(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 552 589 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **92830461.7**

(22) Date of filing: **31.08.92**

(51) Int. Cl.5: **B31F 1/00**, B29C 63/04, B42C 7/00

(30) Priority: **24.01.92 IT FI920020**

(43) Date of publication of application:
28.07.93 Bulletin 93/30

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(71) Applicant: **UNIVERSAL RIBO S.R.L.**
Via Buonarroti n. 1/A
I-50041 Calenzano, Firenze(IT)

(72) Inventor: **Magnolfi, Maresco**
Via Bartolomeo Corsini n.168
I-50031 Barberino di Mugello, Firenze(IT)
Inventor: **Lombardo, Paolo**
Via della Cooperazione n.15
I-50018 Scandicci, Firenze(IT)

(74) Representative: **Mannucci, Michele**
Ufficio Tecnico Ing.A. Mannucci, Via della Scala 4
I-50123 Firenze (IT)

(54) Mechanism for automatically preparing to cover the corners of folders, jackets and the like for the paper, board and bookbinding industry.

(57) The paper (L) glued to one face of the board (S) has borders (L1, L2...) which project from the edges (B1, B2...) of the board (S) for folding down over these edges; after an initial border (L1) has been folded over to cover the corresponding edge (B1) of the board, in the portions (LX) projecting from the corners (A) of the said edge, two tools (148) positioned level with the thickness of the board (S) are used to act on the said portions and thereby create an inward tuck and a fold, in order to prepare the manufacture for the folding down of the adjacent border (L2) so that the corner (A) is neatly covered.

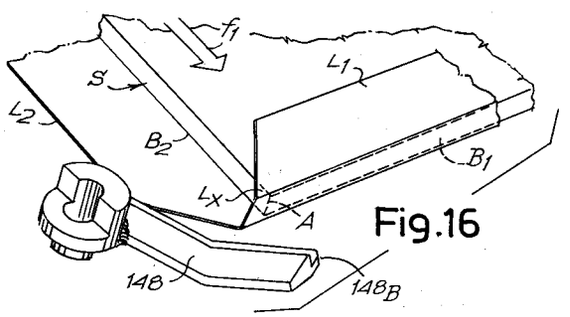


Fig.16

EP 0 552 589 A1

The invention relates to a method and a mechanism for neatly covering - as defined more fully below - the corners of a manufacture of board with the paper glued to one face of this board and the borders of this paper projecting from the edges of the board and cut across at 45° a short distance from each corner; after one border has been folded down over the corresponding edge, the portion of paper projecting from the two corners must be tucked in; in this way when the adjacent edge is folded down, internal folds form around the perimeter of the board, while the corners are covered well and there is no cut paper near the corners. This tucking-in operation has hitherto been performed manually next to the two corners at the ends of an edge which has just been covered. The invention relates to a method and mechanism for automatically performing a tucking-in operation to produce neatly covered corners, as is required in certain bookbinding and other types of work.

The first subject of the invention is a method for neatly covering the corners of a manufacture of board with the paper glued to one face of this board and the borders of this paper projecting from the edges in order to be folded down over these edges and cover them. In the invention, as soon as one border has been folded down over the front edge of the board, the advancing movement, together with two tools positioned level with the thickness of the board, is used to act on the paper at the ends of the folded border, in the portions projecting from the corners of the said edge and thereby create an inward tuck and a fold, in order to prepare the manufacture for the folding down of the adjacent edge so that the corner is neatly covered.

Another subject of the invention is a mechanism for carrying out this method. The said mechanism basically comprises two tools positioned level with the thickness of the board and designed to act on the paper at the ends of a border folded down first to cover the corresponding edge of the board, in the portion projecting from the corners of the said edge; this creates an inward tuck and a fold in order to prepare the manufacture for the folding down of the adjacent border so that the corner is neatly covered.

In practice each of the said tools is in the form of a shaped, angularly movable arm forming part of a rotary element which is stressed elastically to press upon the corner and upon the edge parallel to the direction of advance of the board. In an advantageous embodiment, each tool is moved away from the level of the board, after rubbing along its edge, parallel to the direction of advance; this removes the tool from the operation once the inward tuck has been made.

In an advantageous embodiment the border adjacent to the first folded border is drawn by low pressure in the plane of the paper in order to offer some resistance to the tucking and thereby make it neater. To this end, at the corners to be covered, a continuous band may be provided on whose surface suction is generated by an underlying low-pressure chamber over which it runs; the said continuous band is so driven that its upper active side has a speed equal to the speed of advance of the manufacture which is being processed. A pressure roller acting on the manufacture may also be provided to press it onto the suction band, and this may be raised when not in use.

The invention will be made clearer by the description and accompanying drawing, which latter shows a practical, non-restricting embodiment of the said invention. In the drawing:

Fig. 1 is a perspective view of stages in the processing of a manufacture by a known machine described in an earlier patent;

Figs 2, 3 and 4 show, in plan with parts removed and in the views and sections taken through the lines III-III of Fig. 2 and IV-IV of Fig. 3, such a machine improved by the invention;

Figs 5, 6 and 7 show an enlarged detail of Fig. 2 and the same detail as it reaches successive positions;

Figs 8 and 9 show local views through the lines VIII-VIII of Fig. 5 and IX-IX of Fig. 7;

Figs 10 and 11 show in isolation a tool according to the invention in a modified form, in plan and through IX-IX of Fig. 10;

Figs 12 and 13; and 14 and 15 show in plan and in side elevation a corner of a manufacture in two stages of handling;

Fig. 16 shows a perspective view of the stage seen in Figs 14 and 15 and a tool about to act;

Figs 17 and 18 show in a similar fashion to Figs 12 and 13 or 14 and 15 at a subsequent stage;

Figs 19 and 20 are perspective views of the corner of the manufacture in the stage seen in Figs 17 and 18 and after covering has been completed;

Fig. 21 shows the said corner covered, in plan;

Fig. 22 shows a local section through XXII-XXII of Fig. 3; and

Figs 23 and 24 show, similarly to Figs 5 and 8, an alternative embodiment.

As shown in Fig. 1, a board S of a certain thickness is to be covered with a paper L, which is glued to one face of a board S and has borders L1, L2, L3 and L4 projecting from the edges of the board for the purpose of covering the said edges by being folded down over the edge and glued to the margin of the opposite face of the board. Using a machine fitted with brush tools indicated by 1 and 3, rotating in the directions of arrows f1 and f3,

as already known per se - see prior Italian patents 9411 A/90 and FI91A 63 (European Patent Application 91830220.3) and FI91A 145 (European Patent Application 92830315.5) - and with the manufacture advancing in the direction of the arrow fA, the first border L1 is folded down by the brush rotor 1 and then, with the manufacture advancing in the opposite direction, i.e. in the direction of arrow fB and by means of the brush rotor 3 rotating in the direction of arrow f3, the border L3 of the paper is folded down.

The object of the invention is to ensure complete covering of the corner A of the board S - which is generally quite thick - so that the thick edge of the board cannot be seen in the finished manufacture and also in order to avoid the possibility of the paper covering L being torn by the exposure of a cut edge of the said paper at one of the corners of the manufacture, and also to prevent portions of the paper from projecting, even if folded.

Covering (Figs 12 to 21) is done as normal by folding the border L1 through 180° to cover the edge B1 of the thickness S of board, the paper L being cut as shown at LD at 45° and the board S being applied to the paper such that its corner A is slightly removed from the diagonal cut LD at this corner of the paper. In this way - as seen in the sequence of Figs 12 to 21 - after the border L1 has been folded down over the edge B1 of the board S (Figs 14 to 16) an inward fold must be created in the portion LX indicated in Figs 14 to 16 to obtain the appearance of the corner as indicated in Figs 17, 18, 19, after which the border L2 is folded down over the edge B2, in such a way that the corner A of the board S is completely covered in a properly finished manner, as shown in Figs 20 and 21, with no gaps in the covering around the corner A of the board S, no projecting pieces of paper and no cut edges of paper L in the area around the thickness of the board S, which are liable to become damaged during use. As shown in Figs 20 and 21, the portion LX (indicated in Figs 14 to 16) is pushed in as indicated by LY (Figs 17 to 19) and the fold LZ is formed; next, by folding the border L2, a complete covering of the corner A of the board is formed, with the crease LZ of the border L2 which remains within the perimeter of the manufacture; an optional further covering LK (Fig. 20), applied to the opposite board face to that covered with the paper L, completely covers the cut parts of the borders L1 and L2.

The invention makes it possible automatically to perform the inward fold indicated by LY of the portion LX (as indicated in Figs 14 to 19) and the fold LZ, in such a way that subsequent folding down of the border L2 - even if automatic - ensures that the thickness S is covered neatly at the corner A with the crease LZ at a distance from the edges and corner of the board, as shown in Figs 20 and 21.

