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(71) Applicant: **S.R. Gent PLC, Dodworth Road, Barnsley Yorkshire S70 6JE (GB)**

(72) Inventor: **O'Keefe, Michael, 13 Catania Rise, Darfield Barnsley South Yorkshire (GB)**
Inventor: **Fox, John Richard, 45 The Avenue, Tankersley Barnsley South Yorkshire (GB)**

(74) Representative: **Orr, William McLean et al, Haseltine Lake & Co Hazlitt House 28 Southampton Buildings Chancery Lane, London WC2A 1AT (GB)**

(54) Loop forming attachment for sewing machine.

(57) There is disclosed a loop-forming attachment device for a sewing machine which is adapted to cooperate with a sewing needle (10) and associated hold-down arrangement (10') in order automatically to form and to present a loop (16) ready for attachment by stitching to a garment or garment part (43), the loop (16) being formed from a supplied length of tape (14). The attachment device comprises a forward clamp (11) and a rear clamp (12) which hold therebetween a leading end (13) of a length of tape (14), the clamps being movable between a forward position (F) and a rearward position (R), a retaining device (15) spaced forwardly of the forward position (F) and arranged to receive and to retain the looped end (16), a loop former (17) reciprocable between an initial position at or rearwardly of the rearward position (R) and a forward position in which it cooperates with the retaining device (15), and a cutter (18) arranged between the forward and rearward positions (F, R) and which operates to cut the formed loop (16) from the length of tape (14), which can then be attached by stitching via the sewing needle (10) to a garment (43). A nozzle (23) is arranged to urge the new leading end of the severed tape (14) against the rear clamp (12) at the start of a new operating cycle.

LOOP FORMING ATTACHMENT FOR SEWING MACHINE

This invention relates to a loop forming attachment device which has been developed primarily, but not exclusively, for use with a sewing machine which can stitch-attach a loop formed by the device to a garment or garment part.

In the manufacture of garments, it is often necessary to attach loops to the exterior of a garment (or garment part), such as a dress or coat, which serve as a guide and also as a retainer e.g. for a belt, or as a hanging loop.

It is known to use purely manual manipulation in the formation of loops from lengths of tape or ribbon material, followed by manual placement of the formed loops onto a garment and then stitching of the loops to the garment after bringing down a usual clamp foot of a sewing machine onto the loop.

It is also known to provide an automatic loop forming attachment for a sewing machine, which is able to form a loop from a length of tape, and then permit the loop to be attached by stitching to a garment. A cutting device is provided to separate the formed loop from the length of tape, but the arrangement of the known attachment devices are such that these cannot readily be adapted to work with the different loop-forming materials which are used for the various applications e.g. for the belt loop application a tubular knitted material is used, whereas for the hanging loop application a flat ribbon is used. Also, these known attachment devices first form a loop which is then transferred and positioned under the sewing machine clamp where the loop has to be retained and the transfer device is removed before the loop can be sewn. Also, an attachment device is known to form a loop under the sewing machine clamp, but the arrangement of this attachment device is such that small length of

awaste loop-forming material is produced each time a loop is formed from the supply length of material. Because a substantial amount of waste material is created during each working shift, some means has to be provided for the collection of this waste material. This provides a problem as far as smooth operation of the attachment device is concerned, and quite substantial amounts of waste material will be created during each working shift.

The present invention has been developed primarily, though not exclusively, with a view to improving the known loop forming attachment for a sewing machine, and particularly so as to be readily adaptable to be used with different types of loop-forming material, while also avoiding the creation of waste tape material used in forming the loops.

According to the invention there is provided a loop forming attachment device for a sewing machine which is adapted to cooperate with a sewing needle and associated hold-down arrangement in order automatically to form and to present a loop ready for attachment by stitching to a garment or garment part, the loop being formed from a supplied length of tape, and the attachment device comprising:

a forward clamp and a rear clamp arranged to hold therebetween a leading end of a length of tape, the clamps being movable between a forward tape-holding position and a rearward tape holding position ;

a retaining device spaced forwardly of the forward position of the clamps and arranged to receive and to retain a looped end of the length of tape;

a loop former reciprocable between an initial position at or rearwardly of the rearward position of the clamps and a forward position of cooperation with the retaining device, the loop former being movable from the initial position to engage the tape, when the leading end

of the tape is held by the clamps, and thereby to guide a looped end of tape into the retaining device as it movesto its forward position;

a cutter arranged between the forward and rearward positions of the clamps and operable, when the clamps are in the forward position holding the leading end of the tape and the looped end is in the retaining device so as to form and present a loop ready for stitching-attachment at a position between the retaining device and the forward position of the clamps, to separate the formed loop and thereby form a new leading end of tape;

and means for urging the new leading end of the tape against the rear clamp, after the latter has moved to the rearward position following attachment of the loop, to be joined subsequently by the forward clamp which thereby clamps the new leading end therebetween, and the clamps thereafter returning jointly to the forward position drawing the new leading end to the forward position ready for a further loop-attachment operation.

The means for urging the new leading end of the tape against the rear clamp may take any convenient form, and preferably comprises a nozzle arranged to direct a jet of air which pushes the leading end of the tape against the rear clamp.

The loop forming attachment is designed so as to be readily mounted on any suitable existing design of sewing machine, and will be provided with suitable control means to control its cycle of operations in conjunction with operation of the sewing machine which carries out the stitching-attachment of the loops to a garment. Any suitable means may be provided to move the forward and rear clamps between their forward and rearward tape-holding positions, and to operate the retaining device, the cutter and the loop former in an

appropriate timed sequence with the movement of the clamps to achieve formation and presentation of the loopsto the sewing needle and associate hold-down arrangement of the sewing machine with which the attachment is to be used.

Embodiments of loop forming attachment according to the invention will now be described in detail, by way of example only, with reference to the accompanying drawing in which:-

Figure 1 is a schematic side illustration of the loop forming attachment for a sewing machine in an initial position of a loop forming cycle;

Figure 2 is a view, similar to Figure 1, of a further stage in the cycle of operation;

Figure 3 is a schematic illustration of a further stage in the cycle of operation;

Figure 4 is a schematic illustration of an automatically operating loop-forming station having a bank of sewing machines each provided with a loop-forming attachment device;

Figure 5 is a schematic side illustration, similar to Figure 2, of an alternative construction of loop-forming attachment device according to the invention, in one stage of an operating cycle;

Figure 6 is a view, similar to Figure 5, of a further stage in the operating cycle;

Figure 7 is a view, similar to Figures 5 and 6, of a still further stage in the operating cycle;

Figure 8 is a view, similar to Figures 5 to 7, of the end of one operating cycle and the commencement of a further cycle;

Figure 9 is a perspective illustration, in more detail, of a garment-feed arrangement for use with a loop-attachment device according to the invention;

Figure 10 is a side view, corresponding to Figure

9, illustrating a garment-feeding stage;

Figure 11 is a side view, similar to Figure 10, illustrating garment-removal after attachment of a loop;

Figure 12 is a schematic side illustration of an air operated hold-down clamp arrangement for use with a loop-forming attachment device;

Figure 13 is a schematic illustration of an overrun prevention device for use with a reel supply of loop-forming material;

Figure 14 is a schematic front view of one form of unitary construction of loop-forming attachment device, which is movable horizontally between operative and inoperative positions with respect to a sewing machine; and

Figure 15 is a view, similar to Figure 14, illustrating another form of unitary construction which is pivotable between operative and inoperative positions with respect to a sewing machine.

Referring now to Figures 1 to 3 of the drawings, there is shown schematically a loop forming attachment which can be provided in any suitable construction of sewing machine. Conveniently, the attachment will be designed to be used with industrial designs of sewing machine for use in garment making factories. By way of example, the attachment may be used with the Reece S2 sewing machine. For ease of illustration, only a sewing needle 10 of a sewing machine is shown in the drawings, though it should be understood that a clamp-foot hold down arrangement will be associated therewith.

The loop forming attachment which will be described is adapted to cooperate with the sewing needle 10 and associated hold-down arrangement in order automatically to form and to present a loop ready for attachment by stitching to a garment. The loop is formed from a supplied length of tape, ribbon or other

loop-forming material, this being derived from reel or other convenient forms of supply.

