acts on the upper surface 53 of the second arm 24 such that this arm 24 is forced toward the support 21.

This force which, supplementary to the influence of the weight of the second arm 24, forces the above-mentioned part 26 of this arm 24 toward the support 21, has the advantage that the transition to the situation in fig. 22 is executed faster than if carried out under the influence of gravity alone.

It must be noted that in all embodiments the stop 34 is situated such that the part 26 moves away from the support 21 faster than the tap 43 of the arm 8 moves. This can be obtained by an appropriate mechanical advantage of lever of the second arm 24, in particular because the distance of the hinge point 25 to the stop 34 is made smaller than the distance to the part 26. This has the advantage that a small move of the tap 43 results in a large move of the part 26, which is necessary in order for this part 26 to pass along the support 21 when the bearing lid 19 is opened.

In order to avoid any damage as a result of tolerance deviations of the positioning of the transporting machine 2 when the taps 43 come into contact with the fastenings 17, measures have been taken to obtain a certain flexibility by this contact. As shown in figs. 23 and 24, the supporting planes 36 and 37 can to this end be formed by means which have a certain flexibility.

In the embodiment in fig. 23, these supporting planes 36 and 37 are formed by the free ends of a profile 56 which is attached to the first arm 22 and which consists for example of a bent leaf spring or similar. Tolerance deviations of the positioning of the transporting machine 2 as the taps 43 make contact with the supporting planes 36 or 37 are anticipated by the bending of the flanges of the profile 56.

In the embodiment in fig. 24, the supporting planes 36 and 37 make up part of the arms 57 and 58 which are attached to the first arm 22 by means of a hinge point 59 and which are supported by the relatively rigid springs 60 and 61. The arms 57 and 58 are in their free situation in the position as shown in fig. 24. Tolerance deviations of the positioning of the transporting machine 2 are in this case anticipated by pressing the spring 60 or 61.

According to a variant, the press elements, in other words the taps 43, are made in a flexibly transformable, for example bendable, material such that the tolerance deviations of the positioning of the transporting machine 2 are anticipated by the transformation of these taps 43.

According to another variant, shown in fig. 25, the taps 43 are supported in a flexible manner by means of springs 62 and 63 according to two directions, in order to anticipate the above-mentioned tolerance deviations.

As shown in fig. 26, the first arm 22 of each of the fastenings 17 may be equipped with a grip 64 for manually opening and fastening this fastening 17.

When the fastening 17 is opened, the grip 64 is pressed into a clamp 65, which is made analogous to the clamp 47, but is attached to the bearing lid 19 concerned. As a result it is possible to lift the bearing lid 19 by this grip 64.

As shown in fig. 26, one or more springs 66 can be applied between the first arm 22 and the second arm 24, which pull these arms together, in particular pull the second arm 24 to the support 21. This has the advantage that the part 26 moves faster to the support 21 during the transition between the positions in figs. 16 and 17. This is particularly advantageous in the case of manual operation. It must be borne in mind that during the transition of the position according to fig. 12 to the position of fig. 14, the arms 22 and 24 remain separated, such that the part 26 can pass along the support 21. In the embodiment shown in fig. 26 this is obtained by the above-mentioned clamp 65. This could also be obtained by creating a sufficiently great friction in the first hinge point 23, for example by means of the above-mentioned O-rings 45. These O-rings, however, are not necessary in the embodiment in fig. 26.

It is clear that the device 5 described above can also be applied for attaching a cloth beam, a sand beam, a back rest beam, a warp stop motion, harness guides or other components on the frame of a weaving machine. It is also clear that the fastening parts do not necessarily consist of cylindrical shaft ends 4, but may also have another shape. The parts 18 and 19 are in that case made in an appropriate form. In fig. 27 an example is shown whereby the shaft ends in have two flat faces 67 and 68.

In the embodiment described above, the part 26 to which the second arm 24 clutches behind the support 21 is situated between the seating of the removable element and the support 21. According to a variant, this part 26 can also be situated at the side of the support 21 which is turned away from the seating of the removable element. This means that the support 21 is situated between the seating and the second arm 24.

A first example of this is shown in figs. 28 and 29. Fig. 28 shows the fastening 17 in its closed position. Hereby the part 26 clutches behind the support 21 and the whole is in a taut situation, analogous to the embodiments mentioned above. The whole remains in a taut position, as the turning of the first arm 22 is prevented by means of a stop 27 which in this case is applied to the bearing lid 19.

To open the fastening 17, the whole can be pulled over a dead centre, for example by exerting a pressure on the first arm 22 by means of the tap 43 mentioned above. The whole then takes a posi-

tion as shown in fig. 29, whereby the first arm 22 operates in conjunction with a clamp 65 which is attached to the bearing lid 19. In the position mentioned above, the centre of gravity Z of the whole in the example shown is situated in relation to the first hinge point 23 such that the first arm 22 is inclined to turn to the bearing lid 19. In this case the clamp 65 is not necessarily provided.

Also, means are provided which allow the second arm 24 to be detached from the support 21 when the fastening 17 is opened, and which consist of stopping means which for example are formed by the shaft end of the first hinge point 23 and the side 69 of the second arm 24 facing it. According to figs. 28 and 29, these stopping means are situated such that they make contact as the tap 43 is pressed when the fastening 17 is opened, such that the part 26 is removed from the support 21 not only at its upper surface 32 but also at its lateral surface 33. As a result the part 26 of the support 21 is removed such that the second arm 24 can move freely along the above-mentioned support 21 when the seating is opened. In the embodiment of figs. 28 and 29 this is obtained because the above-mentioned stopping means are situated between the second hinge point 25 and the above-mentioned part 26, and because the cooperation of the stopping means make the second arm 24 turn round the first hinge point 23, as it were.

It is clear that instead of the shaft end of the first hinge point 23 use can be made of another stop which can operate in conjunction with the above-mentioned second arm 24.

Figs. 30 and 31 show a variant of the embodiment according to figs. 28 and 29, whereby the above-mentioned stopping means are made such that, as shown in fig. 30, at the moment the fastening 17 is pulled loose, these stopping means do not yet operate in conjunction with each other, and that the second arm 24 still rests against the support 21 with the lateral surface 33. As shown in fig. 31, the part 26 of the second arm 24 only comes off the support 21 after the bearing lid 19 has already turned over a short distance as the stopping means come into contact with each other. The stopping means are hereby situated such that the second arm 24 can move freely along the above-mentioned support 21 when the seating is opened. In this case, the stopping means are also situated between the second hinge point 25 and the part 26, such that these only come into contact with each other as soon as the bearing lid 19 is already partly opened, as a result of which these stopping means allow the part 26 of the second arm 24 to move freely along the above-mentioned support 21 as the seating is opened further.

As shown in figs. 28 to 31, the straight line connecting the lateral surface 33 with the second hinge point 25 and the upper surface 32 form an acute angle. As a result, during the normal operation of the weaving machine the part 26 of the second arm 24 is prevented from coming off the support 21, and the fastening 17 remains securely closed.

The present invention is in no way limited to the embodiments described and shown in the drawings; on the contrary, such a device for attaching a beam in weaving machines can be made in various variants while still remaining within the scope of the invention.

Claims

1. Device for attaching removable elements to a machine, consisting of two parts forming a detachable seating for the removable element (3) and a fastening (17) operating in conjunction with these parts, characterized in that said fastening (17) essentially consists of a support (21) attached to a first part (18) of said parts; a first arm (22) which is attached to the second part (19) of the above-mentioned parts by means of a first hinge point (23); a second arm (24) which is attached to the first arm (22) by means of a second hinge point (25), at a distance (L1) from the first hinge point (23), and which has a part (26) to which the second arm (24) can clutch behind the support (21); and means which make it possible for the second arm (24) to move freely along said support (21) when the seating is opened.

2. Device according to claim 1, characterized in that in the situation whereby the second arm (24) clutches behind the support (21), the first hinge point (23) is situated between the support (21) and the second hinge point (25), whereby the whole can be brought in a taut situation by moving the second hinge point (25) over a dead centre.

3. Device according to claim 1 or 2, characterized in that the part (26) to which the second arm (24) can clutch behind the support (21) is situated between the seating of the removable element (3) and the above-mentioned support (21) when the fastening (17) is in its closed position.

4. Device according to claim 3, characterized in that the above-mentioned means also make it possible for the second arm (24) to be detached from the support (21) when the fastening (17) is opened, and in that they consist of a stop (34) which is applied to the second arm (24) and which is situated opposite the first

hinge point (23) in relation to the second hinge point (25), whereby this stop (34) makes contact with said second part (19) when the fastening (17) is opened.

5. Device according to claim 3, characterized in that the above-mentioned means also make it possible for the second arm (24) to be detached from the support (21) when the fastening (17) is opened, and in that they consist of a stop (34) which is applied to the second part (19) and which makes contact with the seoond arm (24) when the fastening (17) is opened, whereby this stop (34) is situated at a greater distance from the first hinge point (23) than the second hinge point (25).

6. Device according to claim 5, characterized in that the stop (34) is made up of an arm attached in a hingeable manner to the second part (19) whose end operates in conjunction with a recess (55) at the end of the second arm (24), particularly with the end which, in relation to the second hinge point (25), is situated opposite the end to which the part (26) is formed which operates in conjunction with the support (21), whereby said stop (34) is pressed against the second arm (24) by means of a spring (52).

7. Device according to claim 1 or 2, characterized in that the part (26) to which the second arm (24) can clutch behind the support (21) operates in conjunction with the side of the support (21) which is turned away from the seating of the removable element (3).

8. Device according to claim 7, characterized in that the above-mentioned means which make it possible for the second arm (24) to move freely along the above-mentioned support (21) when the seating is opened are situated such that the second arm (24) is detached from the support (21) when the fastening (17) is opened.

9. Device according to claim 7, characterized in that the above-mentioned means which make it possible for the second arm (24) to move freely along the above-mentioned support (21) when the seating is opened are situated such that the second arm (24) keeps resting against the support (21) when the fastening (17) is opened, and that the second arm (24) is detached from the support (21) when the seating is opened.

10. Device according to claim 8 or 9, characterized in that the above-mentioned means consist of the shaft end of the first hinge point (23) and a side (69) of the second arm (24).

11. Device according to any of the above claims, characterized in that the first arm (22) is provided with means by which the whole formed by the first arm (22) and the second arm (24) can be moved, such that the fastening (17) is opened and closed respectively.

12. Device according to claim 11, characterized in that the means to open or close the fastening (17) respectively consist of two supporting planes (36, 37).