The invention is embodied - according to the example illustrated - by a machine which comprises the brush rotors such as 1 and 3, and other components described in more detail below in the detailed description of the machine, which machine is fitted with the device of the invention for carrying out the folding and the neat covering of the corner of the board S. Various functional parts are shown from the conventional machine in addition to the two brush rotors 1 and 3 mentioned above. A continuous belt conveyor 5 passes round, among other elements, a cylinder 7 and is supported by an internal supporting bar 9, against which is a forwarding cylinder 10 which is at a slight and adjustable distance from the active upper surface of the continuous conveyor 5, this distance being dependent on the thickness of the board S joined to the paper L and forwarded in the direction of arrow fA by the conveyor 5 to be pinched between the conveyor 5 lying on the bar 9 and the forwarding cylinder 10. The supporting plane of the upper active surface of the conveyor 5 interacts with the lower portion of the flexible bristles of the brush rotor 1, turning in the direction of arrow f1. 12 and 14 indicate the two cylinders of a pair of cylinders located downstream of the brush rotor 1 relative to the direction of advance fA of the manufacture being processed. The bristles in the lower portion of the brush rotor 1 act on the border L1 and fold it down over the edge B1 of the board S as it passes under this brush rotor 1, and the pair of cylinders 12, 14 compresses the border L1 onto the board S face opposite that to which the paper covering L has been glued, the border L1 being provided with glue with the same distribution as for the gluing of the paper L against the board S. The manufacture undergoing processing reaches a continuous air-permeable band 15 which passes round a cylinder 16 and small cylinders 16A; the active upper side of said band 15 passes closely over an underlying low-pressure chamber 17; a pressure roller 16C also acts on the band 15. The manufacture is then discharged in the direction of arrow f16 until it drops onto the upper active side of a second continuous conveyor 18 whose active upper surface moves in the direction of arrow fB for the folding down of the second border L3; 20 indicates lateral guide plates for controlling the free fall of the manufacture in the direction of arrow f16 from the forwarding plane - defined by the conveyor 5, the cylinders 12, 14, the band 15 and the roller 16A used in the first operation in which the border L1 is folded and glued - onto the conveyor 18. After falling in a controlled manner onto the continuous conveyor 18, the manufacture is forwarded in the

direction of the arrow fB by the said conveyor under a cylinder 22 similar to the cylinder 10 in order to reach the brush rotor 3, which works like the rotor 1 against the conveyor 18 which passes around a return cylinder 24, until the manufacture has been forwarded between two cylinders 26 and 28 (similar to 12 and 14) which compress and stabilise the gluing of the border L3 folded down by the brush rotor 3 onto the corresponding edge of the board S. A subsequent air-permeable continuous band 29 passing around a cylinder 30 and small cylinders 30A, a low-pressure chamber 31 and a pressure roller 30C are provided downstream of the cylinders 26 and 28 to guide the subsequent path of the manufacture through the subsequent processes, which may be the folding down of the other two borders L2 and L4 in similar operations to those indicated above in relation to the folding of the borders L1 and L3.

For the purpose of automatically carrying out, during the movement of the manufacture inside the mechanisms described above for the folding of the borders L1 and L3 over the corresponding edges of the board S, the inward folds as indicated by LY of the portion LX of the borders L1, L2 and corresponding edges, and the folds LZ, for the purposes already indicated, there is provided at the sides of the board S and against each border parallel to the direction of advance - as borders L2 and L4 - a mechanism as described below, both after the passage through the cylinders 12, 14 and after the passage through the cylinders 26, 28.

Referring in the drawing to the second path which the manufacture must follow in the direction of arrow fB in the second passage as described with reference to Fig. 2 for the folding of the border L3, a device as described below is applied to the machine on each side of the path of the manufacture.

The device, which is located on the left-hand side when viewing Fig. 4, comprises a block 32 in which a through seat 34 (see also Fig. 8) is formed with a vertical axis. Mounted in this seat on bearings 36 (shown diagrammatically) is a small cylinder 38 capable of angular movement, which small cylinder receives the restoring force of a spring 40 which stresses this small cylinder in the direction of arrow f38. Mounted on further bearings 42 (also shown diagrammatically) in the seat 34 is an angularly movable and axially slidable spindle 44 belonging to a rotary element 46 to which there also - and in particular - belongs a shaped arm 48; this arm 48 is the tool for forming the inward fold LY and the fold LZ in the portion LX in the two borders meeting at a corner A, such as the borders L1 and L2 shown in Figs 12 ff, for the purposes indicated. The rotary element 46 of the spindle 44 and of the shaped arm 48 is axially slidable and angularly coupled - by means of a tongue 50 - to the small cylinder 38 and is stressed upwards by a spring 52. To oppose and control the upward axial movements of the rotary element 46 (44 and 48), a push element 54 is provided which acts on the upper transverse surface of the rotary element 46 in its axis of rotation; the push element 54 is controlled by an electromagnetic or fluid - especially pneumatic - servo-control system indicated as a whole by 56 and capable, via the push element 54, of lowering the rotary element 46 (44, 48) into the position shown in Fig. 8, where the shaped arm 48 is generally level with the board S moving in the direction of arrow fB, whereas when the servo-control 56 allows the push element 54 to rise, the rotary element 46 (44, 48), stressed by the spring 52, follows (or causes) the rising of the push element 54 and moves into a raised position as shown in Fig. 9. Pivoting at 57A on the servo-control body 56 is an arm or double arm 57 which carries the pressure roller 30C. A servo-control 58 acts on the arm 57 of the roller 30C simultaneously with the command from the servo-control 56 on the push element 54. A similar arrangement is provided for the control of the roller 16C. Combined with the mechanism described and in particular with the block 32 is an optical photocell target indicated diagrammatically by the components 59 and 60. Its ray R may be intercepted by the manufacture advancing in the direction of arrow fB, after the manufacture has passed the cylinder 30. The case of the servo-control 56 is supported by the block 32, for example on an upward extension 32A of this block. On the side of the case of the servo control 56, on a bracket 62, two wheels 64 and 66 are carried, the first of which operates on the upper surface of the block 32 and the second on the cylinder 30 at the exit of the folding unit; the said wheels 64 and 66 are designed to guide the manufacture correctly even at the end of its path past the pair of cylinders 26 and 28.

Fixed to the case of the servo-control 56 is a strip-type bracket 68 shaped as shown in the drawing to present its section 68A (see also Fig. 22) in such a way as to act on the bristles of the brush rotor 3 in the lower portion of the trajectory of the said bristles; the said terminal section 68A of the strip-type bracket 68 is active in the path taken under the brush rotor 3 both of the edge of the board S parallel to the direction of advance (as directions fA and fB) and of the corresponding border that runs parallel to the direction of advance of the developing manufacture, such as borders L2 and L4. In this way the brackets 68, 68A, which are arranged against each of the lateral edges of the advancing board S, prevent - as seen in Fig. 22 - the bristles of the rotor from acting on the borders (as borders L2 and L4) parallel to the direction of

advance of the developing manufacture and from deforming these borders and also from becoming soiled with glue picked up from the border on which the glue is spread; this also avoids the possibility of detachment of the paper from the lower face of the board S to which the paper is glued. The bracket 68 is provided on the block of the servo-control 56 against each of the two borders parallel to the direction of advance, as borders L2 and L4 mentioned above.

One of the two edges, parallel to the direction of advance, of the board S of the developing manufacture is advantageously in a fixed lateral position relative to the front of the machine, which front extends across the maximum dimension possible for the developing manufactures. Since there is a pair of mechanisms such as the mechanism comprising a block 32, a servo-control 56 and a bracket 68, 68A for both brushes 1 and 3, the position of one of the blocks 32 (for example that on the left when viewing Fig. 4) is kept fixed, together with its associated bracket 68 at one of the two extremes of the useful working front of the machine (in the lower extreme as seen in Fig. 2, i.e. the right-hand extreme in the direction of advance of arrow fB) while the position of the mechanism (comprising a block such as block 32 and its associated bracket such as bracket 68, 68A) can be adjusted - according to the width of the manufacture being formed - relative to the opposite extreme of the working front, i.e. the upper extreme when viewing Fig. 2 and the right-hand extreme when viewing Figs 3 and 4. In Figs 2 to 4, the number 332 indicates the two blocks, 356 the servo-controls and 368 the two brackets associated with this extreme; 329 indicates the continuous band symmetrical to band 29 (the band symmetrical to band 15 is not shown) which acts in combination with the complex 332, 356, 368; 330C indicates the roller symmetrical to roller 30C and carried by an arm 357 symmetrical to arm 57. 430 indicates a cylinder around which the band 329 runs; the cylinder 430 is mounted on and driven on the extension 30Z of the cylinder 30, for the purposes indicated below. The two blocks 332 with their related parts are adjustable along guide means parallel to the brushes, in ordere to be moved, for example, from the extreme position 332 indicated by the solid line to a closer position for a reduction of the front as denoted by the broken line at 332A (and the brackets in position 368A) in Fig. 2. The setting must be equal for the two units 332, 368; adjustment is accordingly by means of threaded bars 334 driven simultaneously by a chain drive 336 (Figs 2 and 4) operated via a handwheel 338 or via electric motors; the two threaded bars 334 engage in threaded bushes in the respective blocks 332 enabling them to be operated, these blocks being guided both on the bars 334 and on bars 340 which guide the sliding movement. The strip-type brackets, 368, 368A (corresponding to brackets 68) are therefore adjusted for position via the handwheel 338 to adopt the position corresponding to the border parallel to the direction of advance, to suit the transverse dimension of the developing manufacture. It is thus possible to ensure the efficiency of the shaped arm 48 relative to the blocks 332 and the efficiency of the active part 368A of the brackets 368 corresponding to the brackets 68A already described, whatever the dimension of the developing manufacture transversely to its direction of advance for the folding of the first two borders - that is L1 and L3 - lying across its direction of advance under the brush rotors 1 and 3.