The attachment comprises a forward clamp 11 and a rear clamp 12 which are arranged to hold therebetween a leading end 13 of a length of tape 14, the clamps 11 and 12 being movable jointly (and also separately as described later) between a rearward tape-holding position R shown in Figure 1 and a forward tape-holding position F shown in Figure 2. A retaining/guiding/hold-down device 15 is spaced forwardly of forward clamp 11 and is arranged to receive and to retain a looped end portion 16 of the length of tape 14. The clamps 11,12 are mounted for horizontal sliding movement relative to a housing block 21 of the attachment, shown in schematic outline in Figure 1.

A loop former 17 is arranged to reciprocate between an initial position at or rearwardly of the rearward position R of the clamps (see Figure 1) and a forward position of cooperation with the retaining device 15 (see Figure 2). The loop former 17 is movable from the initial position (shown in full lines in Figure 2) over the tape 14 to engage the tape, (when the leading end is held by the clamps 11,12) and is able thereafter to guide the looped end formed thereby into the retaining device 15 as it moves to its forward position shown in dashed outline in Figure 2. The movement of the loop former 17 towards the retaining device 15 can take place simultaneously with joint movement of the clamps 11 and 12 from the rearward position R to the forward position F shown in Figure 2 or 3. Alternatively, this takes place after the clamps 11 and 12 have reached the forward position, or during movement to their forward position.

A cutter 18 is arranged between the forward and rearward positions of the clamps 11 and 12 and is operable (when the clamps are in the forward position

holding the leading end 13 of the tape and the looped end 16 is in the retaining device so as to form and present a loop ready for stitching to a garment at a position between the retaining device 15 and the forward position of the clamps), to separate the formed loop and thereby form a new leading end 13a of the tape 14.

It will be noted that the sewing needle 10 (and its associated hold-down arrangement) is arranged between the retaining device 15 and the forward tape-holding position F of the clamps 11 and 12. The looped end 16 is shown retained by the retaining device 15 in Figure 3, but the retaining device 15 is released prior to stitching attachment taking place of the loop to a garment (not shown) using the needle and the hold-down arrangement (not shown).

Means is provided for urging the new leading end of the tape against the rear clamp 12 (see Figure 1), after the latter has moved to the rearward position R while attaching the previous loop to a garment, to be joined subsequently by the forward clamp 11 which thereby clamps the new leading end 13a therebetween. Thereafter, the clamps 11 and 12 return jointly to the forward position F drawing the new leading end 13a to the forward position ready for a further loop-forming/attachment operation. In the illustrated arrangement, the means for urging the new leading end 13a, formed following operation of cutter 18, comprises an air jet 23 which raises the cut end 13a and directs it against the upright face of the clamp 12 at the rearward position. Other means may be provided to urge the leading end of the tape against the rear clamp.

The retaining device 15 includes a gripper device 19 which is operated to grip the looped end 16 of the tape or ribbon after the loop former 17 reaches its forward position shown in Figure 2. The loop former 17

then returns to its initial position, as shown in Figure 3.

The retaining device 15 also includes an elongated housing 20 which is narrow, as seen in plan, being somewhat wider only than the width of the tape. The housing 20 is pivotally connected to the housing block 21 so that it can be moved downwardly (and locked) into holding engagement with an article, i.e. a garment or garment part, which will be introduced by an operative between a support surface 22 (see Figure 1) and the underside of the housing 20. This will enable an operative to attend to other matters, if necessary, without dislodgement of the article prior to the loop-forming and stitching-attachment of the loop thereto. The housing 20 need not be pivotally connected to the housing block 21, but can be rigidly connected thereto. Articles can then be fed into the space defined between the underside of the housing 20 and the support surface 22.

The operation of the loop-forming attachment device shown schematically in Figures 1 to 3 may be as follows:

The article onto which the loop is to be attached is placed in position under the normal clamp foot of a sewing machine, at which time a treadle is depressed to activate the pivotally connected housing 20 which functions as a safety guard , and also as a clamp to retain the article in position. The housing 20 is moved downwardly onto the article, and a safety arrangement is provided which functions so that if anything prevents the housing from achieving its clamping/guarding position then the loop forming attachment device will not be activated and the sewing machine cannot be started until both the treadle has been depressed and the housing 20 has reached its operative position so that the attachment

device can then commence its operating cycle.

When the sewing machine has completed its full cycle and the sewing machine clamp has lifted, the article onto which the loop has been attached is then auto-ejected ready for the cycle to be repeated.

The machine clamp is then brought into operation, at which time the housing 20 (functioning as an auxiliary clamp/loop forming guard) is released automatically during the sewing machine cycle and a further article introduced to the sewing station.

Conveniently, the operation of the parts 11,12,14 and 19 takes place under the control of a pneumatic control apparatus which operates respective pneumatic rams coupled with the parts in the appropriate sequence for the loop-forming, and stitch-attachment cycle.

The attachment device can readily be arranged to provide substantially automatic operation of each of one or more i.e. a bank of sewing machines at a loop-forming station. Thus, the attachment device may be used in the automatic attachment of loops at predetermined internals on a garment waist-band, or a continuous band supply, preferably from a reel. The band supply may be caused to be indexed past a sewing maching, to have loops stitch-attached automatically at predetermined intervals along the band. A take-up reel may be provided onto which is rolled the band with loops already attached at the required positions. This provides a convenient way of storing the waist-band material (with loops already attached) ready for use when required in a garment-making factory.

Means may be provided for adjusting the spacing of the gripper 19 of the device 15 relative to the stitching location (adjacent to the forward position of the clamps 11,12) in order to vary the size of the loops as required. Suitable calibration may be provided on the

device 15.

In addition, suitably adjustable advancing means may be provided to engage the band supply, and advance the latter by predetermined intervals according to the desired positions, and spacing between successive loop-attachments.

The attachment device may be mounted rigidly at the stitching location of a sewing machine, and oriented in a direction to suit the optimum direction of feed of the loop-forming tape, and the position to which a garment part is to be fed to the apparatus and/or the direction of supply of waist-band or other continuously supplied material.

In the use of the device for attaching loops to waist-band or other band-like supplied material, a loop-forming station may have one or more sewing machines. By way of example only, as shown schematically in Figure 4, two sewing machines 30 and 31 are arranged in tandem alongside the direction of supply of a band 32. A reel 33 supplies the band 32 (without attached loops) and a take-up reel 34 rolls-up the band 32 with attached loops. A loop-forming attachment 35 is associated with each of the sewing machines 30,31, to form loops which are stitch-attached to the band 32 at the required positions. To vary the intervals between successive loops, at least one of the sewing machines, say the machine 30, is horizontally adjustable (together with its attachment device mounted thereon) relative to the other machine.

The entire operation of the station shown in Figure 4 may be automatically controlled, so that an operative need only function as a machine "minder" rather than as a skilled operative, which will provide guaranteed efficient and speedy operation. Indeed, a "bank" of sewing machines may be provided, all operating

automatically or semi-automatically under the control of a single minder. This enables automatic attachment of loops to continuously supplied garment parts, such as waist-band material. This will provide substantial operating economies to a garment manufacturer, when compared with existing practices for attaching loops, which are dependent , as to speed and quality, on skilled operatives of sewing machines operating at their own individual paces, which vary from person to person, and inevitably also vary during a production shift.

To facilitate initial feeding of a fresh supply of tape 14 into the attachment device, a purpose-built block may be provided upstream of the position R, which is operable to direct a jet of carrying air along the passage defined within the block 21 and below the loop former 17. This conveys the tape 14 to a position ready to be guided by air jet 23 to the starting position shown in Figure 1.

A special switch control system may be provided which is operated, during initial setting-up of a fresh supply of tape, in order to operate the loop-forming cycle up to (but not including) stitching-attachment of the formed loop, at which time the start-up cycle is stopped. The operative can then commence stitching attachment of the formed loop when required, and the cycle proper then starts.