13. Device according to claim 12, characterized in that the supporting planes (36, 37) consist of two flexibly bendable flanges of a profile (56) attached to the first arm (22).

14. Device according to claim 12, characterized in that the supporting planes (36, 37) are part of two arms (57, 58) which are attached in a hingeable manner to the first arm (22) and which are supported by springs (60 ,61).

15. Device according to any of the above claims, characterized in that the part (26) to which the second arm (24) can clutch behind the support (21) has a recess which operates in conjunction with this support (21).

16. Device according to any of the above claims, characterized in that the fastening (17) is tightened over a dead centre, whereby it has a stop (27) to keep the fastening (17) in taut situation.

17. Device according to any of the above claims, characterized in that a stop (35) has been applied to the second part (19) which limits the movement of the second arm (24) when the seating is opened.

18. Device according to any of the above claims, characterized in that a certain friction has been provided in the first hinge point (23).

19. Device according to claim 18, characterized in that at least one O-ring (45) has been provided at the height of the first hinge point (23) between the second part (19) and the first arm (22).

20. Device according to any of the above claims, characterized in that the second part (19) has been attached in a hingeable manner and in that it has a stop (49) which allows the second

element (19) to close when the removable element (3) is applied in the device.

21. Device according to claim 12, whereby use is made of a transporting machine (2) to supply and remove the removable elements (3), particularly whereby these elements (3) are mounted on either side in seatings, each provided with a fastening (17), characterized in that this device also has two press elements (43) which are each mounted on an arm (8) of the transporting machine (2) and which can operate in conjunction with the above-mentioned supporting planes (36, 37).

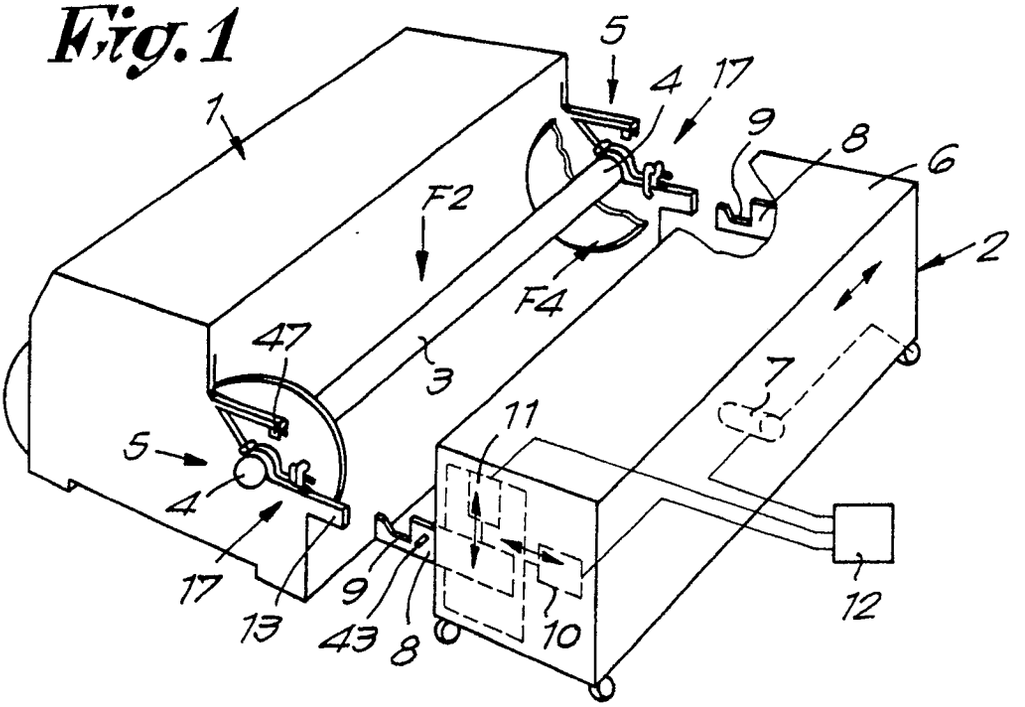
22. Device according to claim 21, characterized in that the press elements (43) consist of flexibly transformable taps.

23. Device according to claim 21, characterized in that the press elements (43) consist of taps supported by means of springs (62, 63).

24. Device according to claim 2, characterized in that the second arm (24) is flexibly transformable.

25. Device for attaching removable elements in a machine, whereby use is made of at least one fastening (17) to attach the removable element (3) in a seating, which has been provided with supporting planes (36, 37) by which the fastening can be opened and closed, and whereby use is made of a transporting machine (2) which is equipped with one or more arms (8) to supply or remove said element (3), characterized in that the arm or arms (8) of the transporting machine (2) have at least one press element (43) which can operate in conjunction with said supporting planes (36, 37).