The bands such as band 329 are moved translationally so as to follow the transverse position at which the blocks such as block 332 are set, inasmuch as the cylinder 430 around which the belt 329 runs is coupled in rotation to and slidable on the narrower section 30Z of the cylinder 30; the cylinder 430 is driven - in an obvious way though not shown - by the block 332 during setting; the rollers 330A are carried by the block 332. Thus the bands 329 (and equivalents) are moved with the setting of the working front width.

The bands 15 and 29 (and adjustable bands such as 329), owing to the suction produced by the low-pressure chambers such as chambers 17 and 31, cause the longitudinal borders (such as borders L2 and L4) to stick to these bands, which advance at the speed of the manufacture; the action of the tools - such as tools 48 - which cause the tucking-in of the portions LY and the folding LZ, is thereby kept under control, though not obstructed, since the suction exerts an efficient but gentle holding action which the tools - such as tool 48 - can overcome on the portion LX, as previously described.

The shaped arm 48 of each mechanism can with advantage be modified as shown in Figs 10 and 11 and indicated by 148. It is shaped so as to have two sections at an angle with each other, with a lower edge 148A and a rounded end 148B, with which it is possible to carry out the action on the portion LX of the paper folded down as shown in Figs 14 to 16, so as to make the deformation LY and the fold LZ, reaching the position shown in Figs 17 to 19. The improved shape of the tool 148 effectively enables it to act on a virtually complete range of cover papers.

Through the action of the springs 40, the arms 48 or 148 of the rotary elements 46 are inclined in the rest position as shown in Figs 2, 5 and 16, when the edge L3 is worked by the advance in the direction of arrow fB, the border L3 having been folded down as shown in Figs 14 to 16. In the

position shown in Figs 3, 5 and 8 the arm 48 or 148 is lowered by the action of the push element 54 and hence of the servo-control 56, in such a way that it comes level with the thickness of the board S, but slightly higher than the paper L and border L2 in a position in which it will be struck by the corner A of the board S covered by the border L3, or, in the position shown in Figs 14, 15 and 16, by the border L1. Advancing from the position in Fig. 5 in the direction of arrow fB, the corner 148A of the shaped arm 48 or 148 commences its own action on the portion LX of the paper while the arm 148 is gradually moved by the corner A and by the thickness of the advancing board S around the axis of the spindle 44 in the opposition direction to arrow f38, until its rounded end 148B is pressing against the edge B2 of the board S as shown in Figs 6 and 17, having yielded elastically by the yielding of the spring 40, thus moving from the position shown in Fig. 5 to the position in Fig. 6; it is during this passage that the inward tuck LY and the fold LZ are formed as shown in Figs 17, 18 and 19, thus preparing for the covering as shown in Figs 20 and 21 by the subsequent folding of the border L2. These operations are made smooth by the gentle holding action of the vacuum produced along the longitudinal borders L2 and L4 through the bands such as bands 15, 29 and 329, while the bands advance in company with the manufacture. The pressure rollers such as pressure rollers 30C and 330C - acting on the board joined to the paper (whose borders are folded down as they pass through the machine) - hold the manufacture against the bands. After the contact with the corner A, that is after the position shown in Fig. 6 of the manufacture advancing in the direction fB, has been passed, the push element 54 and 354 is permitted by the servo-control 56 and 356 to rise so as to allow the rotary element 46 to rise under the action of the spring 52, from the position shown in Fig. 8 to the position shown in Fig. 9; the arm 48 or 148 is consequently free from pressing on the edge B2 of the board S and as it lifts clear of the plane of the board the spring 40 restores it to the inclined position shown in Fig. 7 which corresponds to that in Fig. 5, i.e. ready for a new operation of folding the paper from position LX to position LY, LZ as described, under the action of the servo-control 56 which lowers the rotary element 46 after the manufacture has passed through. Simultaneously with the action of the servo-control 56 and 356, the servo-controls such as 58 lower and raise the rollers such as rollers 30C and 330C.

When the edge L2 in turn is folded down by the machine (either by reinsertion of the manufacture rotated through 90° relative to its two previous passes through the machine or by providing a machine which folds the borders L2 and L4 after the folding of borders L1 and L3 in the manner described) this folding of the border L2 over the corresponding edge B2 of the board S results in the manufacture being covered at the corner A, as shown by the change from the conditions shown in Figs 17 to 19 to the conditions shown in Figs 20 and 21, that is with the crease LZ slightly away from the corner A and from the edges of the board and extending over the opposite face to that covered by the paper L. In this way the edge of the board is neatly covered at the corner A and projections of part of cut or folded sheet in the portions facing the perimeter of the manufacture are avoided. With the optional covering of the opposite face to that covered by the paper L, using a sheet LK as shown in Fig. 20 of slightly smaller dimensions than the board, a complete covering of the board S is achieved without irregularities, as is required in certain kinds of high-quality bookbinding work. The command to raise the push elements such as push elements 54 and 354 and the rollers such as rollers 30C and 330C, may be sent to the servo-controls such as servo-controls 56, 356, 58, 358, by the target represented by the ray R of the photoelectric cell system 59, 60 already described, or by some other equivalent system.

With the arrangement for the setting of the blocks 332, strip-type brackets 368 and bands 329 in the manner indicated, it is possible quickly to prepare the machine for processing manufactures of different formats as far as the dimension in the direction perpendicular to that of advance indicated by arrows fA and fB in the drawing in concerned.

Figs 23 and 24 show an alternative embodiment which relates to the system for controlling both vertical and horizontal movements of the lever tools such as tools 48. The purpose of this embodiment is to simplify access to the parts of the machine by moving to the top the mechanism for producing vertical and horizontal movements of the tools used to act on the corner covering paper. In Figs 23 and 24 the numbers of parts corresponding to those from the previous example are simply increased by 500.

Under the bands such as band 529 and in a block 532 only one tensioning rotary element 601 is provided, which acts on one of the rollers 530A which is a tension roller for the band 529. Above the area through which the developing manufacture passes is a unit 556 which carries the strip-type brackets 568 and forms a seat for bearings 603 on which is mounted a rotary element 605 that can be moved on a vertical axis. This rotary element 605 carries at its lower end an attached block 607 with a through hole which is internally splined to turn a splined shaft 609 while allowing it to slide vertically; the bottom end of the shaft 609 carries the tool 548. The shaft 609 receives an upward force from

spring means 611; against the action of these spring means 611 there acts a pneumatic control system with a pipe 613 leading into the cavity 615 of a cylinder and piston system formed in the rotary element 605 and comprising a piston fastened to the top end of the shaft 609; pneumatic control thus lowers the tool 548 into the active position. A spring 540 acts between the angularly movable rotary element 605 and an anchor point 619 fastened to the unit 556; in this way the said rotary element and hence the shaft 609 and the tool 548 are stressed in the same way as the tool 48 was stressed by the spring 40 in the previous example, performing the same function. Engaged on the unit 556 is also an actuator 558 which is intended to operate the support arm 557 for the roller 530C acting on the advancing manufacture to press it onto the active upper side of the band 529.

The arrangement shown in Figs 23 and 24 transfers everything relating to the driving of the tool 548 above the trajectory of the developing manufacture, allowing easier access for maintenance and the like.

It will be understood that the drawing shows only an embodiment given purely as a practical demonstration of the invention, it being possible for the said invention to vary as regards shapes and arrangements without thereby departing from the scope of the concept underlying the said invention. Any reference numbers in the accompanying claims are for the purpose of facilitating the reading of the claims with reference to the description and to the drawing, and do not limit the scope of protection represented by the claims.

For example it is possible to have symmetrical setting of the blocks 32 and 332 relative to the longitudinal mid plane of the machine.

Claims

1. Method for neatly covering the corners (A) of a manufacture of board with the paper (L) glued to one face of this board (S) and the borders (L1...L4) of this paper projecting from the edges (B1...B4) in order to be folded down over these edges and cover them, characterised in that as soon as one border (L1) has been folded down over the front edge (B1) of the board (S), the advancing movement, together with two tools (48) positioned level with the thickness of the board (S), is used to act on the paper at the ends of the folded border (L1), in the portions (LX) projecting from the corners (A) of the said edge and thereby create an inward tuck (LY) and a fold (LZ), in order to prepare the manufacture for the folding down of the adjacent edge so that the corner (A) is neatly covered.

2. Mechanism for neatly covering the corners (A) of a manufacture of board with the paper (L) glued to one face of this board (S) and the borders (L1...L4) of this paper projecting from the edges (B1...B4) in order to be folded down over these edges and cover them, characterised in that it comprises two tools (48) positioned level with the thickness of the board (S) and designed to act on the paper at the ends of a border folded down first to cover the corresponding edge of the board, in the portion (LX) projecting from each of the corners (A) of the said edge, and thereby create an inward tuck (LY) and a fold (LZ), in order to prepare the manufacture for the folding down of the adjacent border so that the corresponding corner (A) is neatly covered.

3. Mechanism according to Claim 2, characterised in that each of the said tools (48) is in the form of a shaped, angularly movable arm forming part of an element (46) which is stressed elastically to press upon the corner (A) and upon the edge (BX) parallel to the direction of advance (fA; fB) of the board (S).

4. Mechanism according to Claim 2 or 3, characterised in that each tool (48) is moved away from the edge of the board (S) parallel to the advancing movement after partly rubbing along it with the advancing movement, to remove it from the operation after forming the inward tuck (LY) and the fold (LZ).