Referring now to Figures 5 to 8 of the drawings, there is shown in more detail some modifications of, and additions to, the loop-forming attachment device shown in Figures 1 to 3. Corresponding parts are designated by the same reference numerals, and will not be described in detail again.

Concerning the modifications to the arrangement shown in Figures 1 to 3, it will be noted from Figures 5 to 8 that a hold-down device 10' is shown, which

cooperates with the needle 10, and also functions, during movement from the position shown in Figures 5 to 7 to the position shown in Figure 8, in order to hold-down a formed loop 16 on a garment 43 while stitching-attachment takes place by operation of the needle 10. Also, a slightly nodified retaining device 15a is provided, having movable clamps 36, between which can be introduced the loop former 17 and a looped length of tape, as shown in Figure 5. Prior to withdrawal of the loop former 17, the clamps 36 can then be operated to hold the looped end of the tape until the garment 43 and the loop of tape are to be stitched together, as shown in Figure 8. The insertion of the garment 43 over the support surface 22 is shown in Figure 7, whereby the garment 43 is introduced into the space defined below the loop 16 after withdrawal of the loop former 17. The support surface 22 has an inclined guide surface or nose 41 at one end, to facilitate the movement of the garment 43 into the gap below the loop 16 of tape. The construction and arrangement at the nose 41 will be described in more detail below with reference to Figures 9 to 11. To facilitate removal of the garment 43 with a loop attached thereto, a nozzle arrangement 42 is provided at the nose 41, which blows jets of air through apertures in the nose 41, to facilitate removal of the garment.

There has been described above, with reference to Figures 5 to 8, the modifications to the loop-forming attachment device of Figures 1 to 3. There will now be described the additions to the loop-forming attachment device of Figures 1 to 3. A slack-feed clamp mechanism is provided, designated generally by reference 37, which functions to pay-out tape as required at the initial stage of the loop-forming and attachment operation, and also operates to clamp the supply mechanism during the subsequent stages of the operating cycle. The slack-feed clamping mechanism 37 comprises a pair of fixed guide

rollers 39 to which the tape 14 is supplied from a reel supply (not shown), and a pair of movable guide rollers 40. The rollers 40 are coupled with the loop former 17 to move between the two positions shown in Figures 5 to 8 durng movement of the loop former 17 between its operating position. A vertically movable clamp 38 can move up and down through a hole in the support surface 22 between a released position, shown in Figure 5, and a clamping-engagement position with the tape 14, as shown in Figures 6 to 8.

As shown in Figure 5, during movement of the loop former 17 in the initial stage of the operating cycle, the movable rollers 40 move from the position shown in dotted lines to the position shown in full lines, with the clamp 38 in the released position, thereby to permit the paying-out of a sufficient amount of tape 14. Thereafter, as shown in Figure 6, the clamp 38 moves to the clamped position, and the movable rollers 40 move to the right to the position shown in full lines in Figure 6, whereby a further amount of tape 14 is withdrawn from the reel. Figure 7 shows the slack-feed clamping mechanism 37 in the same position as in Figure 6, though illustrating further stage in the operating cycle of the loop-forming attachment device. Figure 8 also shows the mechanism 37 in the same position as in Figures 6 and 7, while the final stage of the loop-forming and attachment of the formed and cut loop 16 takes place. Thereafter, the mechanism 37 is unclamped, and reverts to the position shown in Figure 5, during the commencement of a further operating cycle.

Referring now to Figures 9 to 11, the construction of the nose 41 is shown in more detail. The nose 41 comprises a curved upright box 41' which is fastened at the inlet end of the support surface 22, and forms a curved guiding surface 43 which extends upwardly and then curves into a substantially horizontal portion which merges into the support surface 22. This facilitates the

work of an operative in feeding a garment 43 up the guide surface 43 and into the gap below a formed loop 16. Limit stops 44 are mounted on the box 41' to limit the degree of insertion of a garment relative to the sewing station below the needle 10.

When a loop has been formed, and then stitch-attached to the garment 43, the needle 10 and hold-down device 10' are then automatically lifted, whereby the garment 43 can be removed. To facilitate this removal, outlet apertures 45 are formed in the guiding surface 43 whereby jets of air from nozzle arrangement 42 engage the garment 43 and thereby facilitate its withdrawal.

In addition, it will be noted that a specially shaped shield or shroud 46 is provided around the end of the loop-forming attachment device (not shown in figures 9 to 11), and this shields the operating equipment (at the retaining device 15 end), and also forms a guide surface 47 co-operating with the guide surface 43, and below which a garment is introduced as it is passed up and over the guide surface 43. As an alternative to the air jet discharge arrangement 42, 43, a suitable arrangement may be provided (not shown) in the curved part of the shield 46. This comprises air jets directed downwardly onto a garment while the latter engages the guide surface 43. It has been found that this causes very efficient discharge of a garment after stitching-attachment of a loop.

Referring now to Figure 12 of the drawings, there is shown in detail a hold-down arrangement, designated generally by reference 50, which is shown schematically by reference 10' in Figures 5 to 8. The mechanism 50 has a hold-down head 51 which is movable between a released position, shown in full lines, to an operative hold-down position, shown in dashed lines. The hold-down head 51 cooperates with a sewing needle 10 in the manner

previously described. The mechanism 50 is arranged (by means not shown) to be air operated to move between its operative and inoperative positions. The mechanism 50 is pivotable about a pivot 52, and has a projecting arm 53 which is arranged to act on either one of two limit sensors 54 and 55 which correspond to the operative and inoperative positions respectively of the mechanism 50. These sensors are controlled by the movement and operation of the mechanism 50 under the action of pneumatic cylinders, in appropriate timed sequence with the operation of the sewing machine, and the loop-forming attachment.

Referring now to Figure 13 of the drawings, there is shown schematically a reel supply device for the tape 14. The device is designated generally by reference 60 and comprises a reel holder 61 which is rotatable on a spindle 62, the tape being withdrawn by operation of the slack-feed mechanism 37, described above. The spindle 62 is mounted in a support frame 63, and an air operated brake is also mounted on the support frame 63, to prevent over-run of the reel holder 61. The brake comprises an air cylinder 64 which operates a brake lever 65, mounted on a pivot 66, and which operates to exert braking action on the inner cylindrical surface 67 of the reel holder 61. The brake lever 65 is shown in full lines in a braking position, to which it has been moved by operation of the air cylinder 64, and can revert to a release position, shown in dashed lines, permitting rotation of the reel holder 61. The operation of the air cylinder 64 will be triggered, in phase with the operating stages of the loop-forming attachment device, whereby the reel holder 61 is automatically braked when no further tape is required.

Finally, referring to Figures 14 and 15, there is shown schematically two modular constructions of loop-forming attachment device according to the

invention. A sewing machine installation is designated generally by reference 70 and comprises a sewing machine 71 having a sewing needle and hold-down head 72.

Figure 14 shows schematically a modular loop-forming attachment device 73 which can be moved substantially horizontally, by operation of pneumatic drive cylinders 74, between an inoperative position, shown in full lines in Figure 14, to an operative position, shown in dash-dot lines, in which it is ready to cooperate with the sewing machine head 72.

Figure 15 shows a modular construction of loop-forming attachment device 75 which is pivotally adjustable between an inoperative position, shown in full lines, to an operative position, shown in dash-dot lines in Figure 15. Means is also provided, shown by the arrows, for adjusting the modular construction 75 both horizontally, and vertically, as required.

The embodiments of loop-forming attachment devices disclosed herein can readily be mounted to co-operate with existing designs of factory-type sewing machines. Also, the devices can be readily adjusted to operate with different widths, lengths and types of loop-forming material (tape).

When the device is to be converted to operate with somewhat elastic tape e.g. knitted material, which tends to stretch during loop-forming, it is preferred that the elements 11, 12 and 17 should be adjustable to provide a rear position R which is further to the right than that shown in Figures 5 to 8. Thereby, following clamping and cutting of the tape 14 as shown in Figure 8, there will remain a sufficient amount of residual leading end of the tape (despite unstretching of the tape) to enable the end 13 to be located adjacent to the rear clamp 12 ready for engagement by the forward clamp 11.