Fig. 1



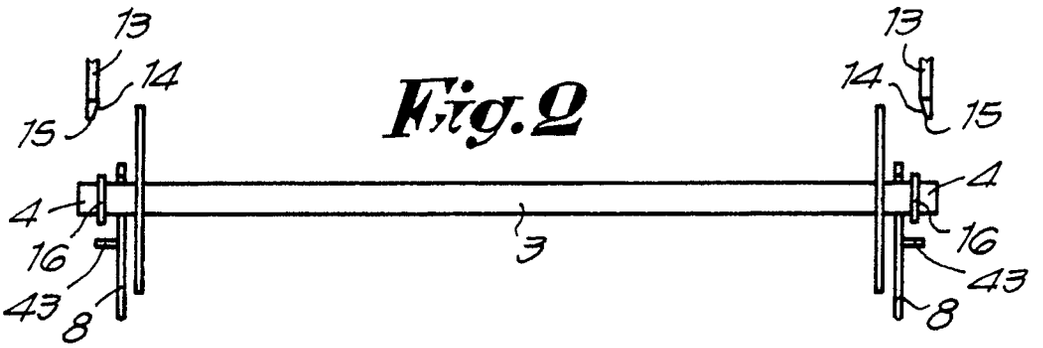


Fig. 2

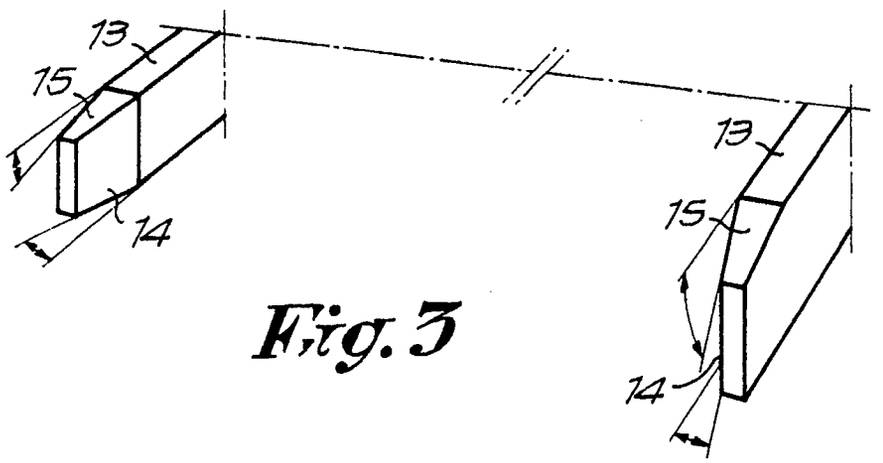


Fig. 3

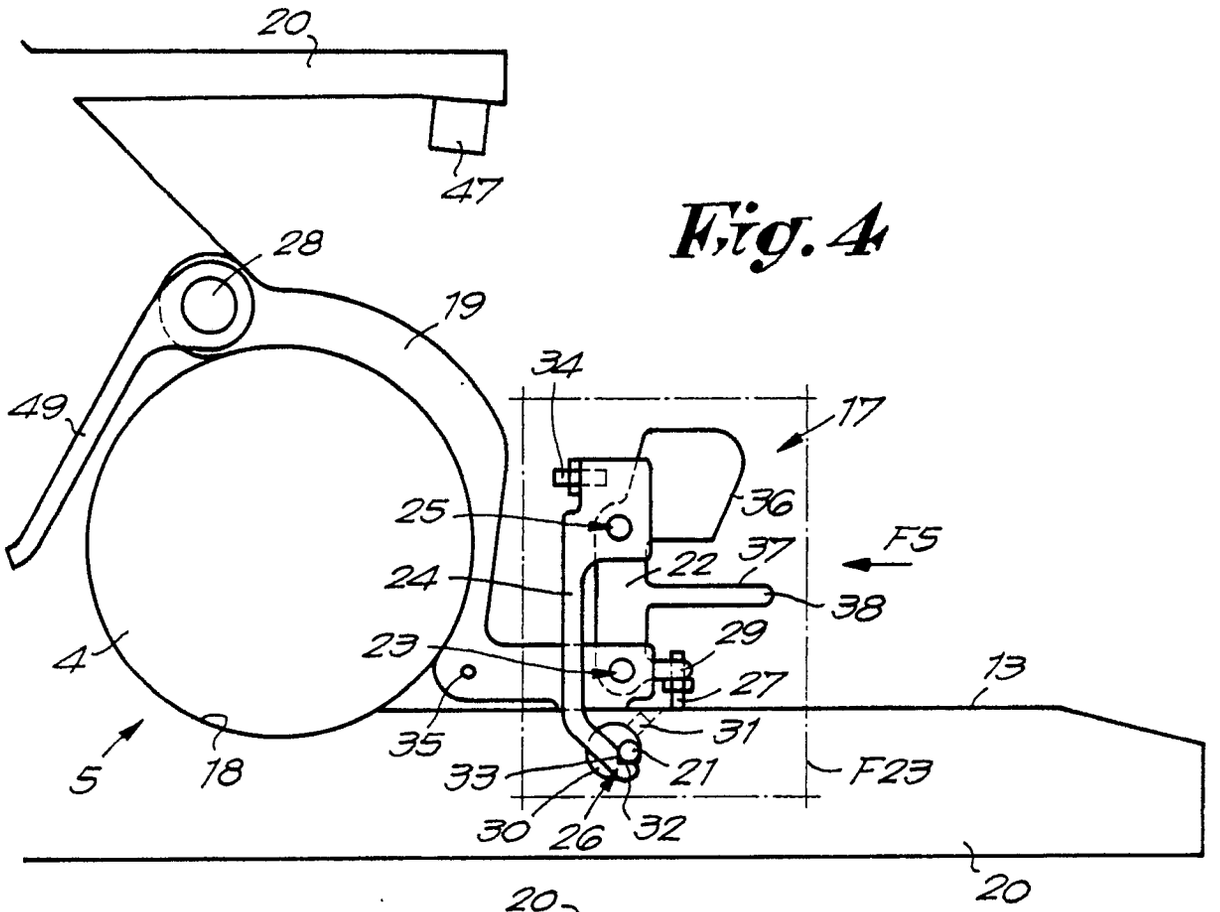

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Fig. 4

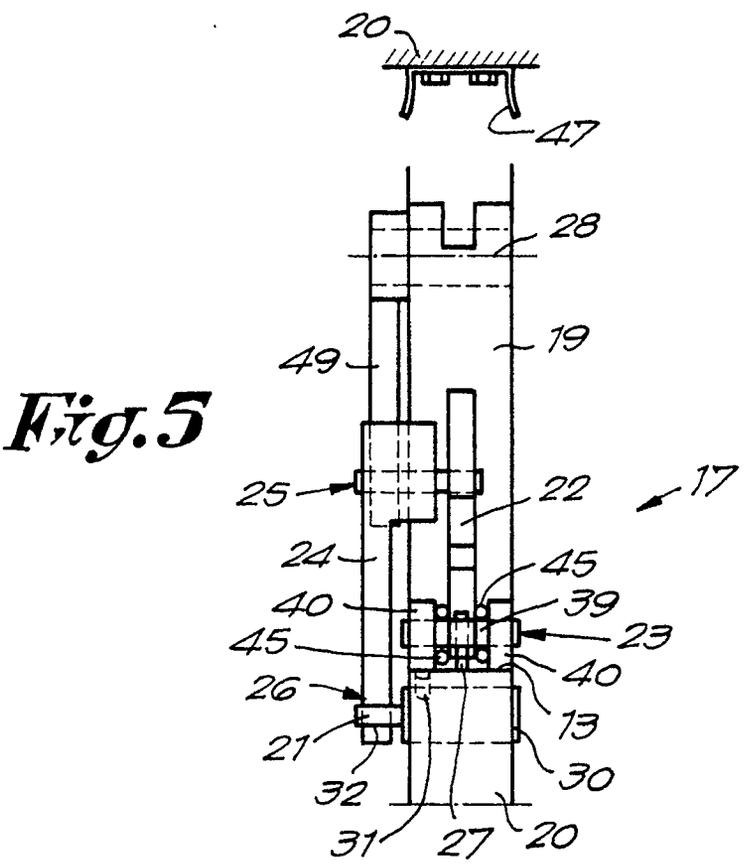
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Fig. 5

Fig.6

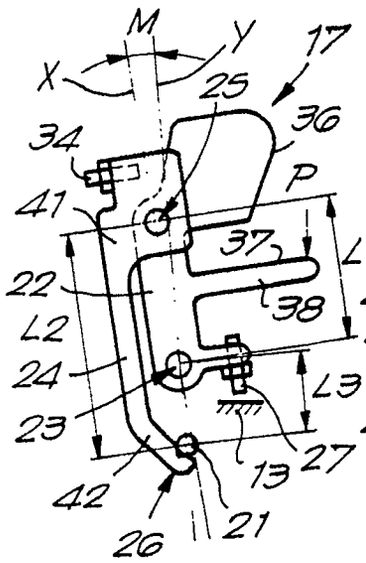


Fig.7

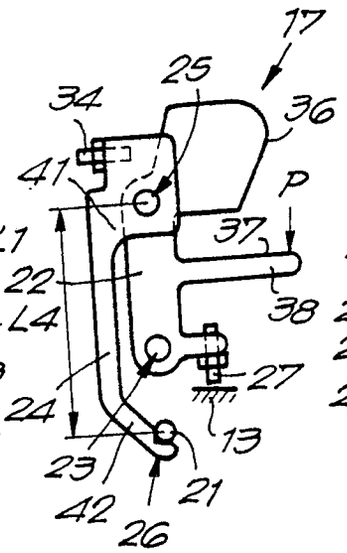
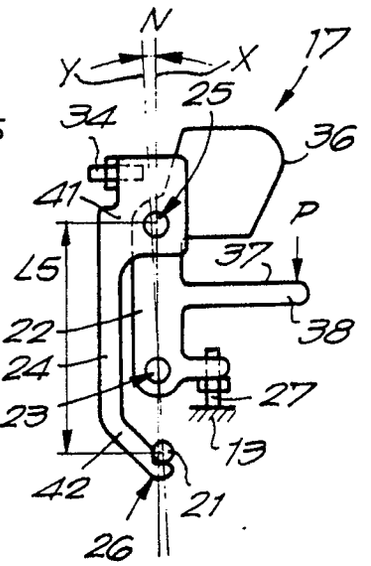


Fig.8



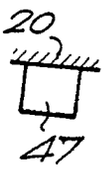
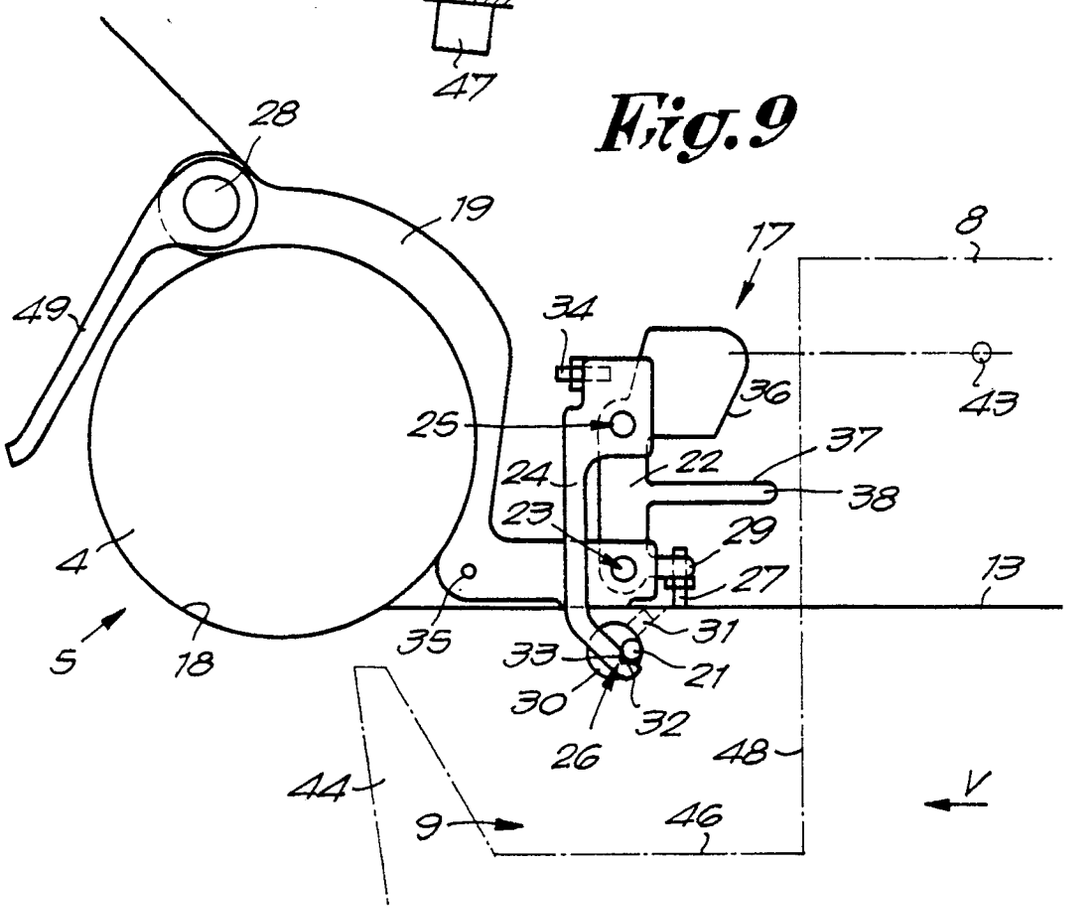


