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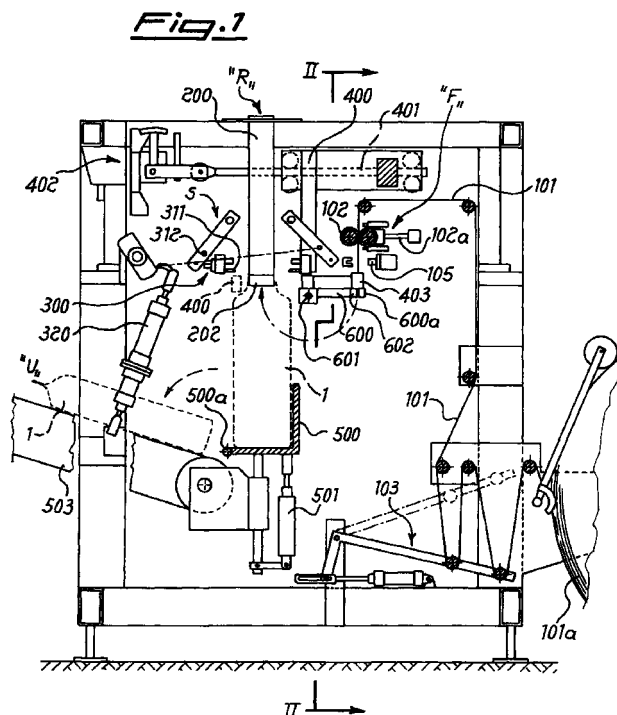
(71) Applicant: **CONCETTI S.p.A.**
I-06083 Bastia Umbra PG (IT)

(72) Inventor: **Concetti, Teodoro**
Bastia Umbra (Perugia) (IT)

(74) Representative:
Raimondi, Alfredo, Dott. Ing. Prof.
Dott. Ing. Prof. RAIMONDI ALFREDO S.r.l.
Piazzale Cadorna 15
20123 Milano (IT)

(54) **Machine for forming, filling and sealing bags**

(57) Machine for forming, filling and sealing bags (1) comprising at least one station (F) for forming the bag, at least one station (R) for filling the bag and at least one station (S) for sealing the bottom and the mouth of the bag, arranged opposite the filling station (R), as well as means (400) for transporting a bag from one station to the next, wherein means (600) are provided for transporting the bottom (1b) of the bag (1) from the forming station (F) to said welding station (S), for initial sealing of the bottom itself.



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Description

[0001] The present invention relates to machine for filling, forming and sealing bags, comprising welding means for sealing the bottom and the mouth of the bags, arranged opposite the said filling station, as well as means for transporting the bottom of the bag from the forming station to said welding means, for initial sealing of the bottom itself.

[0002] In the art of filling bags with loose material, automatic - so-called forming and filling - machines able to perform at great speed the cycle of forming, filling and final sealing of the mouth of the bag are known.

[0003] Said sealing of the upper mouth of the bag is normally performed by means of hot-welding techniques performed by means of suitable apparatus which act directly on the two opposite edges of the bag so that the two respective internal surfaces come into contact and merge with each other.

[0004] An example of this type of machine is for example described in EP-0,595,778 in the name of the same present applicant: said machine, however, is designed for high hourly outputs and has at least three independent stations for forming the bag with sealing of the bottom, filling and sealing of the mouth of the bag after the latter has been filled, respectively.

[0005] Although practical for high hourly outputs, the dimensions of the machine and the component parts cannot be reduced for those cases where a much lower hourly production rate is required.

[0006] EP-0,439,789 also discloses a more compact machine with a single station for welding the bottom and the mouth of the bag; this station, however, is arranged upstream of the filling station in the direction of feeding of the bag which, after it has been filled, must perform a return movement for sealing of the mouth, thus occupying the machine which is unable to fill at the same time the next bag; this results in an obvious and unacceptable increase in the dead time of the cycle and low productivity of the machine.

[0007] The technical problem which is posed, therefore, is that of providing an automatic machine for forming, filling and sealing bags, which is compact and simplified in terms of the component parts, but is such as to allow high average hourly production outputs with a reduction in the dead time of the cycle.

[0008] These technical problems are solved according to the present invention by a machine for forming, filling and sealing bags, comprising at least one station for forming the bag, at least one station for filling the bag and means for sealing the bottom and the mouth of the bag, arranged opposite the filling station, wherein means are provided for transporting the bottom of the bag from the forming station to said welding means, for initial sealing of the bottom itself.

[0009] Further details may be obtained from the following description of a non-limiting example of embodiment provided with reference to the accompanying

drawings, in which:

- Figure 1 shows a schematic side view of a machine according to the present invention;
- Figure 2 shows a cross-section along the plane indicated by II-II in Fig. 1;
- Figure 3 shows a schematic cross-sectional view of the machine, illustrating welding of the bottom of the bag;
- Figure 4 shows a cross-sectional view similar to that of Fig. 3 relating to the operation involving transportation and opening of the mouth of the bag;
- Figure 5 shows a schematic view of the operating sequence of the machine according to the invention.

[0010] As illustrated in Fig. 1, a machine according to the invention comprises two workstations: respectively, F, for forming the bag 1 from tubular material 101 unwound from a reel 101a, and R, for filling the bag with material fed into it by means of a hopper 200.

[0011] The filling station R also has, arranged opposite it, means for initial sealing of the bottom 1b of the bag and final sealing of the mouth 1a thereof.

[0012] In greater detail, the forming station comprises a pair of rollers 102 for feeding the tubular material 101; the interaxial distance of said rollers is adjustable via corresponding means 102a, while the tubular material is kept taut by corresponding means 103 for tensioning and recovering the tubular material itself.