CLAIMS:

1. A loop forming attachment device for a sewing machine which is adapted to cooperate with a sewing needle (10) and associated hold-down arrangement in order automatically to form and to present a loop (16) ready for attachment by stitching to a garment or garment part, the loop (16) being formed from a supplied length of tape, and the attachment device comprising:

a forward clamp (11) and a rear clamp (12) arranged to hold therebetween a leading end (13) of a length of tape (14), the clamps (11, 12) being movable between a forward tape-holding (F) position and a rearward tape holding position (R);

a retaining device (15) spaced forwardly of the forward position (F) of the clamps (11, 12) and arranged to receive and to retain a looped end (16) of the length of tape (14);

a loop former (17) reciprocable between an initial position at or rearwardly of the rearward position (R) of the clamps (11, 12) and a forward position of cooperation with the retaining device (15), the loop former (17) being movable from the initial position to engage the tape (14), when the leading end (13) of the tape is held by the clamps (11, 12), and thereby to guide a looped end (16) of tape into the retaining device (15) as it moves to its forward position;

a cutter (18) arranged between the forward and rearward positions (F, R) of the clamps (11, 12) and operable, when the clamps are in the forward position holding the leading end of the tape and the looped end is in the retaining device so as to form and present a loop ready for stitching-attachment at a position between the retaining device and the forward position of the clamps, to separate the formed loop and thereby form a new leading end of tape; and

means (23) for urging the new leading end of the tape against the rear clamp (12), after the latter has moved to the rearward position following attachment of the loop, to be joined subsequently by the forward clamp (11) which thereby clamps the new leading end therebetween, and the clamps (11, 12) thereafter returning jointly to the forward position drawing the new leading end to the forward position ready for a further loop-attachment operation.

2. A device according to claim 1, characterised in that said means for urging the new leading end of the tape against the rear clamp (12) comprises a nozzle (23) arranged to direct a jet of air which pushes the leading end (13) of the tape (14) against the rear clamp (12).

3. A device according to claim 1 or 2, characterised in that the retaining device (15,15a) has releasable clamps (19,36) to receive the looped end (16) of tape and the loop former (17).

4. A device according to any one of the preceding claims, characterised by a slack-feed mechanism (37) to control the supply of tape (14) in accordance with the forward movement of the forward and rear clamps (11,12), and the loop former (17).

5. A device according to any one of the preceding claims, characterised by a guide nose (41) for guiding a garment (43) to a sewing station below the sewing needle (10), and a shield (46) which surrounds the retaining device (15,15a) and which defines with the guide nose (41) a guide path for the garment (43).

6. A device according to claim 5, characterised by an air ejector nozzle arrangement (42,45) in the guide nose (41) for ejecting a garment (43) after stitching-attachment of a loop (16) thereon.

7. A device according to any one of the preceding claims, characterised by a reel holder (61) for holding

the tape (14), and an air-operated brake (64,65) operable in sequence with the operation of the loop-forming attachment device in order to permit supply of tape when required, and to brake the reel holder (61) when the tape supply is required to be interrupted.

8. A device according to any one of the preceding claims, characterised in that the device is of a modular construction (73,75) which is movable bodily between operative and inoperative positions with respect to a sewing machine (70).

9. A device according to claim 8, characterised in that the modular construction (73) is horizontally movable between the operative and inoperative positions.

10. A device according to claim 8, characterised in that the modular construction (75) is pivotally movable between the operative and inoperative positions.