5. Mechanism according to the preceding claims, characterised in that the tool (148) is in the form of two sections forming an angle with each other.

6. Mechanism according to Claim 4, characterised in that each tool is raised above the level of the board.

7. Mechanism according to Claim 4 or 5 or 6, characterised in that the said rotary element (46) of the tool with the shaped arm (48, 148) is axially movable relative to a small cylinder (38) stressed by an elastic means (40) and is coupled in rotation to the said small cylinder (38) in order to be stressed towards the board (S), and in that the said rotary element is controlled in its axial movements having by a servo-control (56), generally having a push element (54) against which the said rotary element (46) is pushed by an axially-acting spring (52).

8. Mechanism according to Claim 4 or 5 or 6, characterised in that the rotary element (609) of the said arm (548) is vertically slidable on but angularly coupled to an angularly movable rotary element (605) and stressed by spring means (540) in order to press the tool (548) against the edge of the board parallel to the direction of advance; these all being positioned above the path of the developing manufacture.

9. Mechanism according to at least Claim 2, characterised in that it comprises means (31) for acting on the border adjacent to the first folded border, in order to draw it by means of low pressure in the plane of the paper and to offer some resistance to the tucking and thereby make it neater.

10. Mechanism according to Claim 9, characterised in that it comprises, at the corners to be covered, a continuous band (29; 529) on whose surface suction is generated by an underlying low-pressure chamber (31) over which it runs; the said continuous band (29, 529) being so driven that its upper active side has a speed equal to the speed of advance of the manufacture which is being processed.

11. Mechanism according to Claim 10, characterised in that it comprises a pressure roller (30C; 530C) acting on the manufacture to press it onto the suction band (29; 529), and this may be raised when not in use.

12. Mechanism according to at least Claim 2, characterised: in that two blocks (32; 332) are provided, each fitted with the associated tool (48, 148); and in that the position of at least one of the said blocks can be adjusted along the machine front for folding down at the front a border intended to cover the front edge of the board (S), to suit the dimensions of the manufacture.

13. Mechanism according to Claim 12, for a machine for successively folding down two opposite borders onto the two opposite board edges lying transversely to the direction of advance in two successively active sections, characterised in that the two adjustable blocks (332) of the two sections are adjusted simultaneously by means of threaded bars (334) driven by a common drive (336, 338).

14. Mechanism according to Claim 12 and 13, for a machine having rotors with bristles (1, 3), characterised in that the position-adjustable blocks (332 and optionally 32) carry shaped brackets (368 and optionally 68) for removing from the operation the rotor bristles which would otherwise be active in the area of those edges of the board (S) and those borders of the paper (L) which are parallel to the direction of advance of the manufacture.