Fig.9



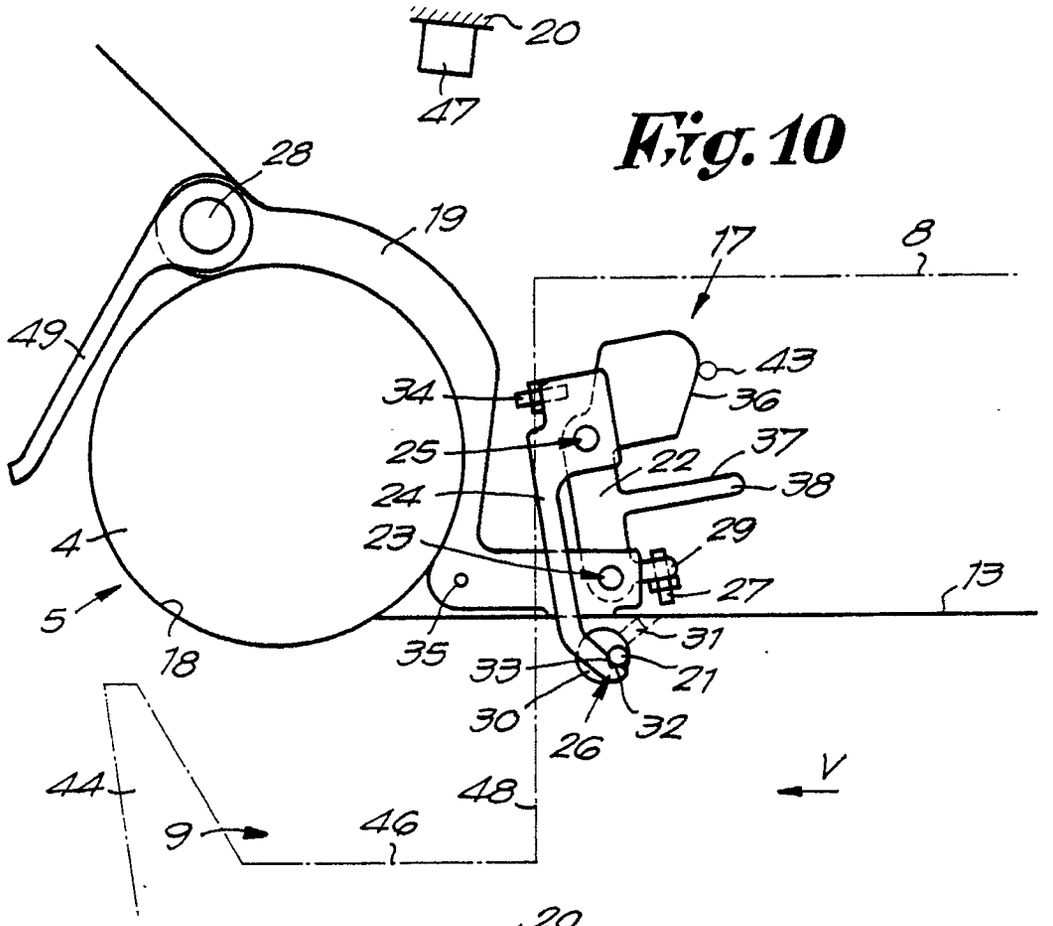

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Fig. 10

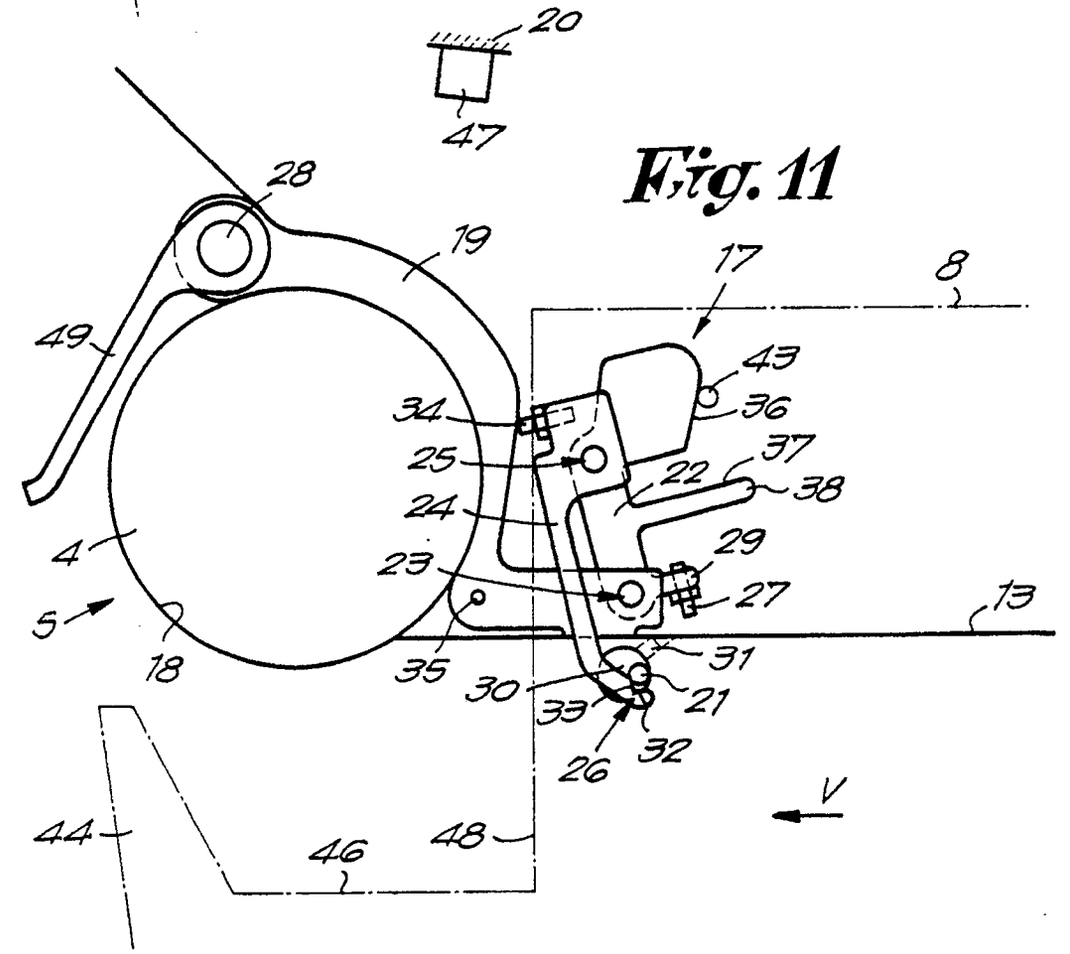
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Fig. 11

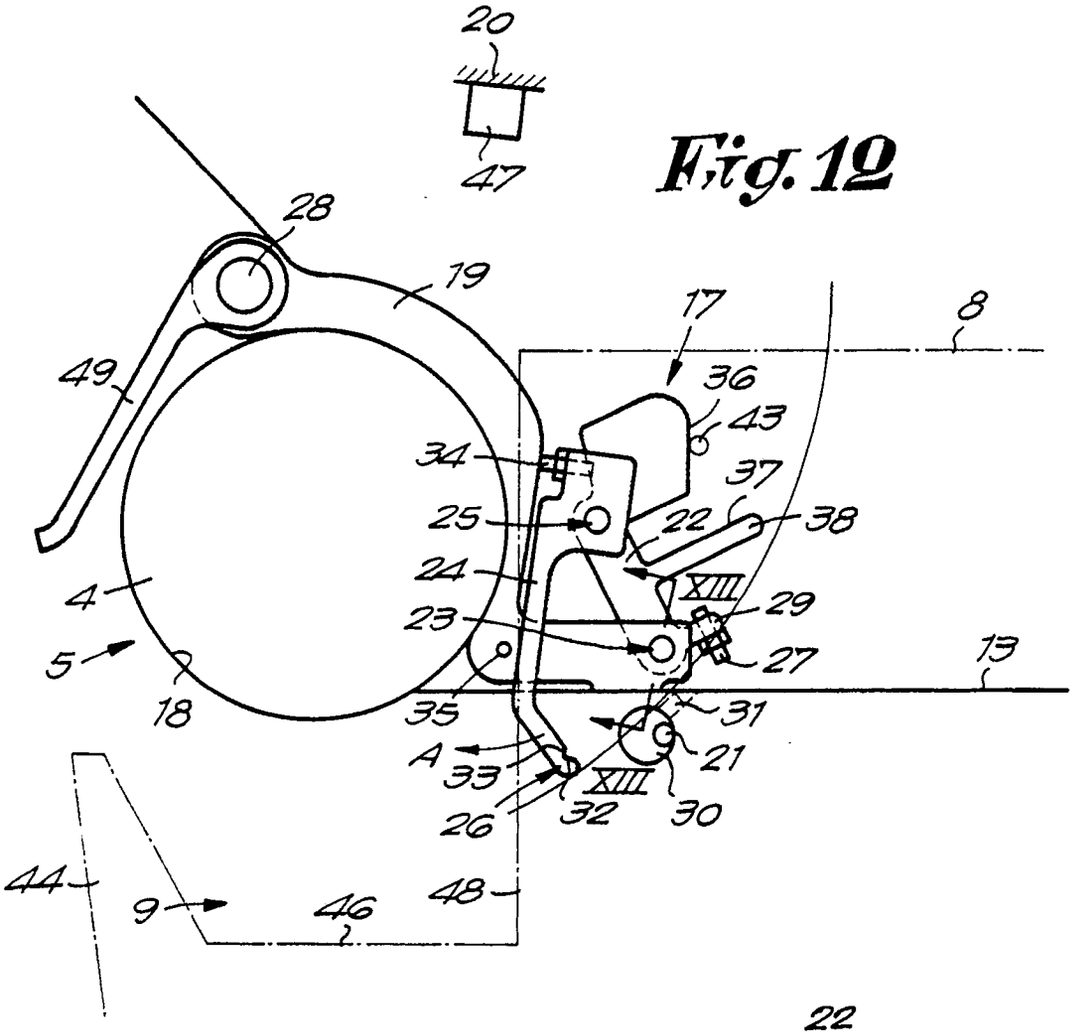
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Fig. 12

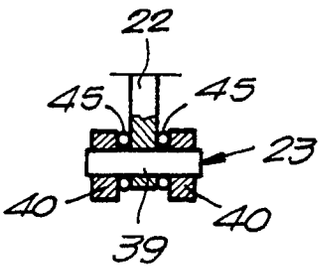
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Fig. 13

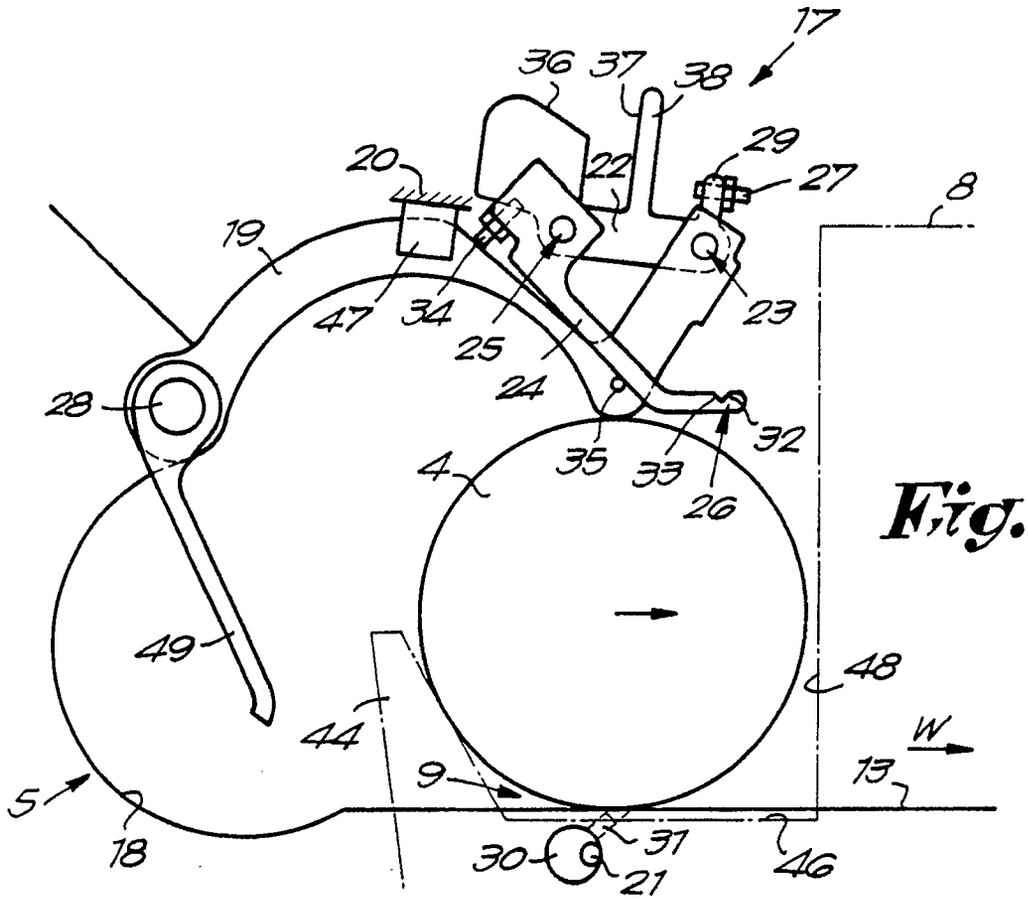
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Fig. 14