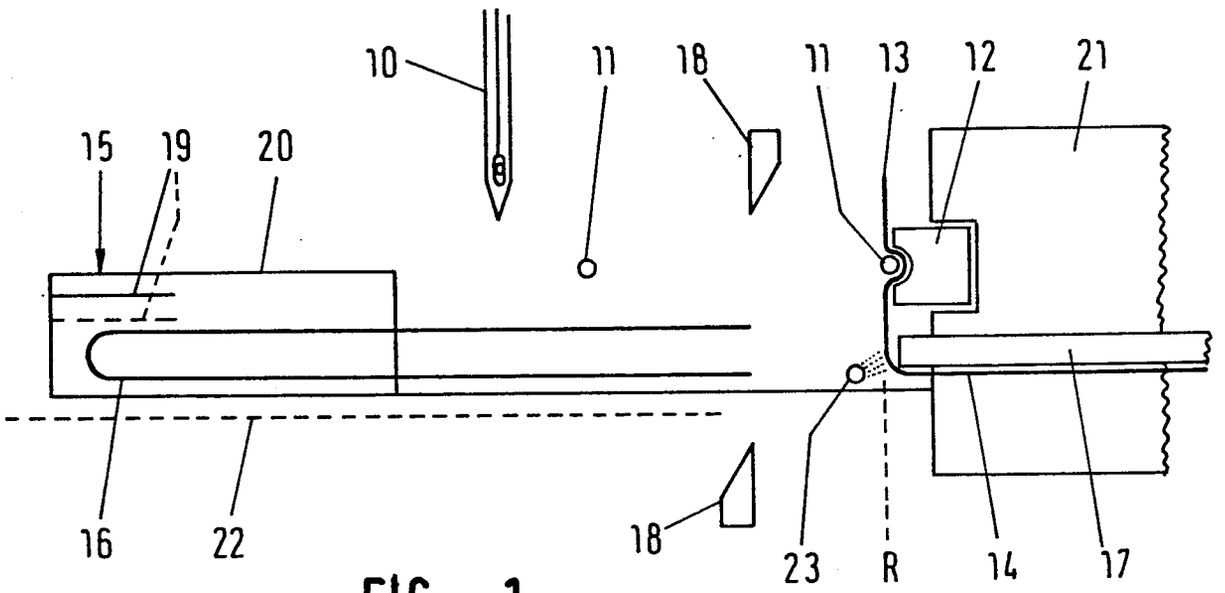

FIG. 1

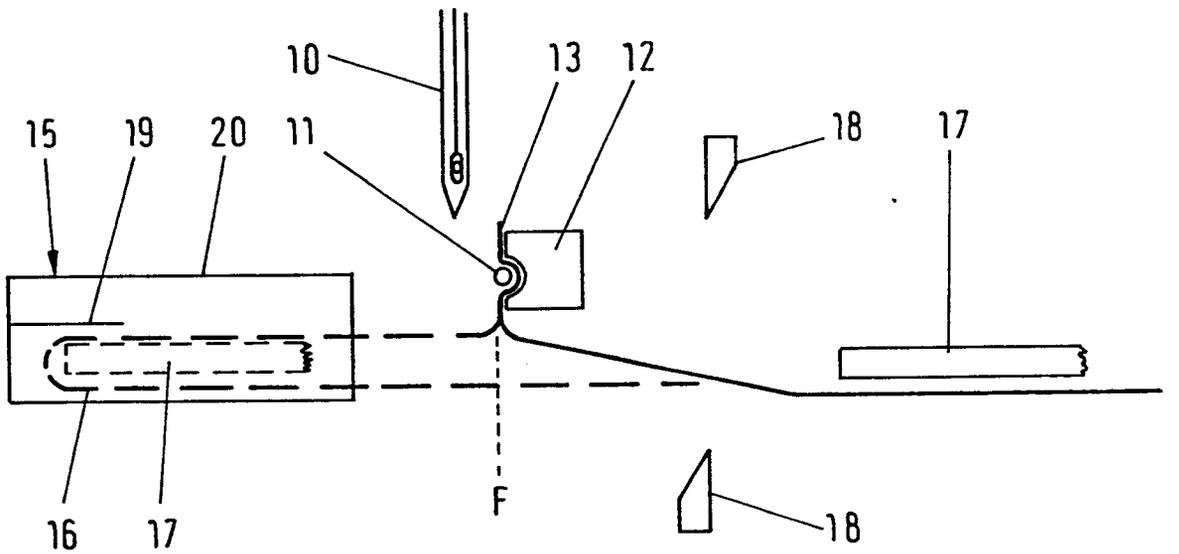

FIG. 2

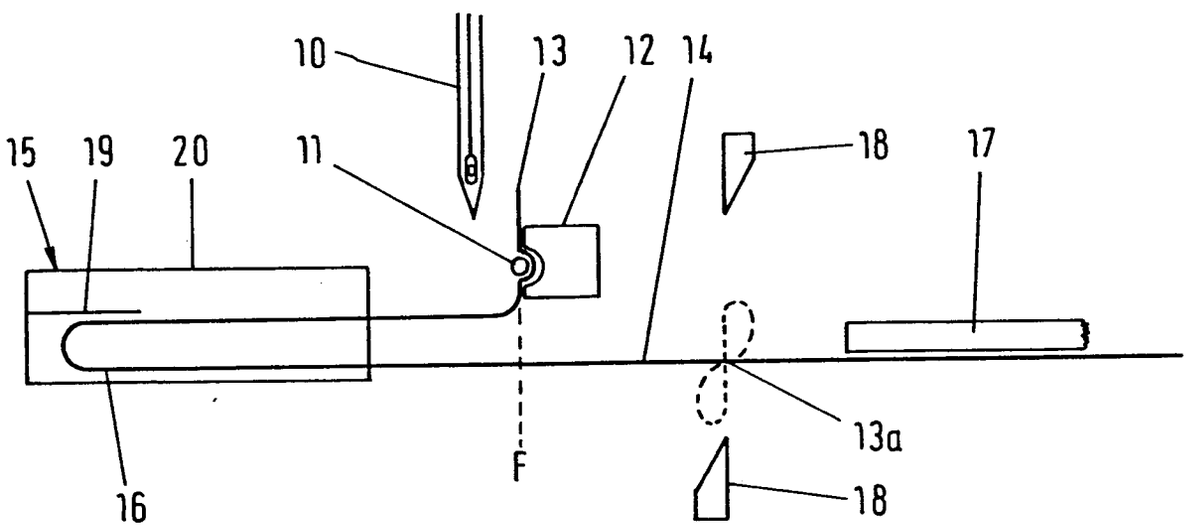

FIG. 3

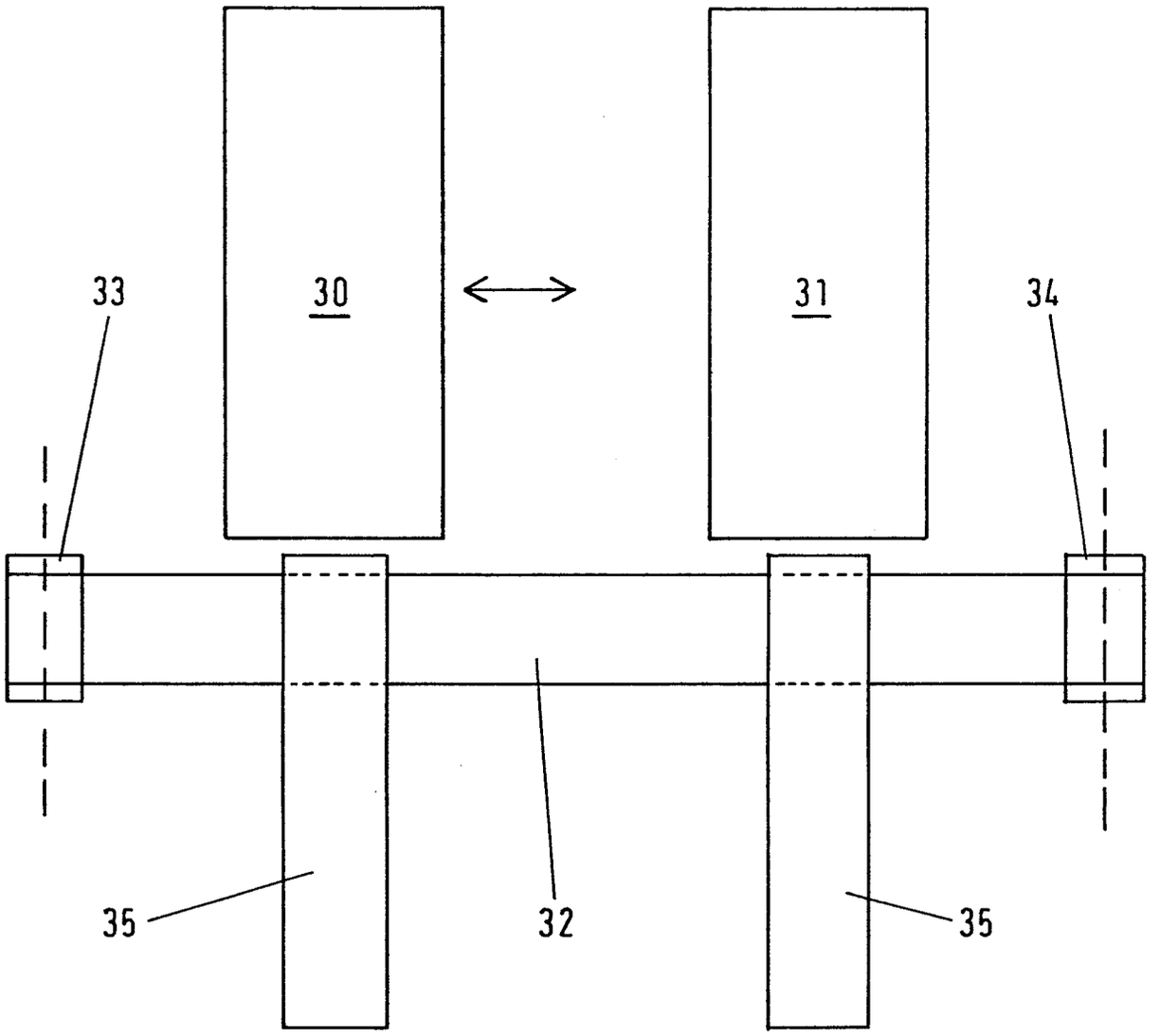

FIG. 4

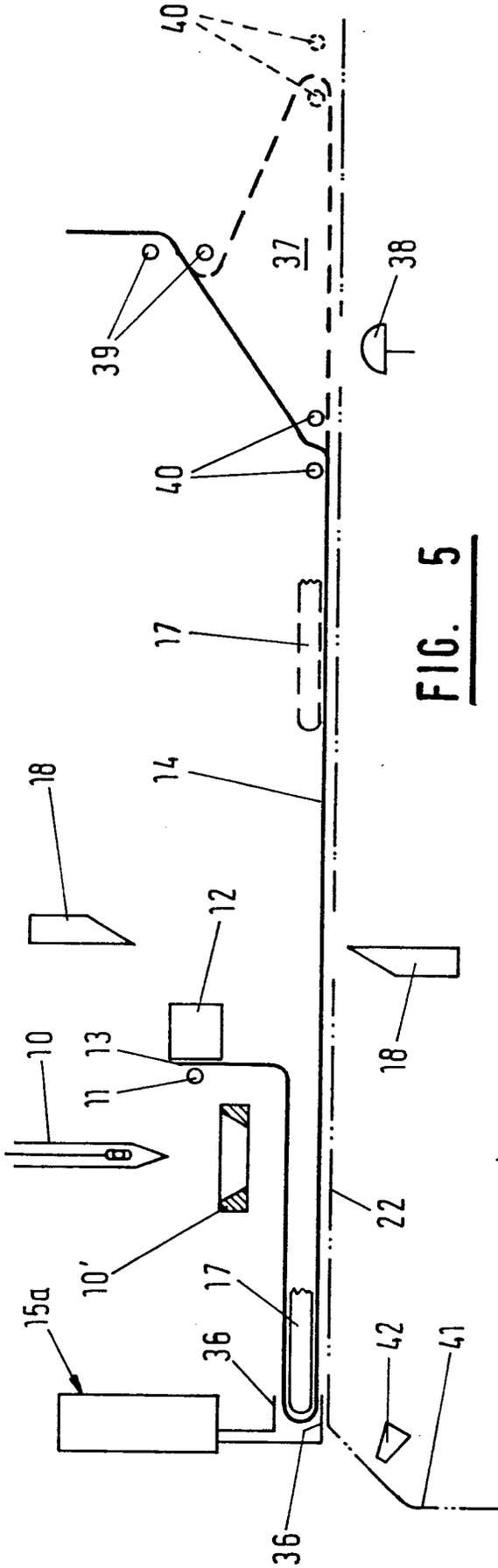
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FIG. 5