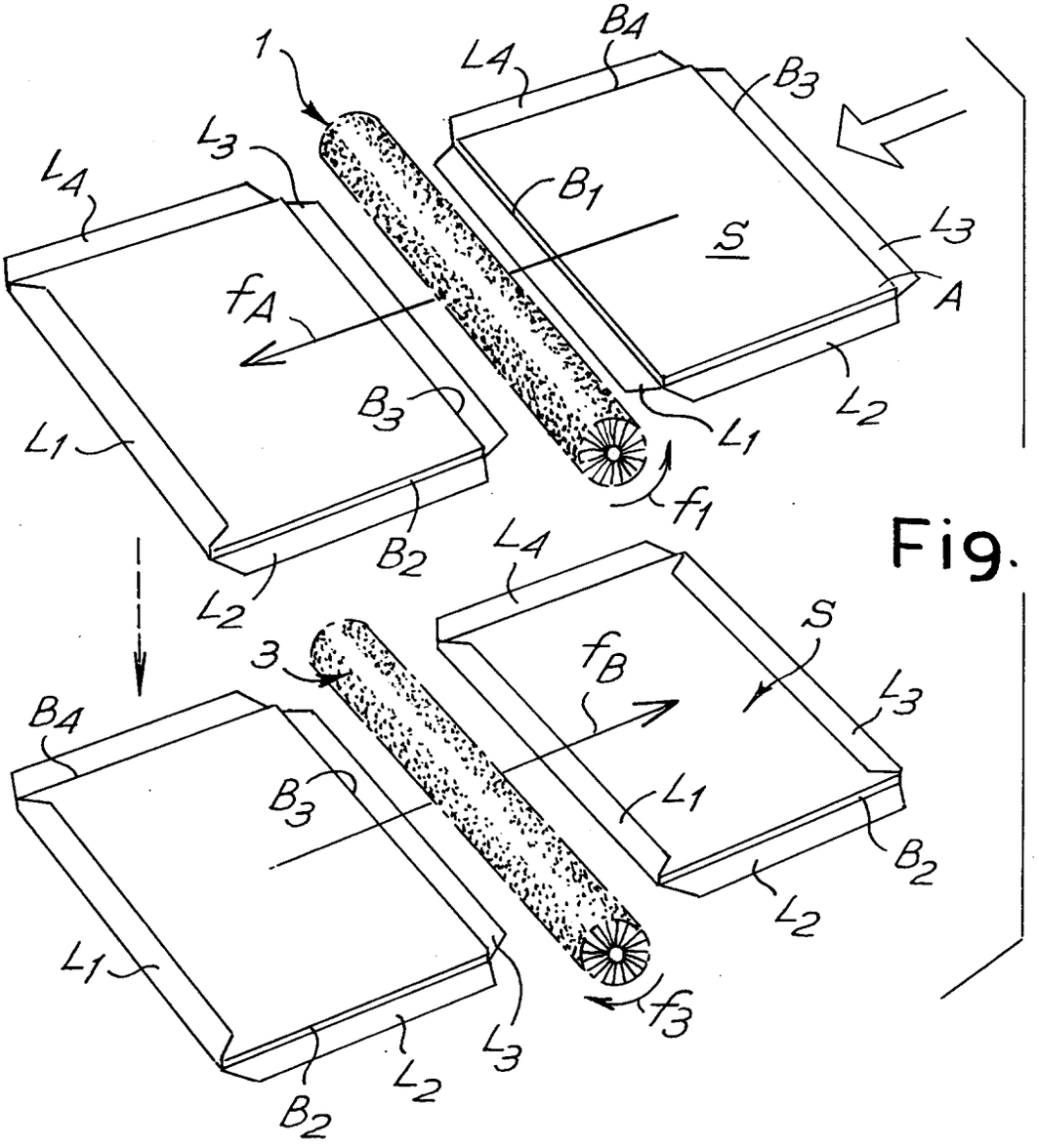


Fig. 1

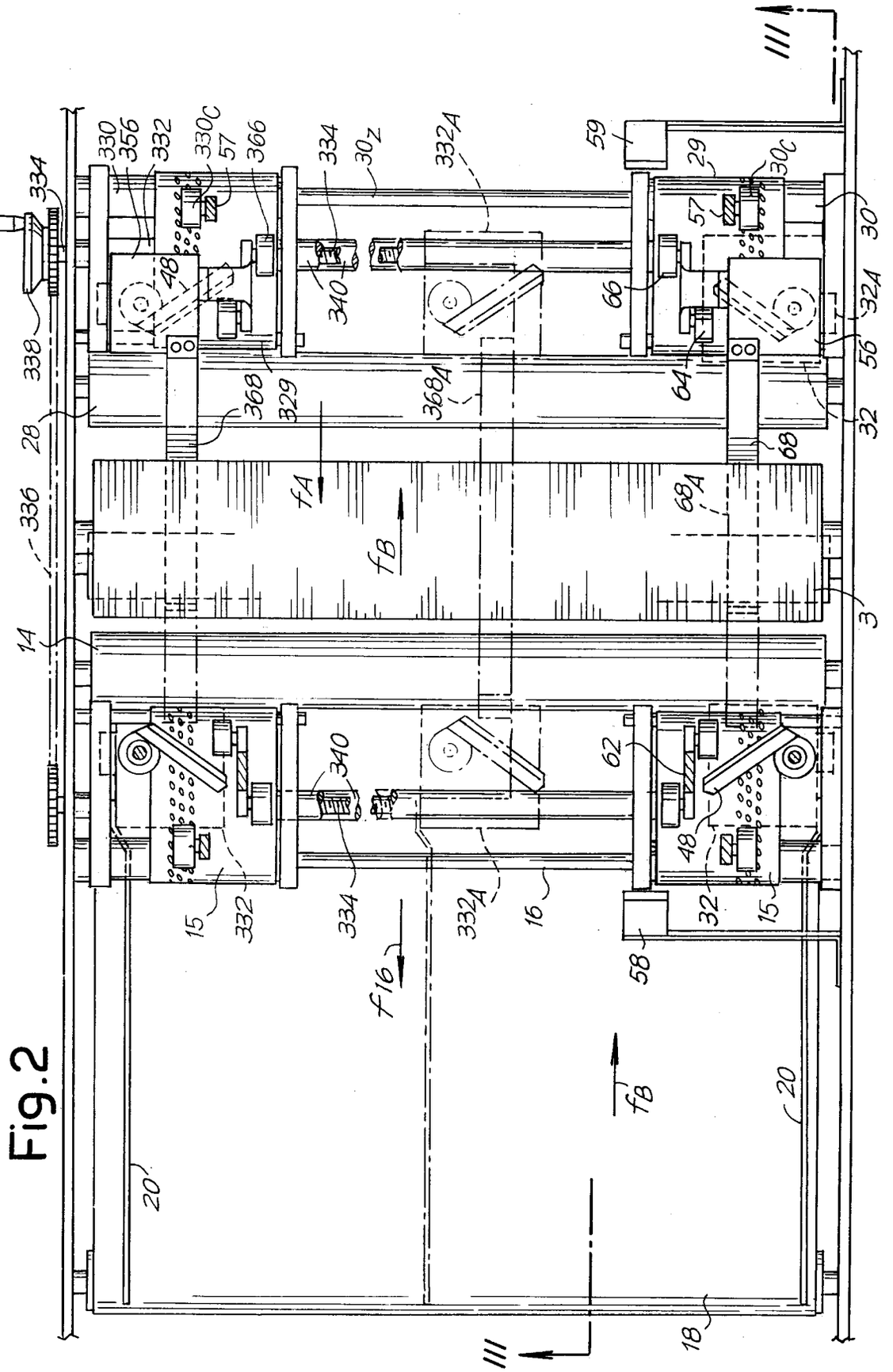

III
330
356
332
330C
57
366
334
30Z
332A
59
29
30C
30
334
48
340
66
324
338
360
329
368A
64
56
28
32
336
fA
68
68A
fB
3
14
340
62
48
15
332
334
332A
16
32
15
58
f16
fB
20
20
18
III

Fig.2

Fig.3

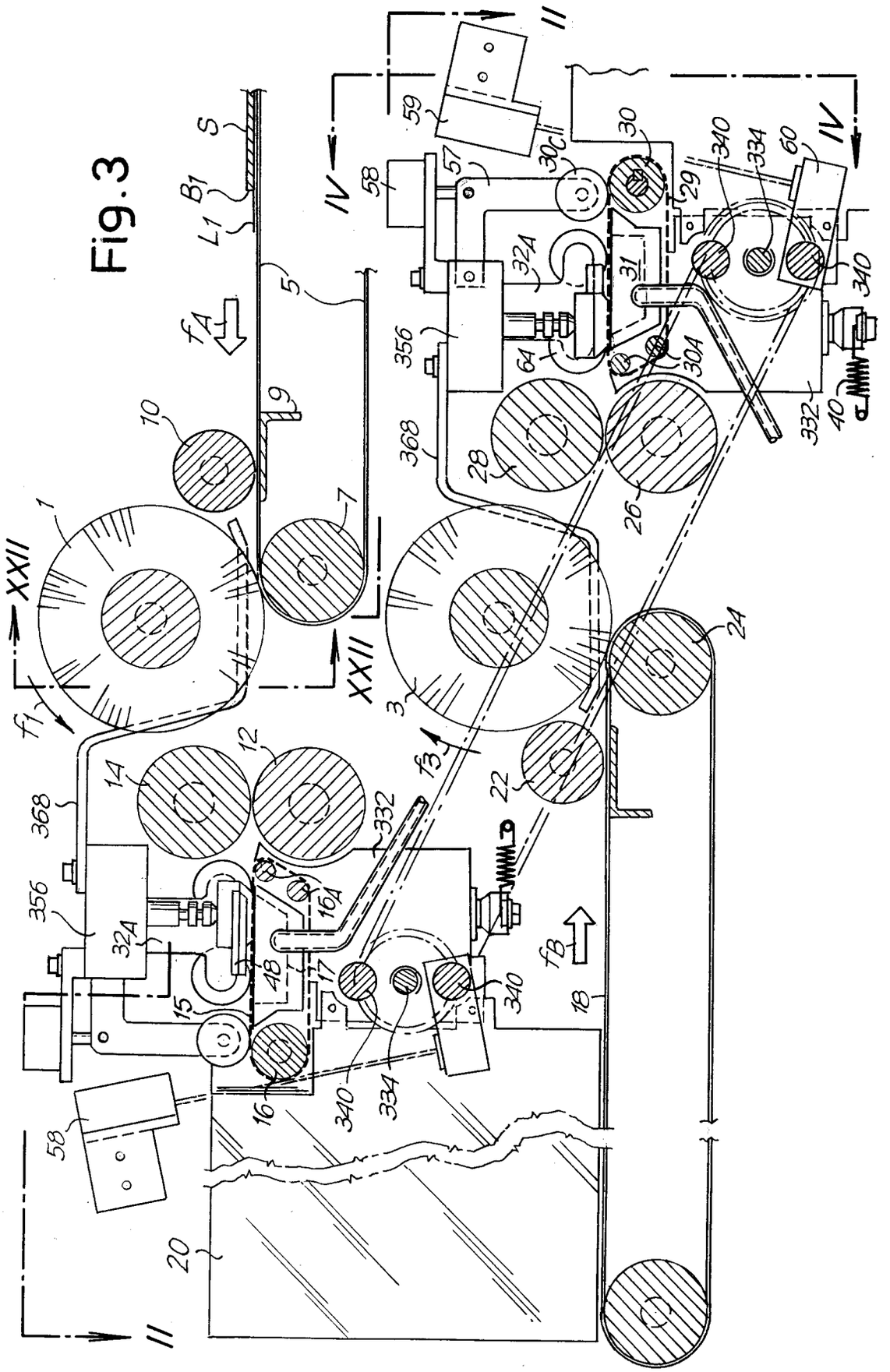

XXII
XXIII
II
IV
S
B1
L1
fA
fB
f1
f3
1
3
5
7
9
10
12
14
15
16
16A
17
18
20
22
24
26
28
30
30c
31
32A
334
340
356
368
40
48
57
58
59
60
64
304
332

Fig. 4

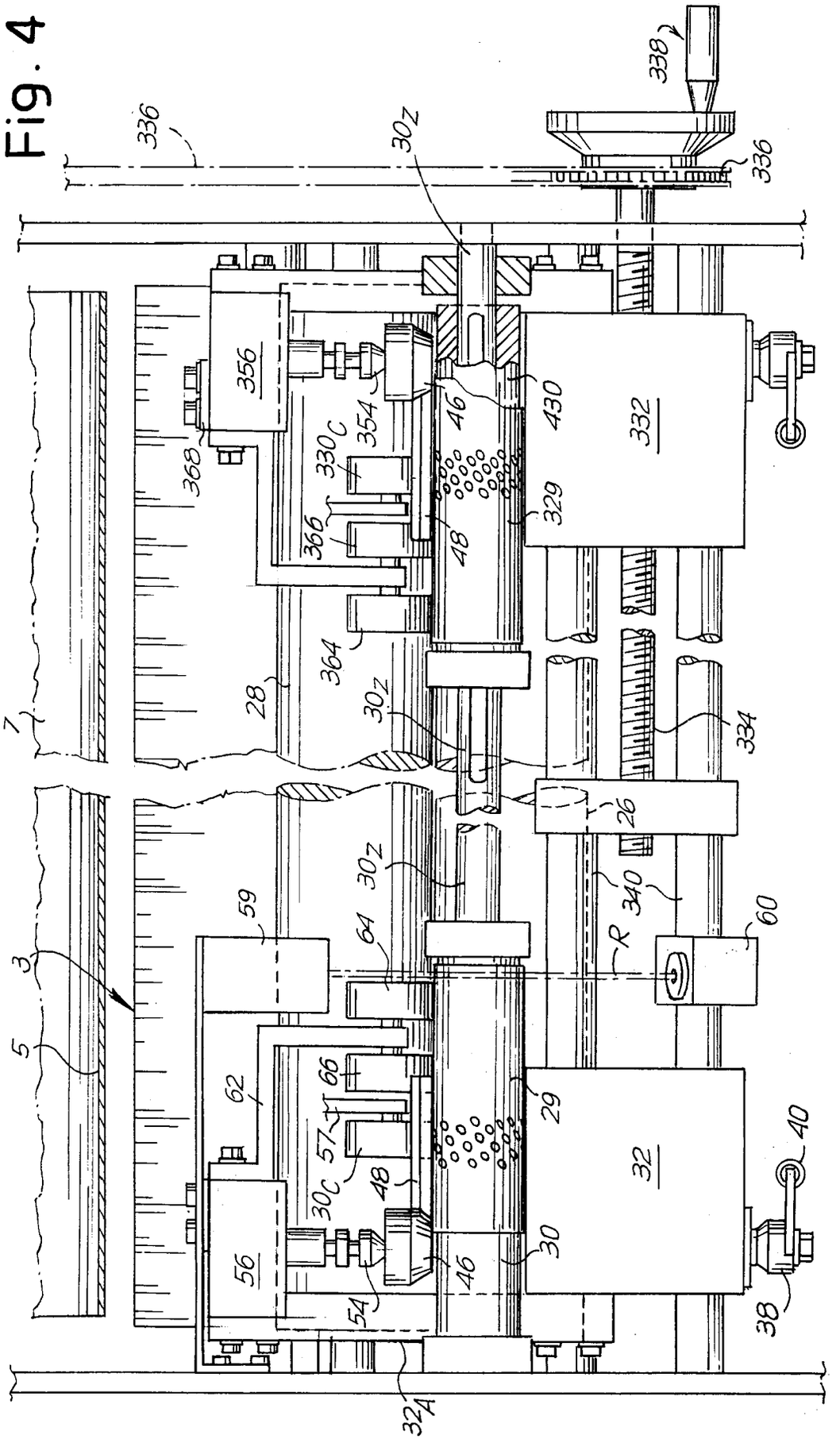

338
336
30z
336
356
354
330c
368
46
430
332
329
366
48
364
28
30z
334
26
30z
340
R
59
64
60
3
5
62
66
57
48
30c
29
32
40
56
54
46
30
38
32A