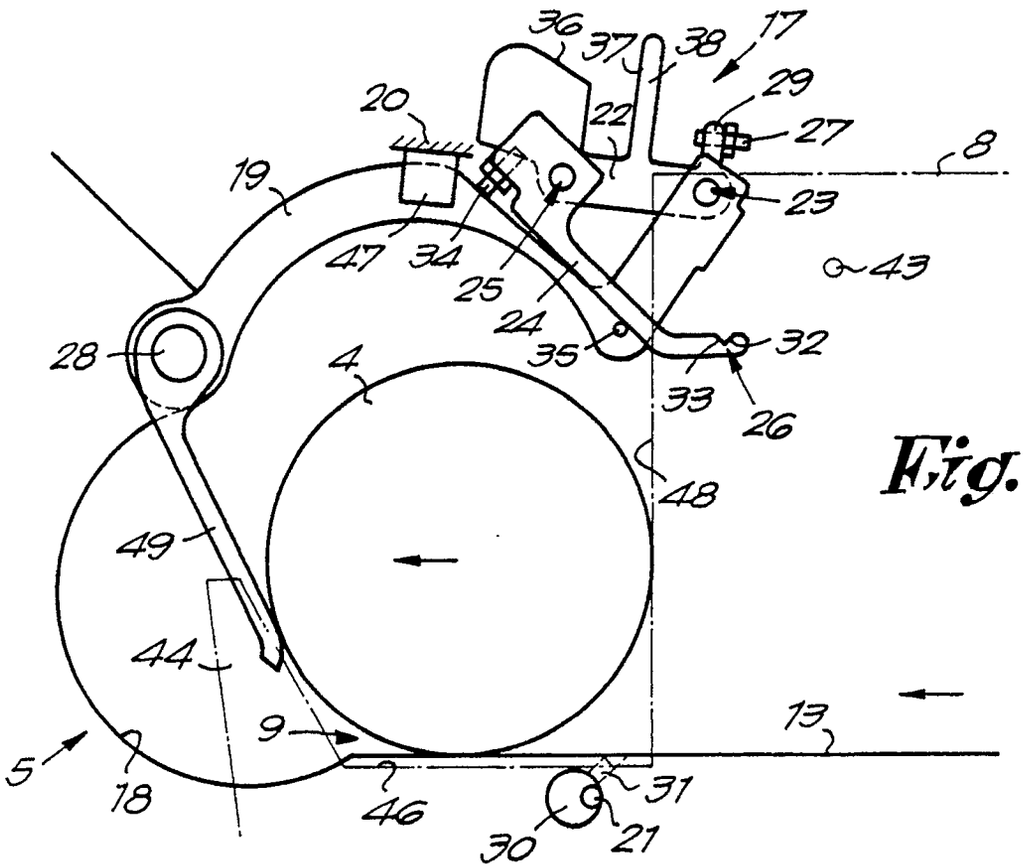
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Fig. 15

Fig. 16

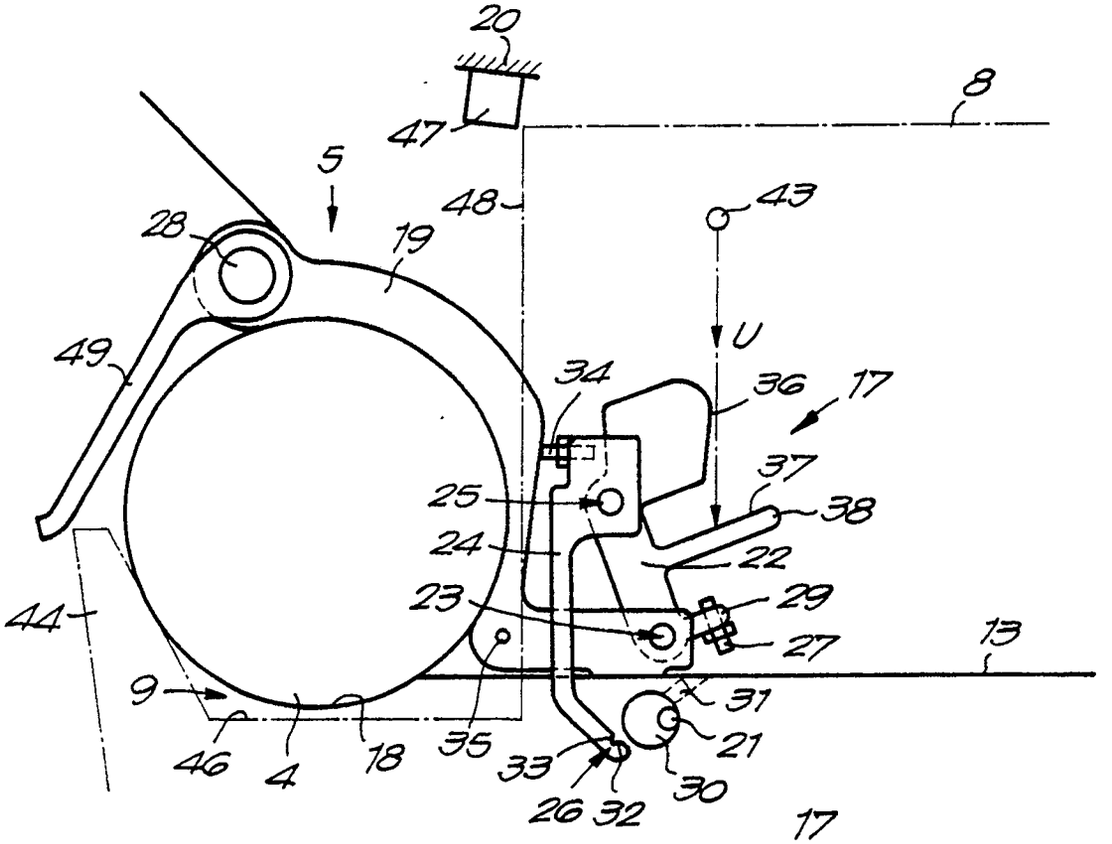
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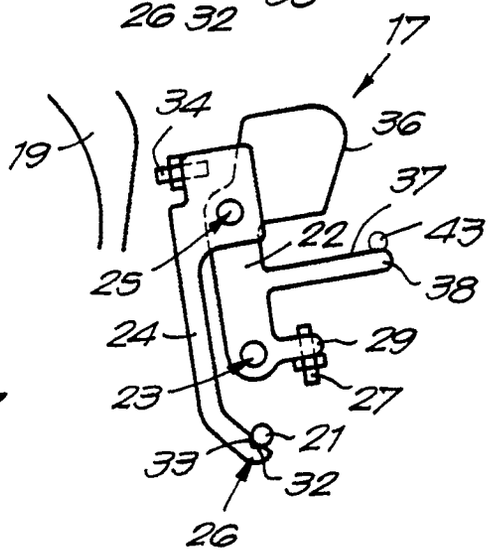
Fig. 17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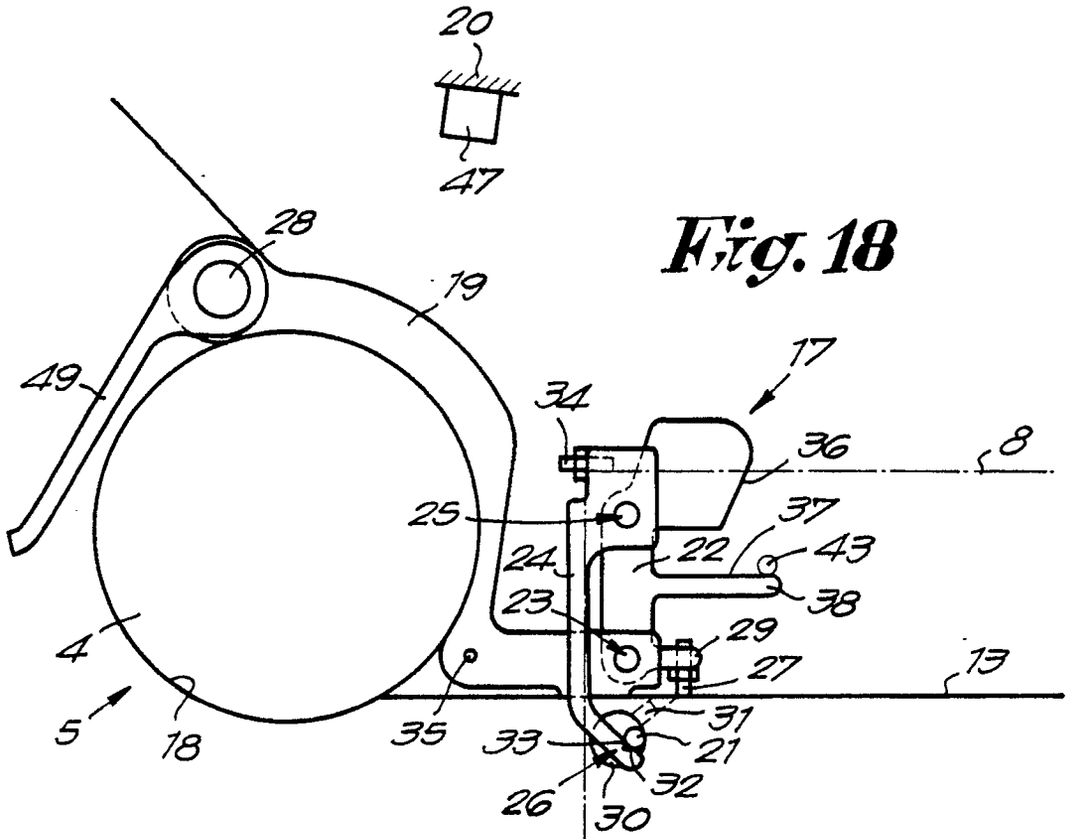