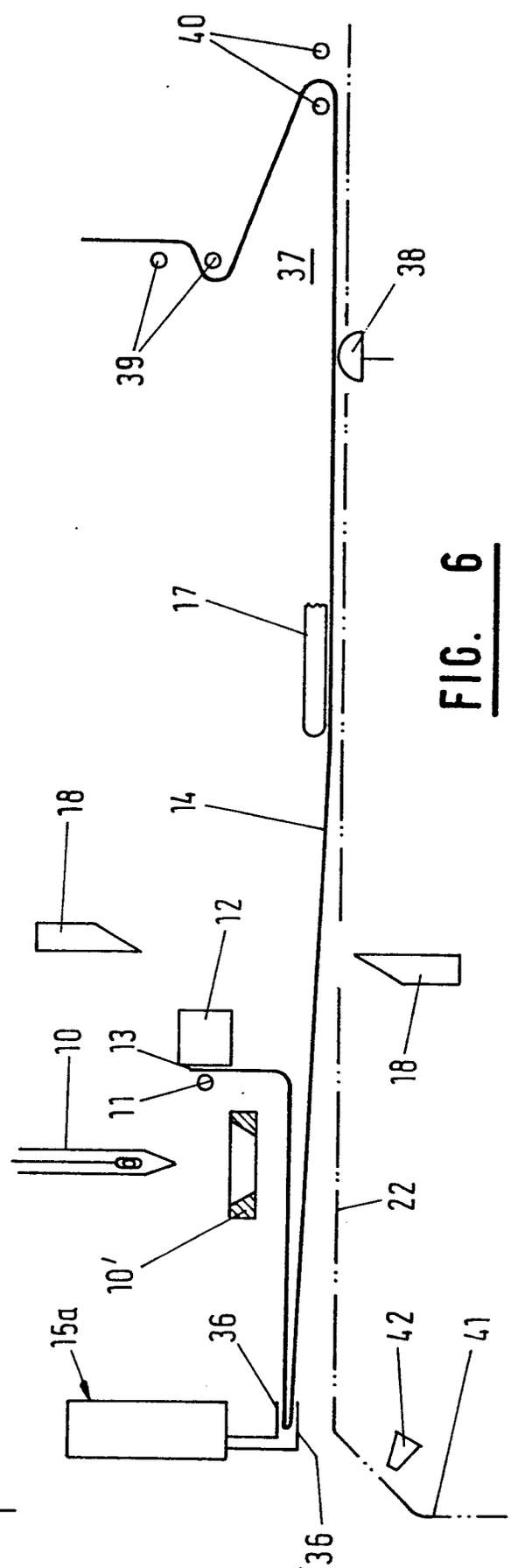
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FIG. 6

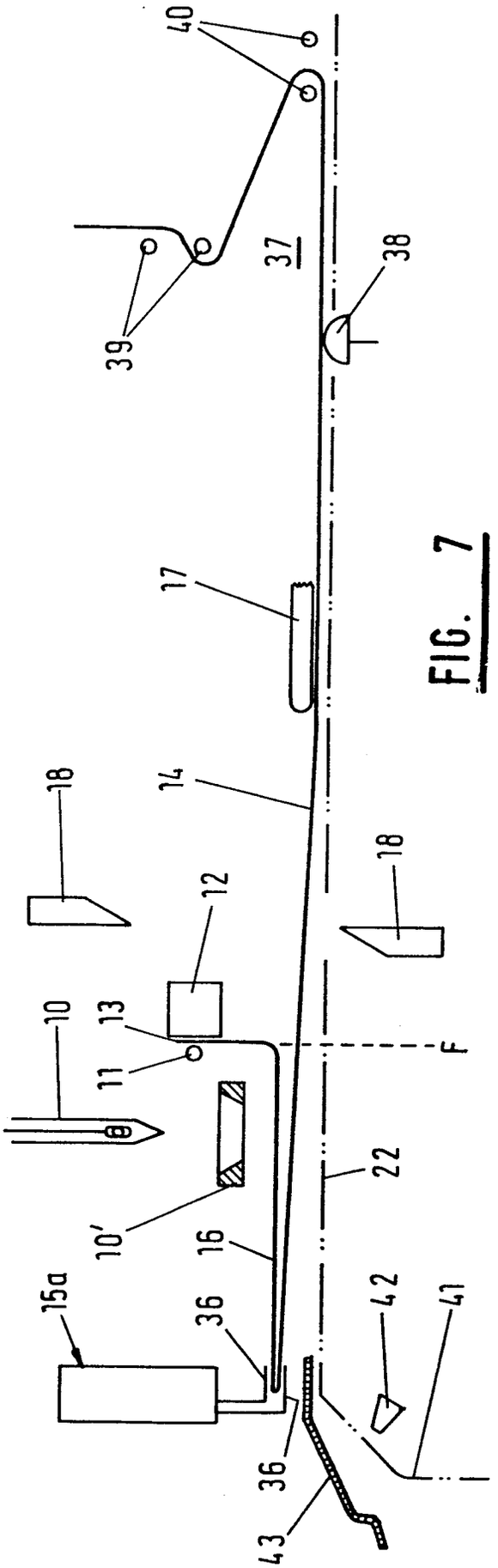
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FIG. 7

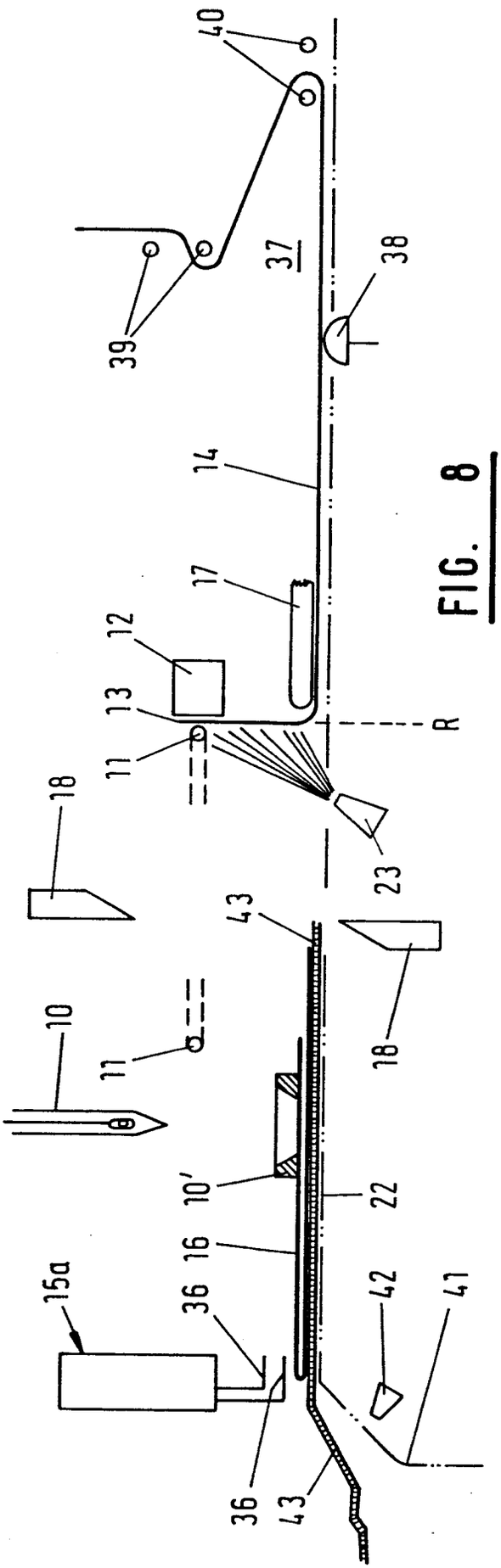
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FIG. 8