Fig.8

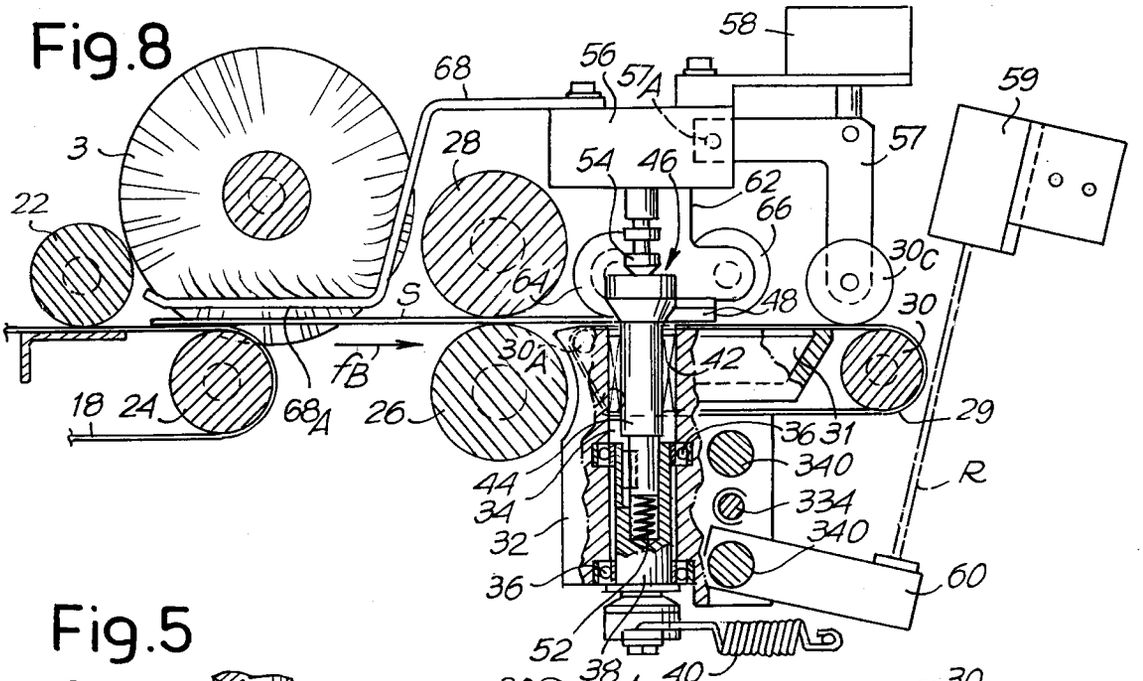


Fig.5

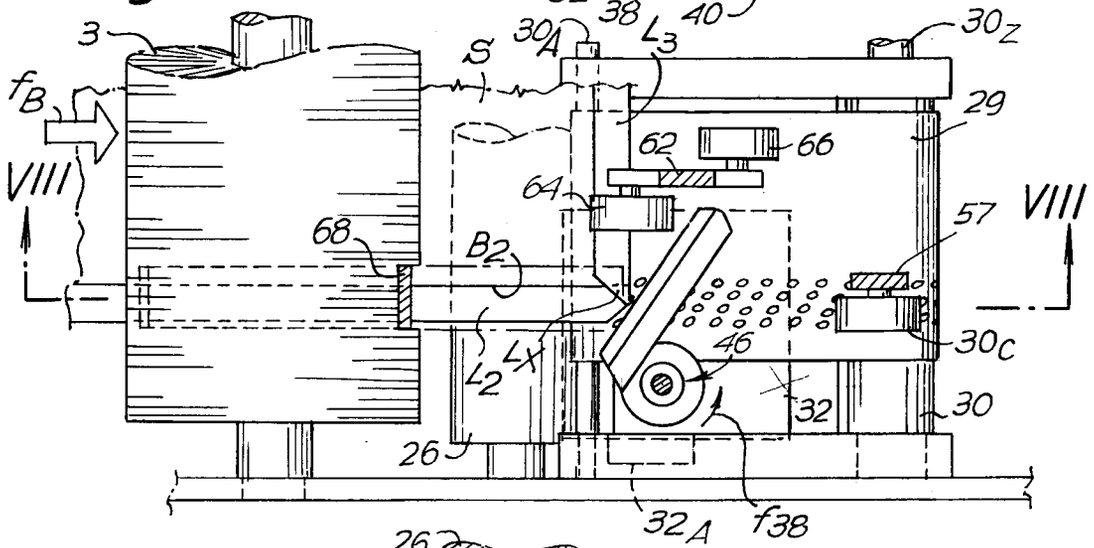


Fig.6

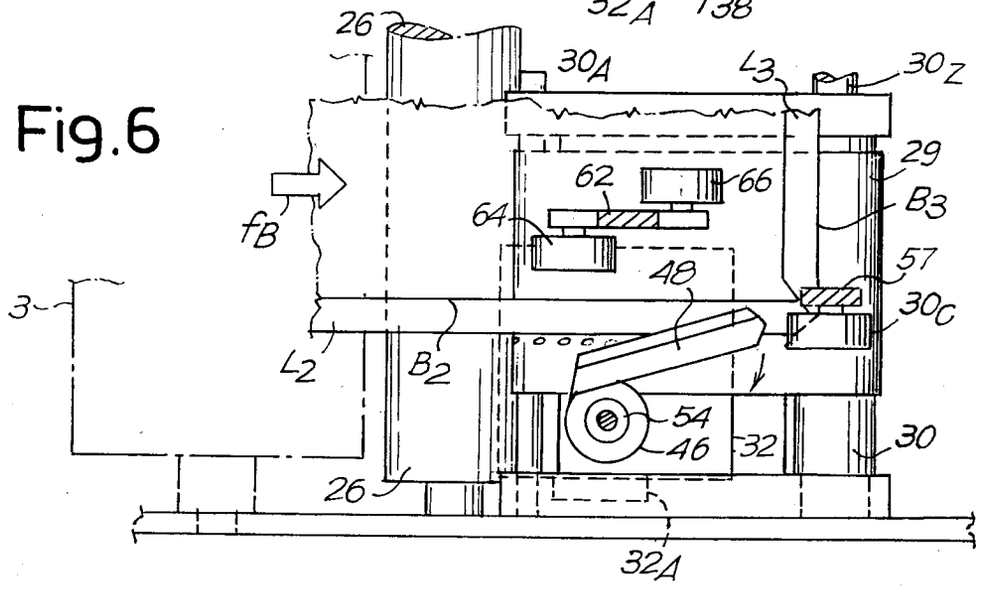


Fig.9

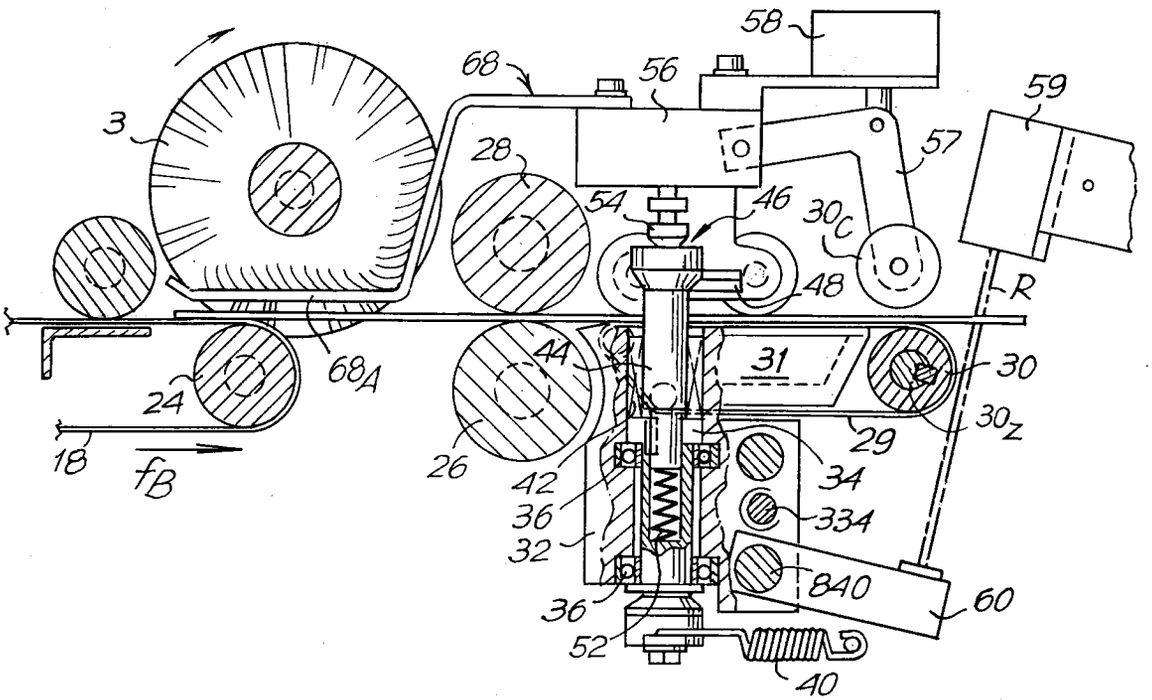

58
68
56
59
3
28
57
54
46
30C
48
R
44
31
30
68A
24
30Z
29
18
fB
26
42
34
36
334
32
840
60
36
52
40

Fig.7

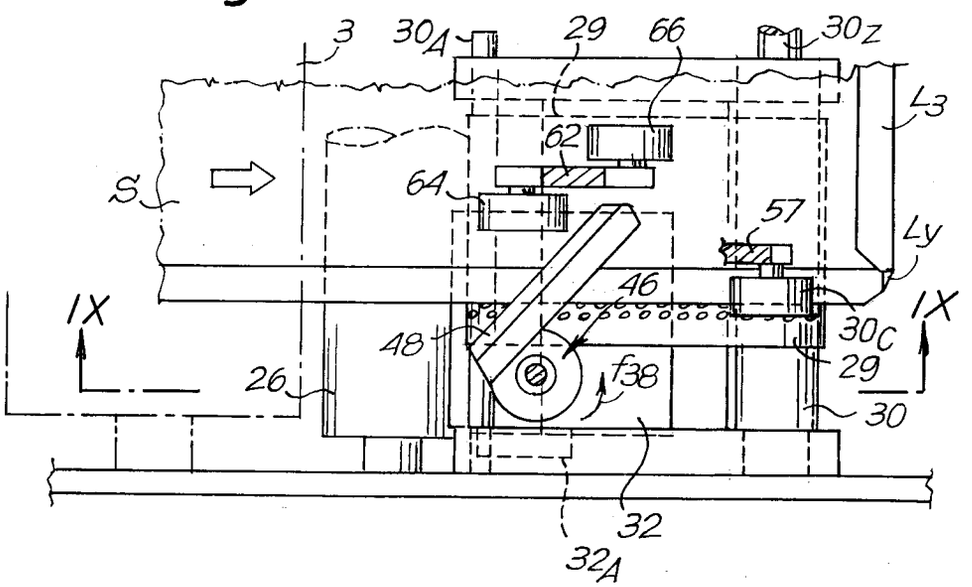

3
30A
29
66
30Z
L3
62
S
64
57
Ly
46
IX
IX
48
30C
26
f38
29
30
32
32A

Fig.13