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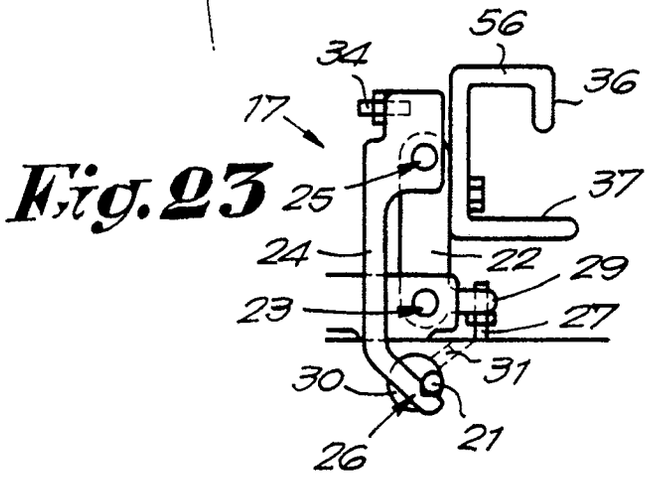

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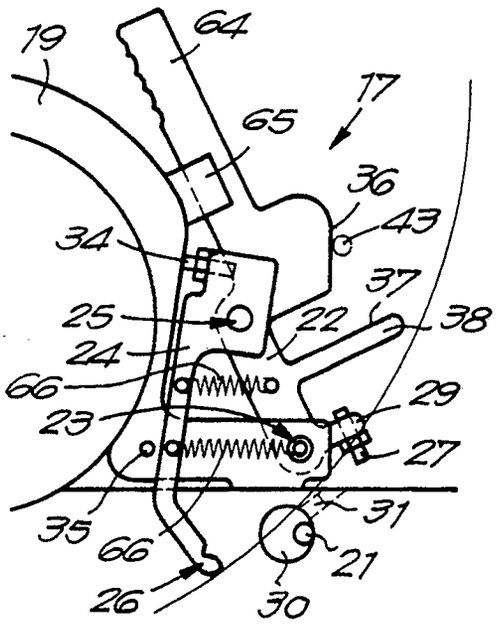

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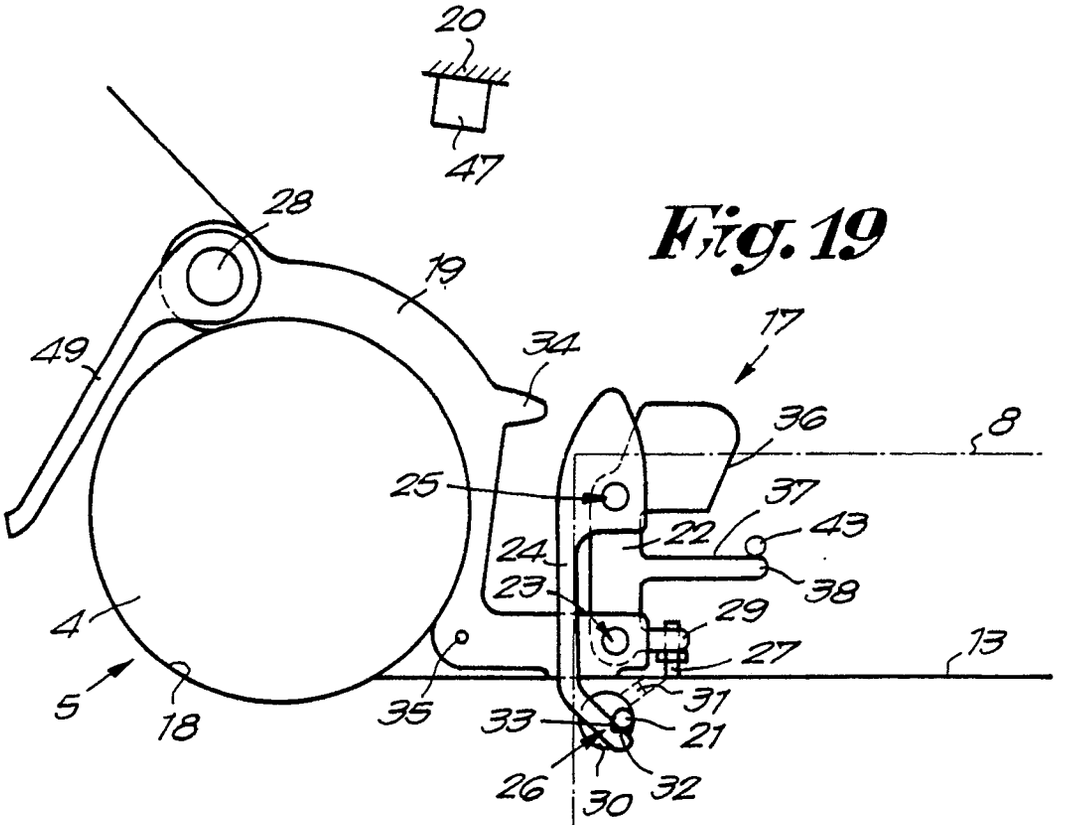

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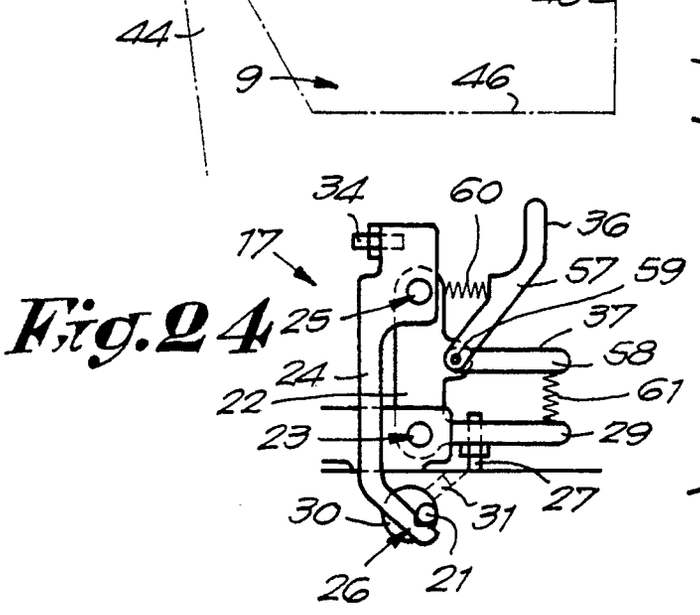
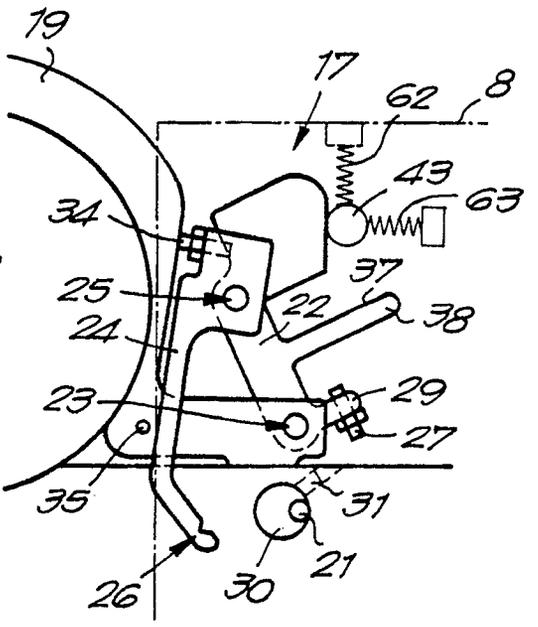


Fig. 24



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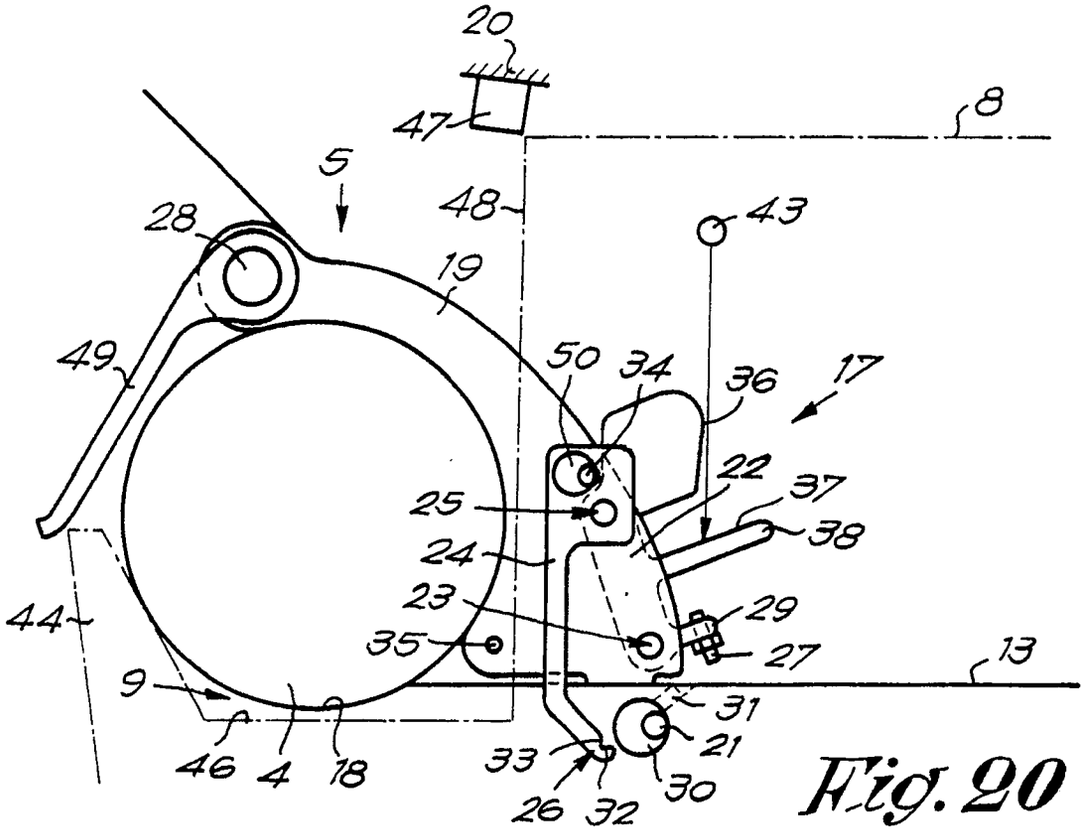
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Fig. 20