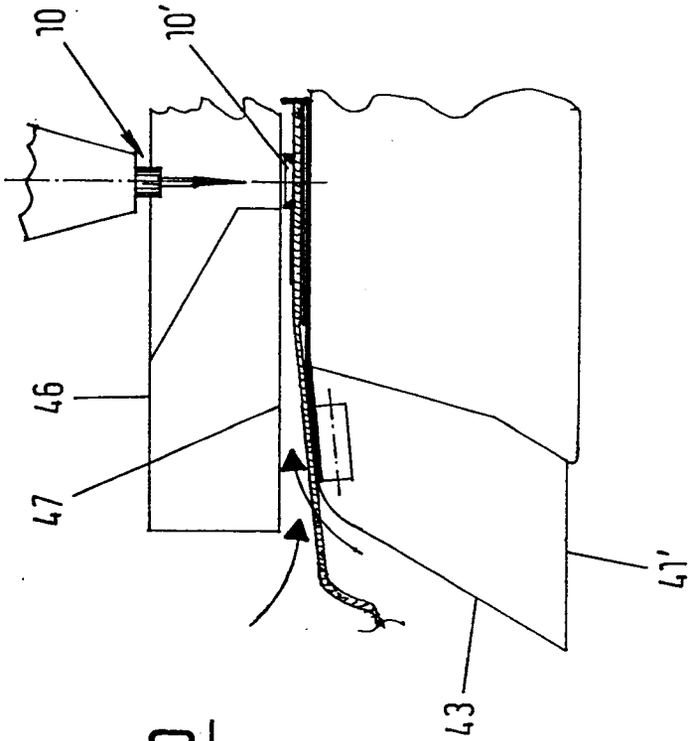

FIG 10

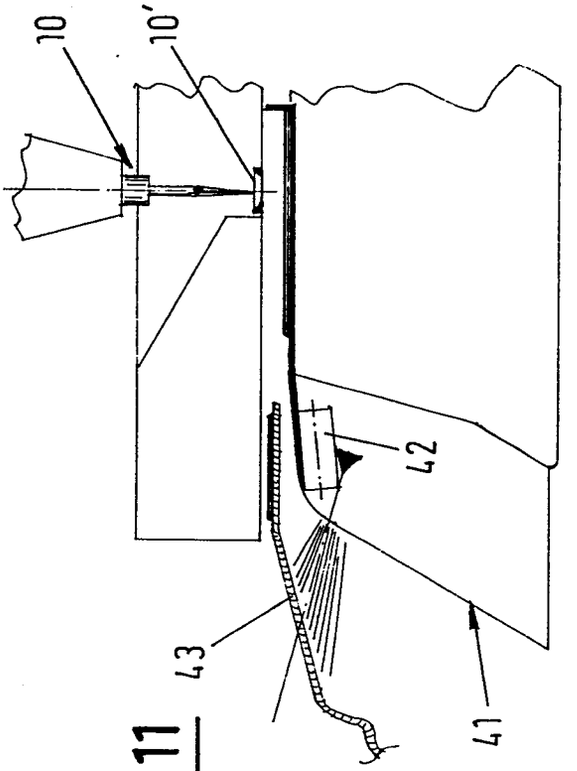

FIG. 11

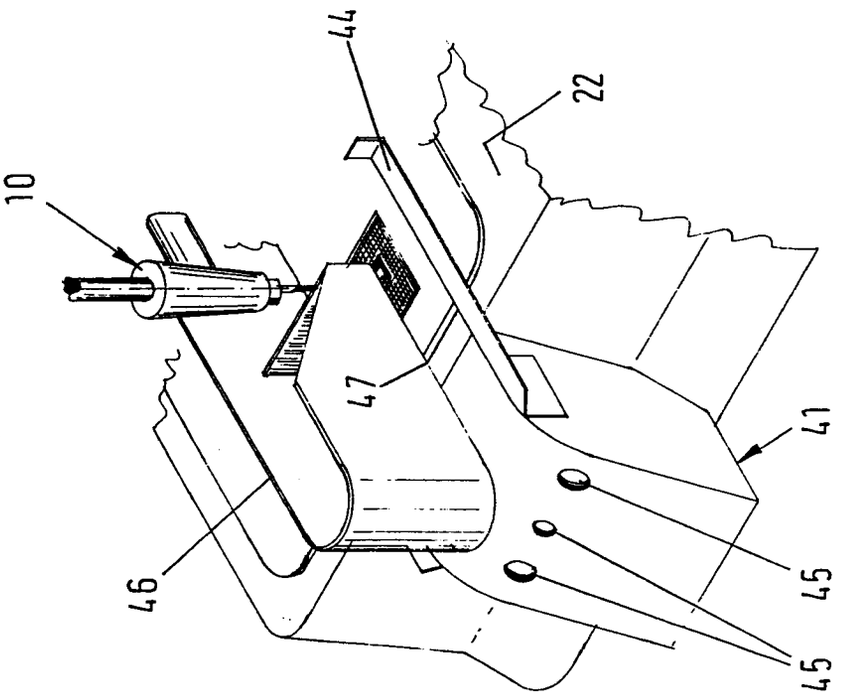

FIG. 9

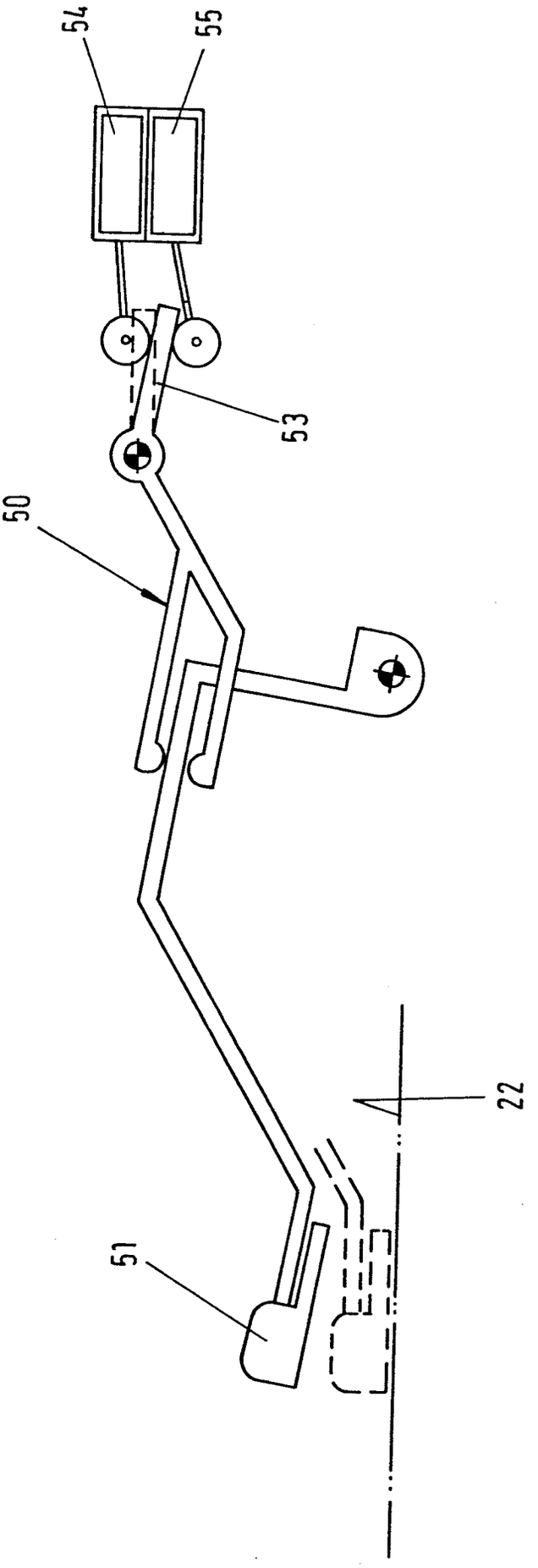