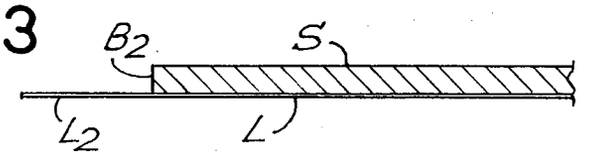
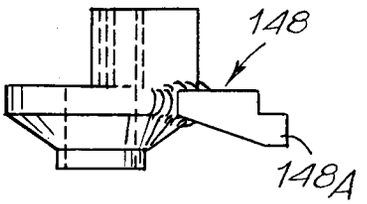


Fig.11



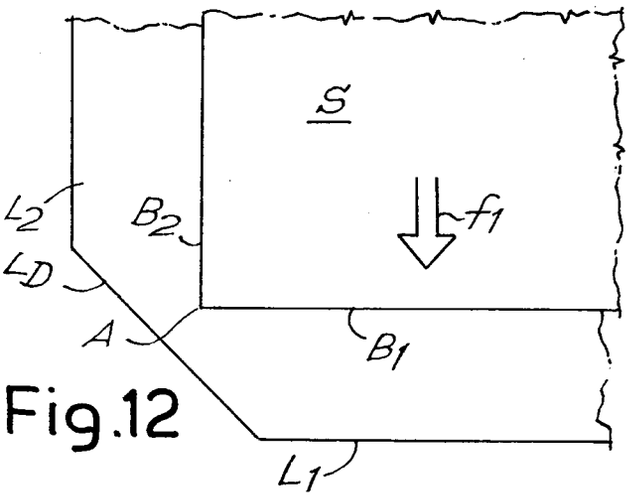


Fig.12

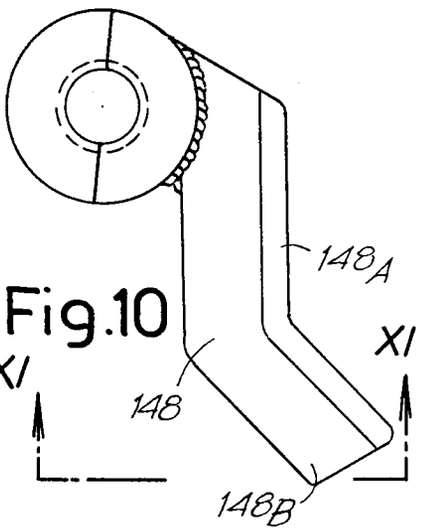
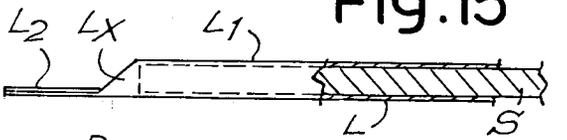


Fig.10

Fig.15



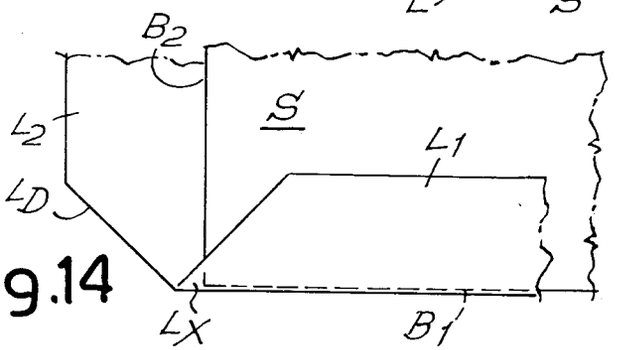


Fig.14

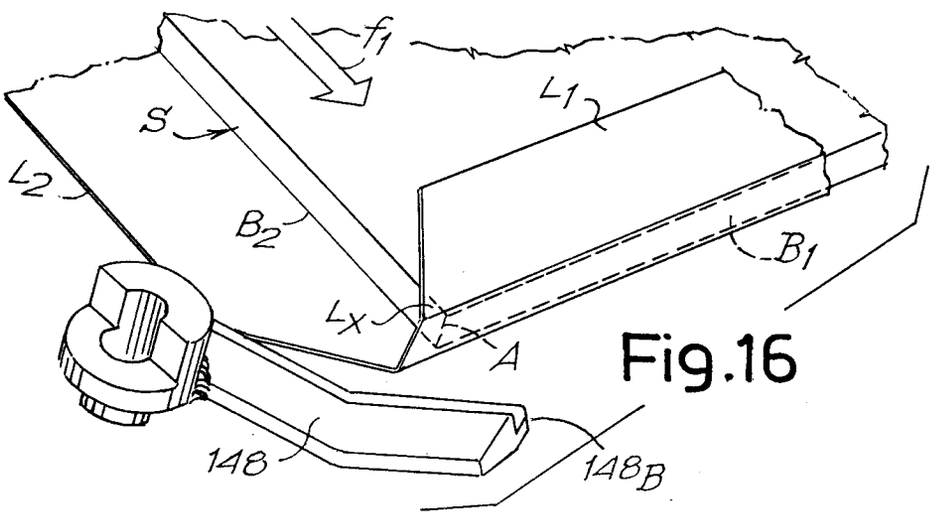


Fig.16

Fig.18

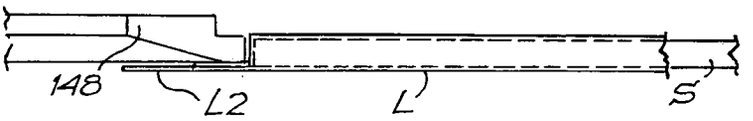
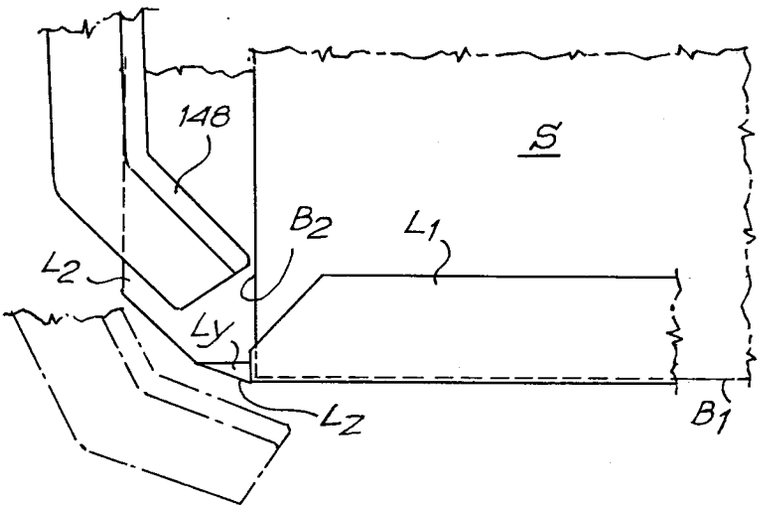