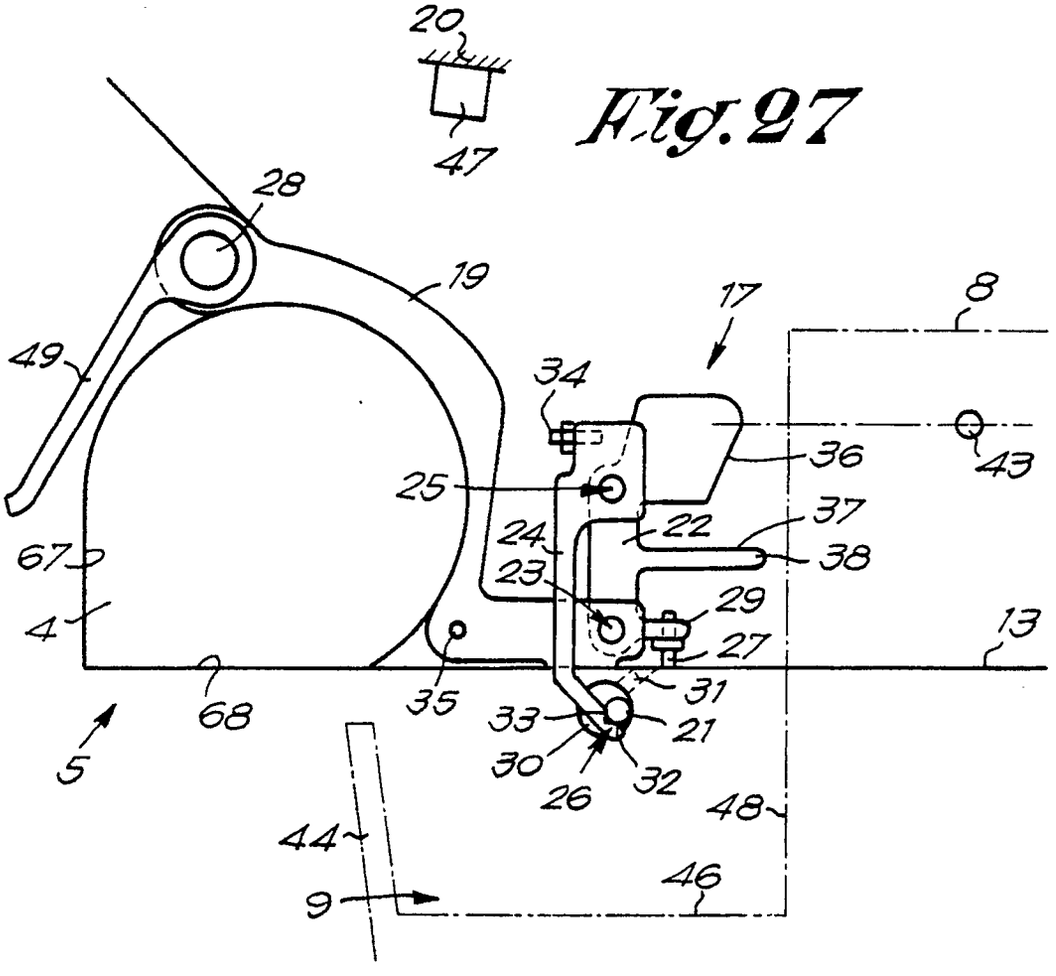
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Fig. 27

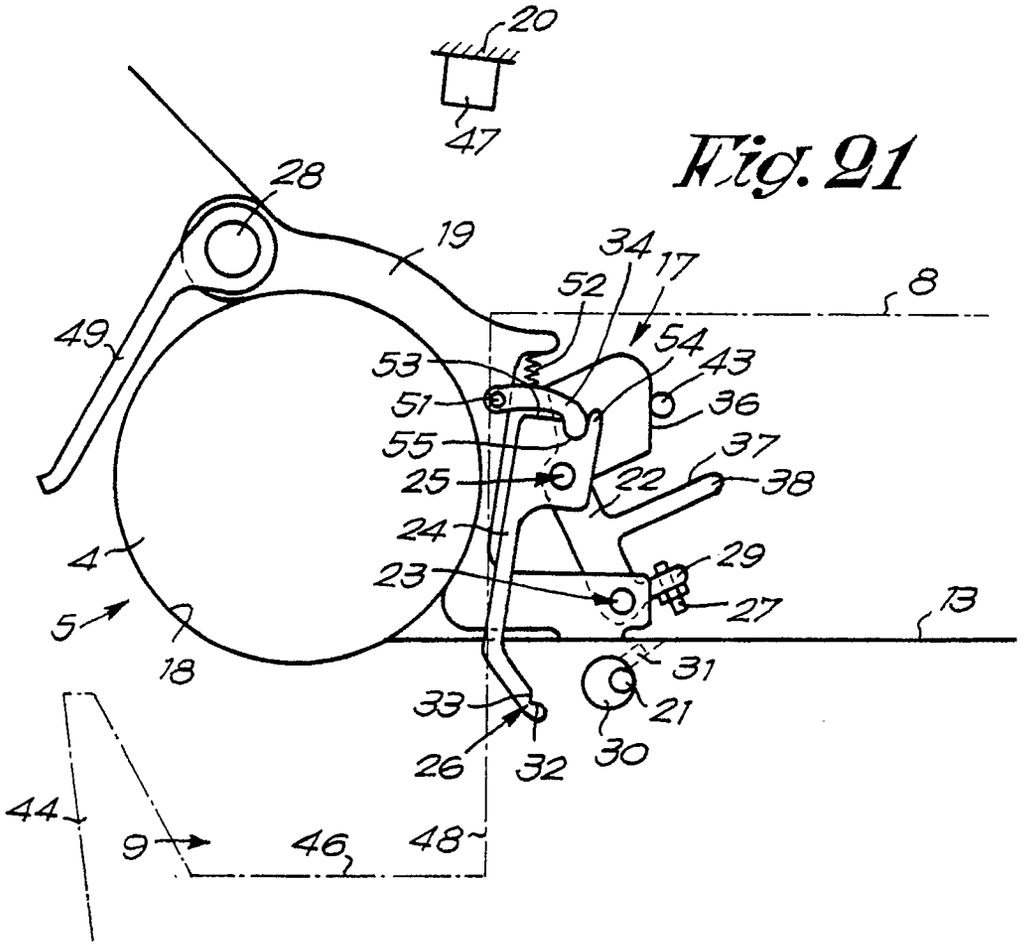
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Fig. 21

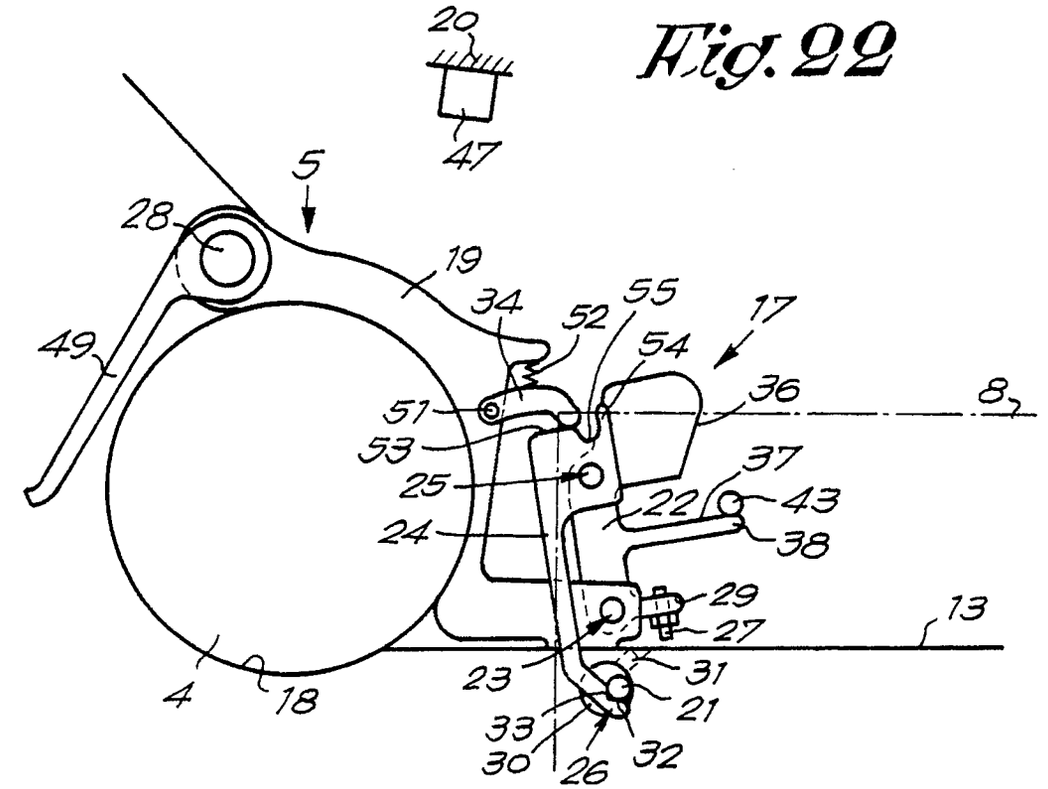
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Fig. 22

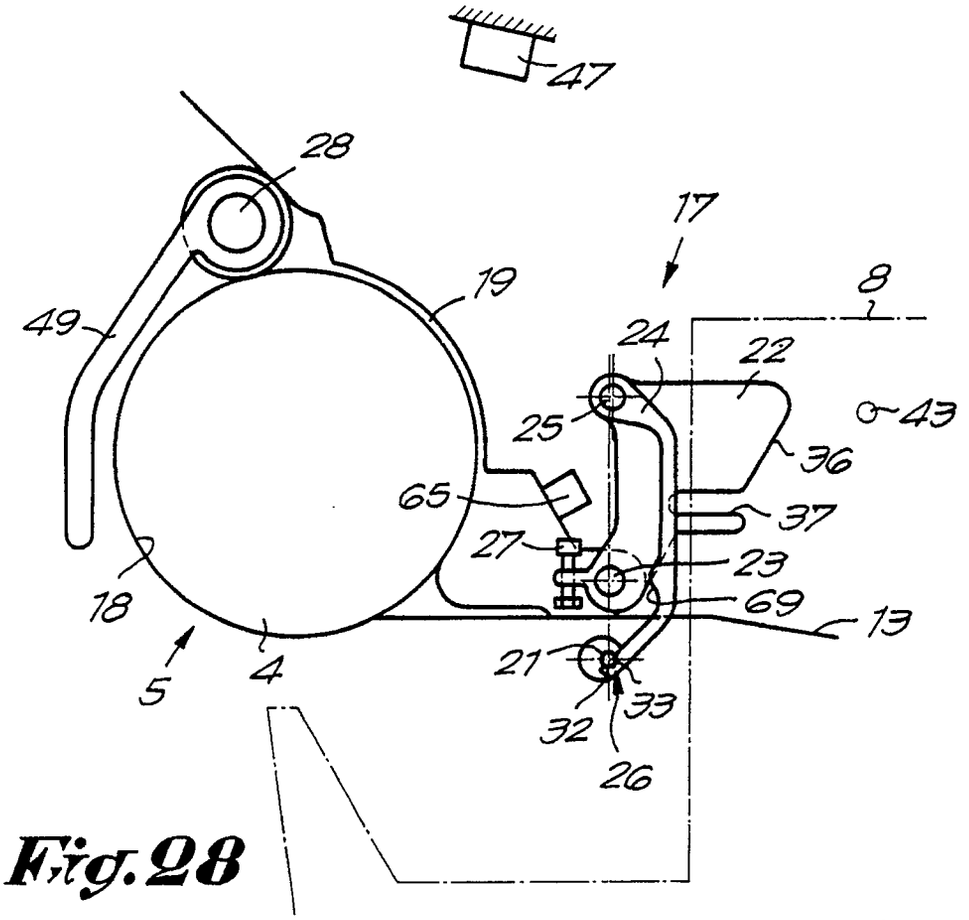
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Fig.28