FIG. 12

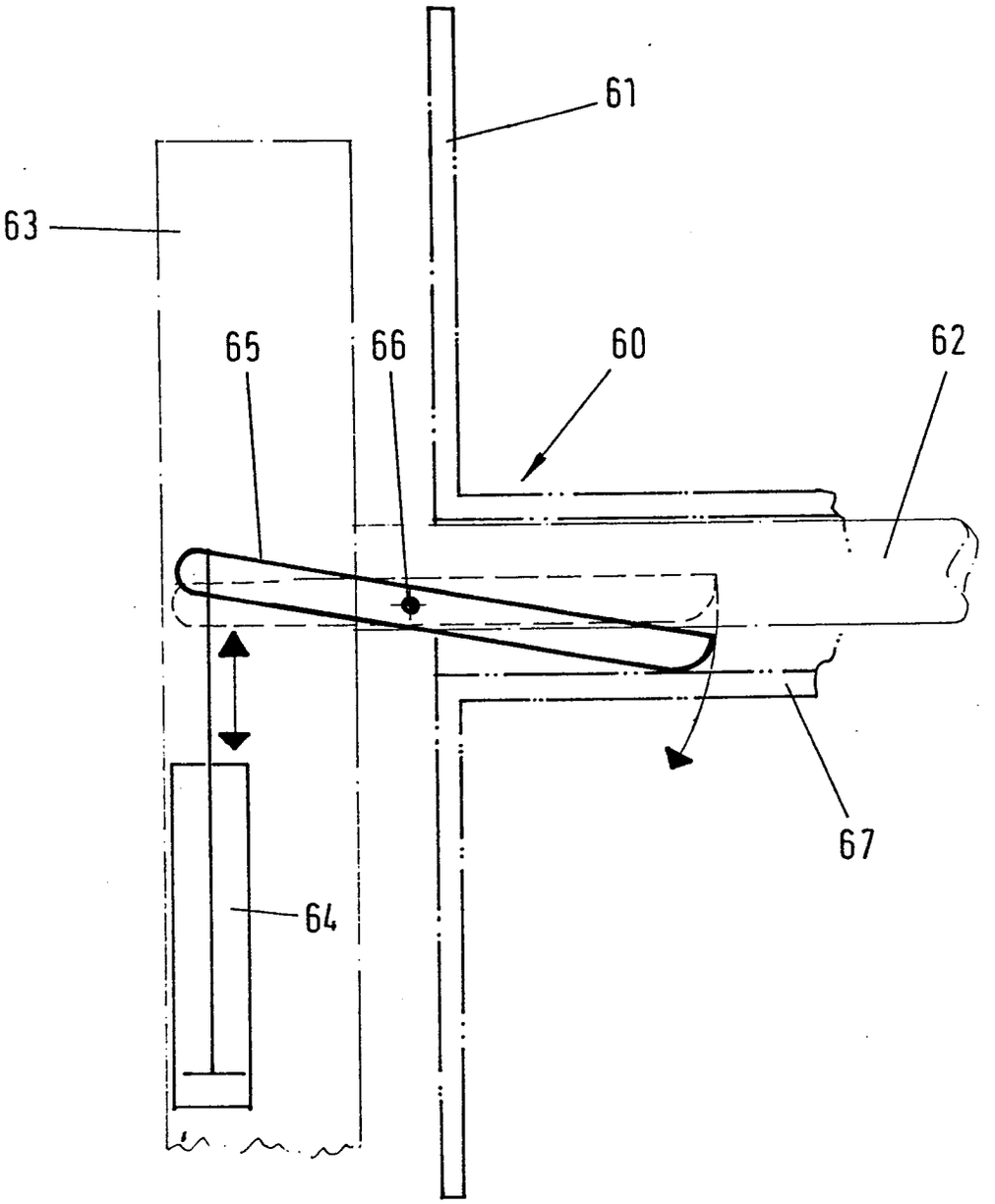

FIG. 13

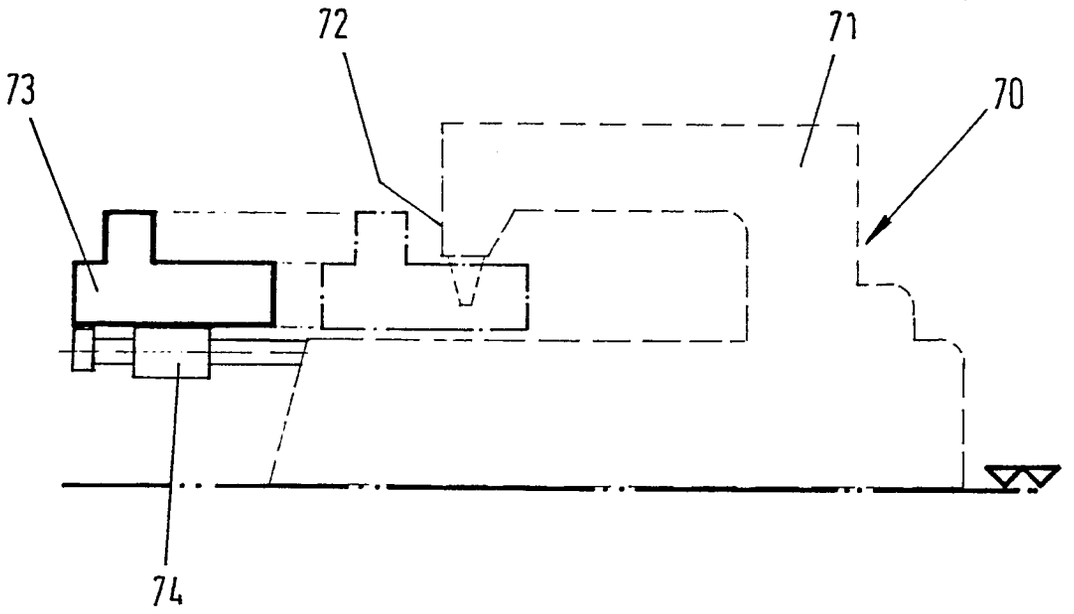

FIG. 14

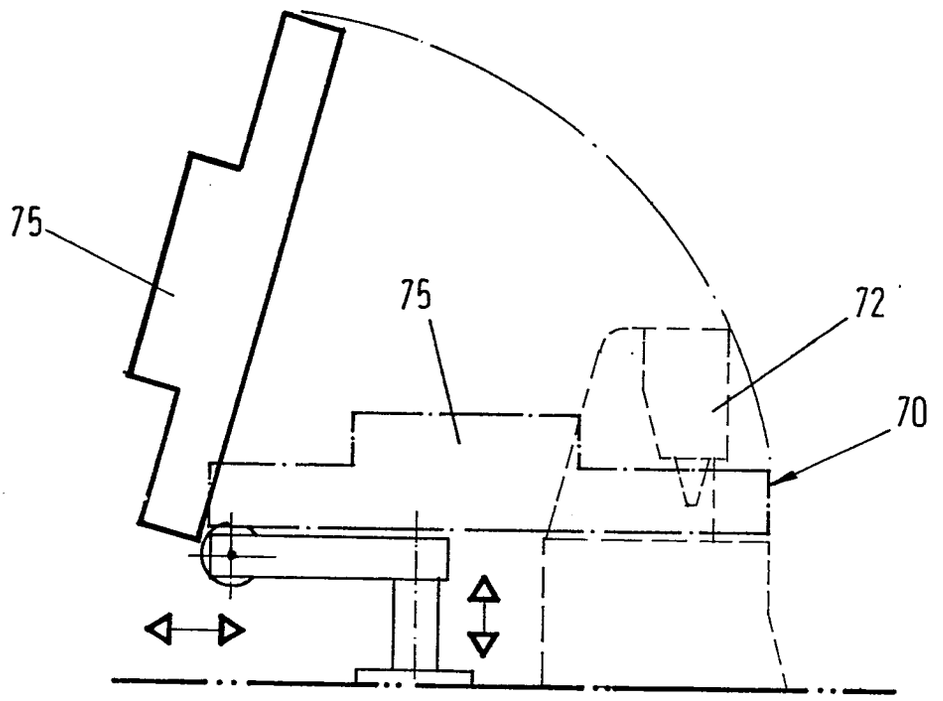

FIG. 15