Fig.17



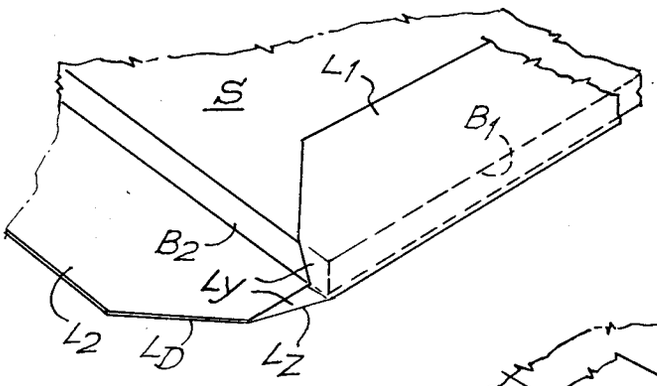
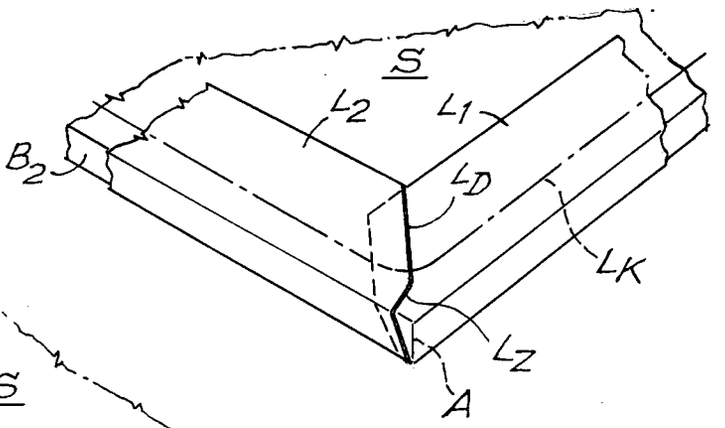


Fig.19

Fig.20



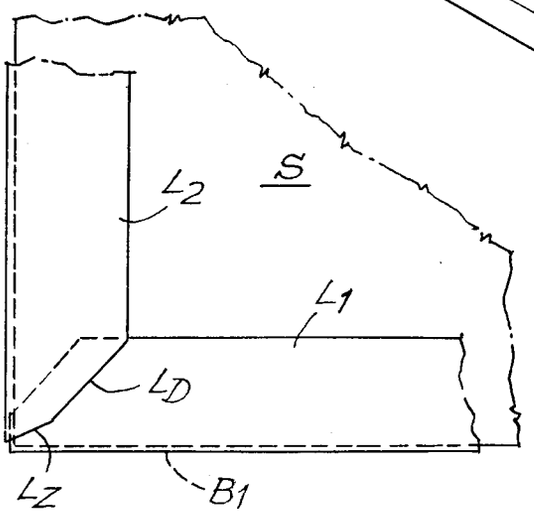


Fig.21

Fig.22

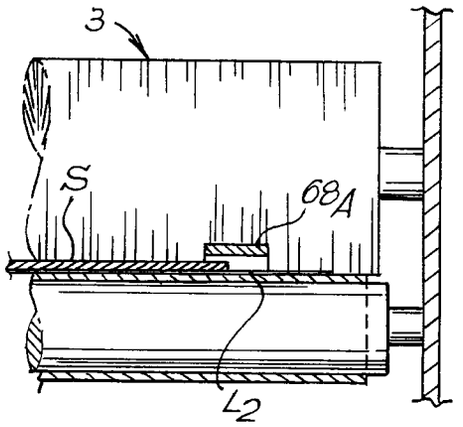


Fig.24

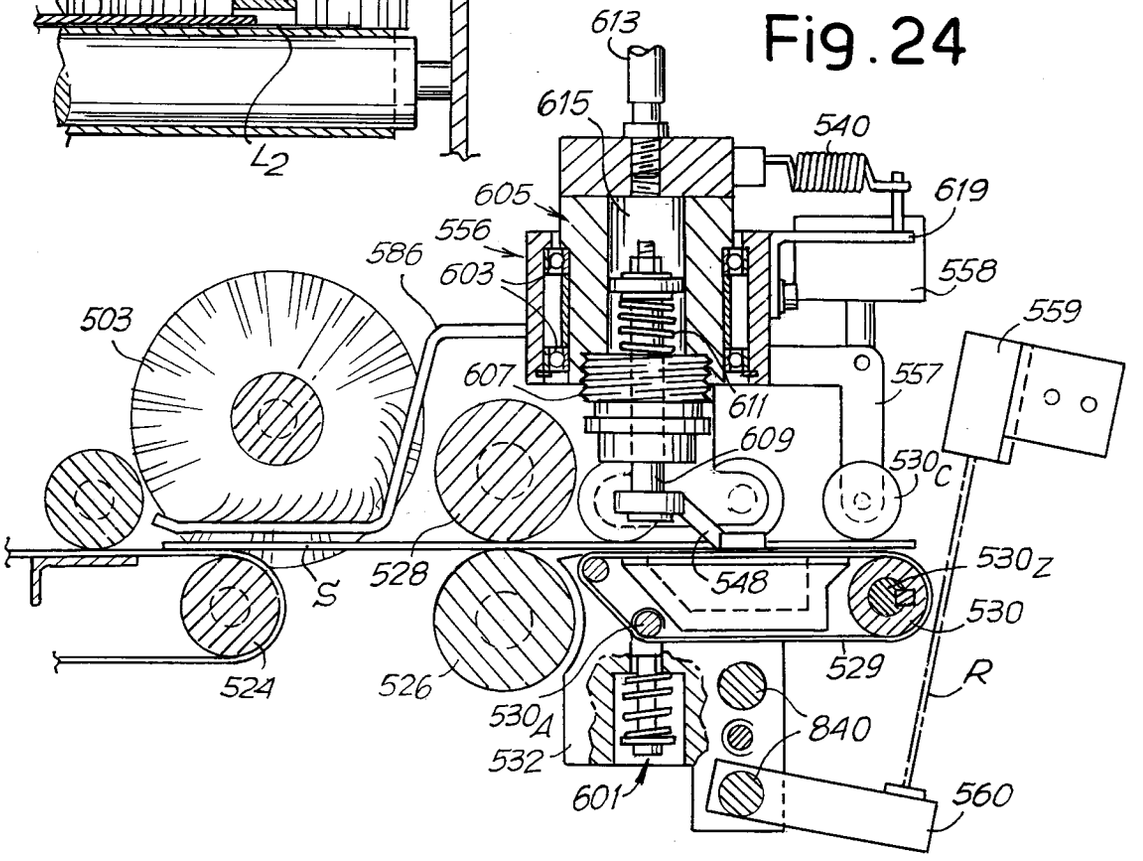
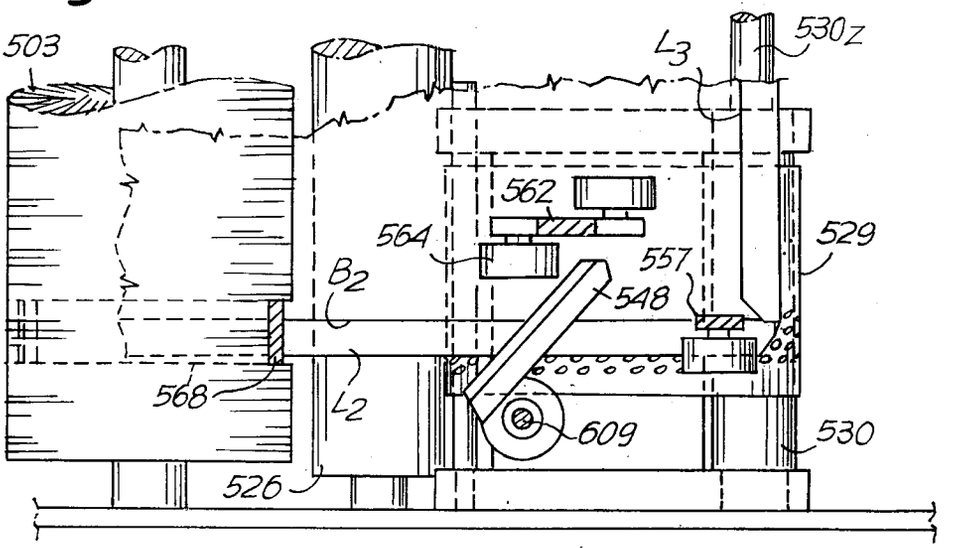


Fig.23



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 83 0461

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)
X	US-A-3 009 179 (THE SMYTH MANUFACTURING COMPANY) * column 11, line 24 - column 13, line 46; figures 17-20 *	1-3,5	B31F1/00 B29C63/04 B42C7/00
X	FR-A-2 291 038 (FMC EUROPE S.A.) * page 4, line 7 - line 14; figures 7,8 * * page 5, line 15 - page 6, line 20 *	1-4	
X	US-A-2 749 967 (DEXTER FOLDER COMPANY) * column 10, line 41 - column 11, line 36 * * figures 6,7,17-20 *	1-4,6	
A		7,8	
X	US-A-4 248 657 (NATIONAL SERVICE INDUSTRIES, INC.) * figures 2,3,9 * * column 3, line 62 - column 4, line 10 *	1	
A	EP-A-0 461 083 (UNIVERSAL RIBO S. R. L.) * the whole document *	1,10,11	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-C-243 444 (FIRMA FERD. EMIL JAGENBERG) * claims *	2,12-14	B31F B29C B65B B42C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 APRIL 1993	LANASPEZE J.P.Y.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)