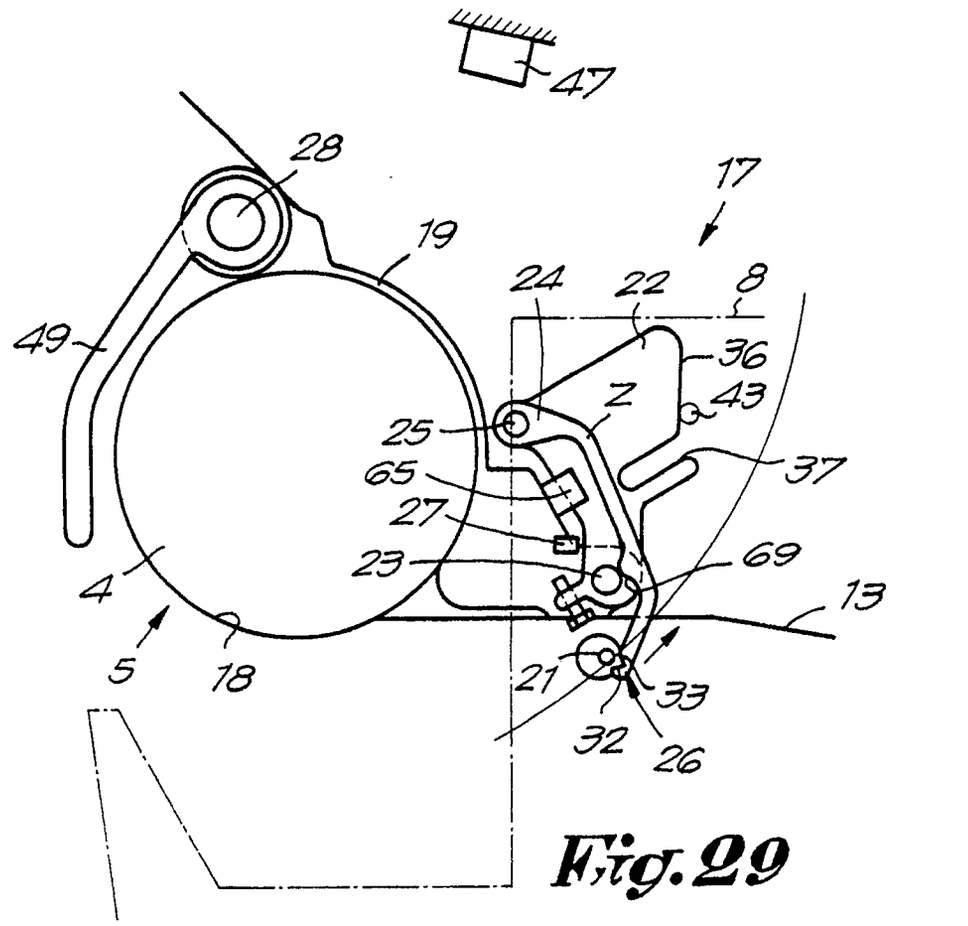
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Fig.29

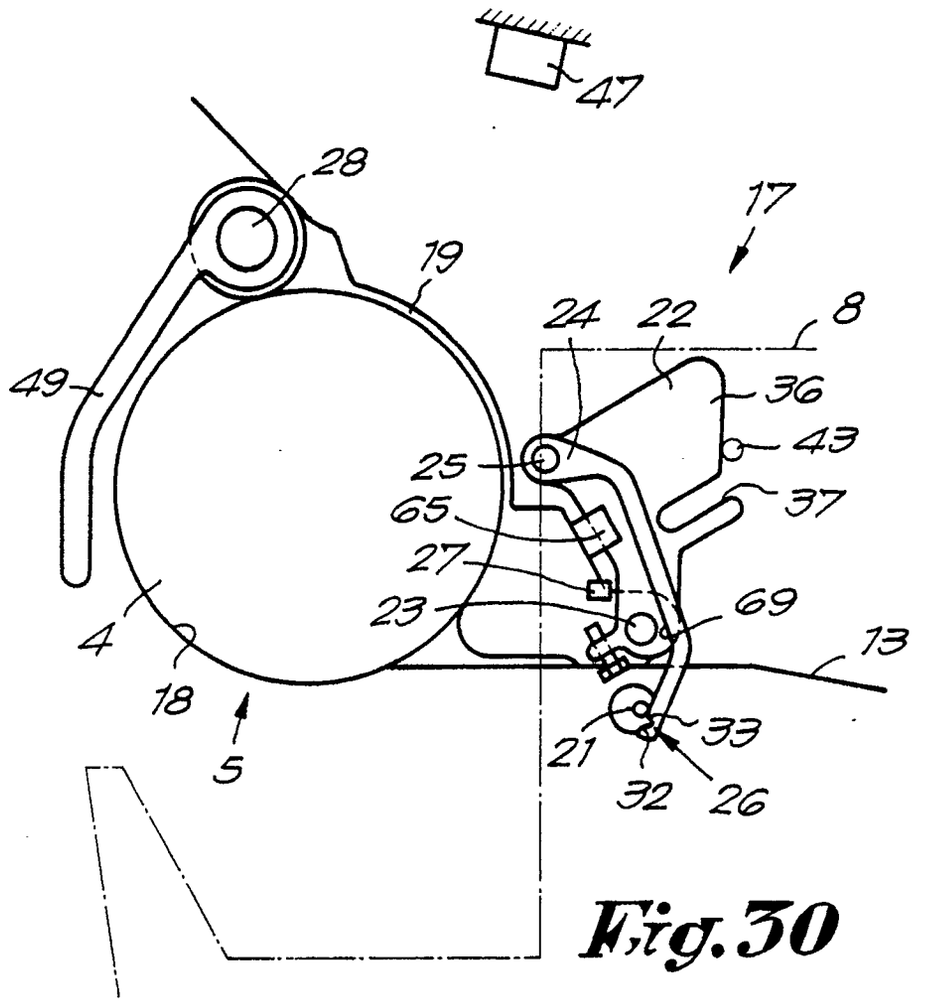
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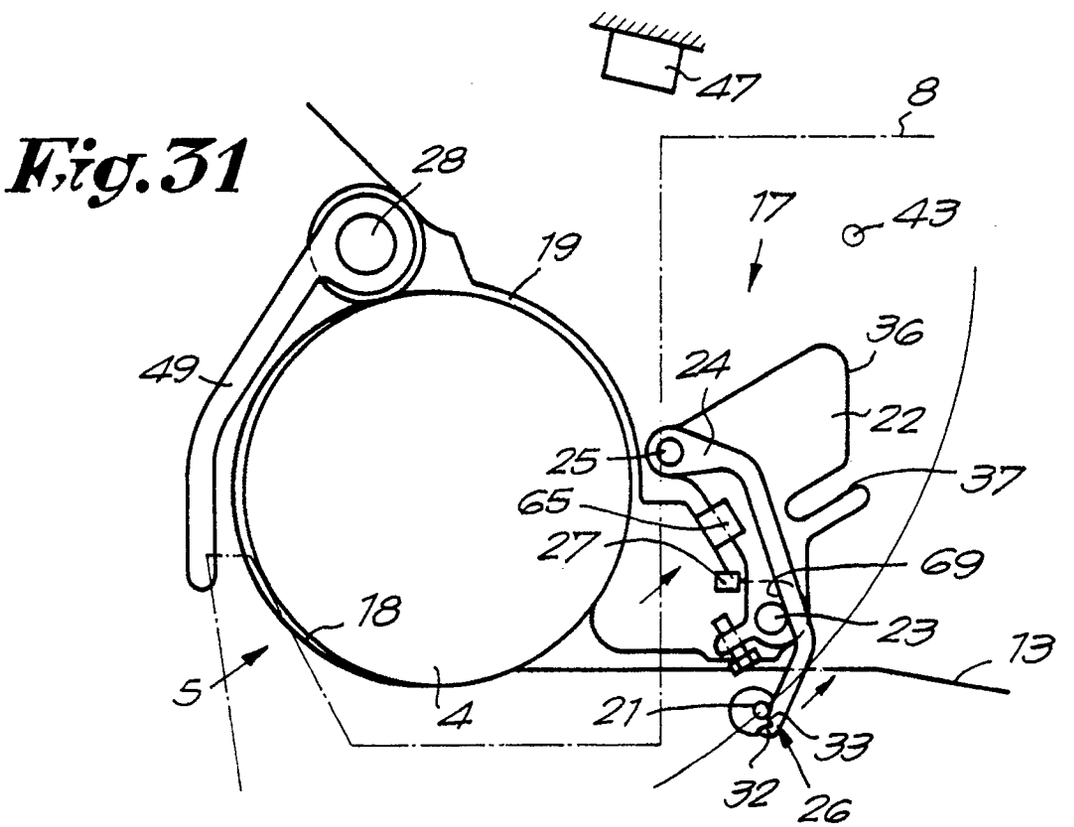
Fig.30

Fig.31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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 20 0139

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.5)
A	DE-A-2 501 319 (EISENHUTT PRINZ RUDOLF) * figure 1 *	1	D 03 J 1/00 B 65 H 19/12
A	US-A-3 938 671 (LEWEY) * figure 1 *	1	
A	DE-B-1 098 457 (JURGENS) * figure 1 *	1	
A,P	EP-A-0 387 189 (SULZER) * the whole document *	1	
A	US-A-1 803 286 (THATCHER)		
A	GB-A-7 693 02 (HOLT)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D 03 J
B 65 H
D 03 D
F 16 C

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	27 May 91	BOUTELEGIER C.H.H.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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A: technological background
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E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

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