[0013] The rollers 102 have, arranged underneath them, the cutting means 105, closing of which, synchronized with the operating steps of the machine, causes the formation of the bag and the mouth of the latter.

[0014] The filling station comprises said hopper 200, the bottom mouth of which is provided with means for opening the discharge flanges 202 in a manner known per se and therefore only schematically shown in the Figures and not described in detail.

[0015] The said welding means S are also arranged opposite the filling station R, said means being per se conventional and represented by way of example as a pair of heating bars 311 extending in a direction transverse to the direction of feeding of the bag and integral with supporting and moving means schematically indicated by hinged levers 312 which are connected to an actuating cylinder 320. Said heating bars 311 are also associated with rolls of anti-adhesive material which is unwound in a manner known per se between the front surface of the bars 311 and the external surfaces of the edges of the bag 1, so that no mutual gluing occurs during welding.

[0016] The means for moving the bag from the forming station F to the filling station R and from the latter to the output U of the machine comprise a carriage 400 movable horizontally in both directions on rectilinear guides 401 and operation by means of connecting-rod and crank devices 402.

[0017] Said carriage is provided with grippers 403 for gripping the bag in the region of the mouth 1a of the latter and for transporting it to the hopper 200.

[0018] Operation of the carriage 440, which is known from the said EP-0,595,778 envisages that, during the translatory movement in the direction of feeding of the bag, the grippers 403 for retaining the mouth move towards each other symmetrically in a direction transverse to the direction of feeding of the bag so as to allow opening of the bag 1a performed via auxiliary means (Fig. 3) such as suction cups 404 and the like which are mounted on arms 404a which move towards/away from each other symmetrically with respect to the bag so as to cause the said opening of the mouth of the bag and allow entry, inside it, of the movable flanges 202 of the hopper 200.

[0019] During filling the bag is always retained by the gripping means of the carriage 400, which, at the end of filling, move away again symmetrically in the direction transverse to the direction of feeding so as to close the mouth of the bag and prepare it for final sealing.

[0020] The devices for moving the bag 1 also comprise a substantially L-shaped element 500 which is arranged below the hopper 200 and with one end pivotably mounted on a fixed fulcrum 500a, which supports the bag during filling thereof.

[0021] Upon operation of a cylinder 501, the support 500 is able to rotate from a substantially vertical position (Fig. 1) to a position inclined forwards for unloading the bag onto a conveyor belt 503 which transports the bag 1 to the outlet U.

[0022] The machine also comprise an arm 600 which is pivotably mounted on a fulcrum 601 fixed to the structure of the machine and provided at its free end 600a with gripping means 602 which are designed to close in the region of the bottom zone of the bag so as to transport it underneath the hopper 200 where the bottom itself is sealed by the welding means 300, the relative pivoting opening/closing movement of which is performed by means of a cylinder 320 and conventional transmission devices 312.

[0023] It is envisaged, moreover, that said gripping means consisting for example of grippers 602 can be opened/closed upon operation of associated programmable control and synchronization means which also control all the other operating steps and actuating movements of the machine.

[0024] The operating principle of the machine is as follows:

- by means of the rollers 102, the tubular material 101 is unwound from the reel until its free end corresponding to the bottom 1b (Figs. 2 and 5a) has gone past the grippers 602 of the rotating arm 600 a suitable amount (determined by control means such as sensors and the like which are conventional per se);
- the retaining grippers 602 close against the bottom

1b of the bag 1 and the arm 600 is rotated (clockwise in the example according to Fig. 5b) so as to bring the bottom of the bag between the welding means 300 which perform sealing of the bottom itself (Figs. 3 and 5c);

- at the same time (Fig. 5d) the rollers 102 cause feeding of the tubular material 101 over a certain distance corresponding to the length of the bag so that closing of the cutting means 105 causes the formation of the bag 1 and the mouth 1a thereof;
- the grippers 402 of the carriage 400 close against the mouth 1a of the bag;
- displacement of the carriage 440 is performed so as to bring the mouth which, in the meantime was opened by means of the symmetrical approach movement of the grippers 403 in a direction transverse to the direction of feeding of the bag towards the hopper 200 and the simultaneous separating movement of the opposing suction-cup means 404 in the said direction of feeding of the bag (Figs. 4 and 5d);
- the mouth is arranged below the hopper which is opened by means of rotation, downwards, of the flanges 202 which enter into the mouth 1a of the bag, thus starting the filling step (Fig. 5d);
- once filling has been completed, the grippers of the carriage move away in a direction transverse to the direction of feeding of the bag so as to cause closing of the mouth 1a of the bag;
- the mouth 1a is sealed via the welding means 300 which are actuated by means of the cylinder 320 (Fig. 5e);
- once welding has been completed, the gripping means of the carriage 400 are opened, thus leaving the carriage free to return into the initial position for gripping of the next bag by means of the same grippers 403 which, during the return travel stroke, in the meantime have moved symmetrically away from each again (Fig. 5f);
- the support 500 is rotated forwards in the direction of feeding of the bag, so as to unload onto the conveyor belt 503 the filled and sealed bag;
- at the same time the arm 600 is rotated in the opposite direction so as to assume the initial position again and start a new forming cycle which is performed substantially at the same time as the filling step.

[0025] The time required for filling the bag and the subsequent removal which frees the welding means 300 is such, in fact, as to allow gripping of the bottom of the next bag being formed and the renewed rotation of the arm 600 so as to bring the bottom of the new bag to the welding point.

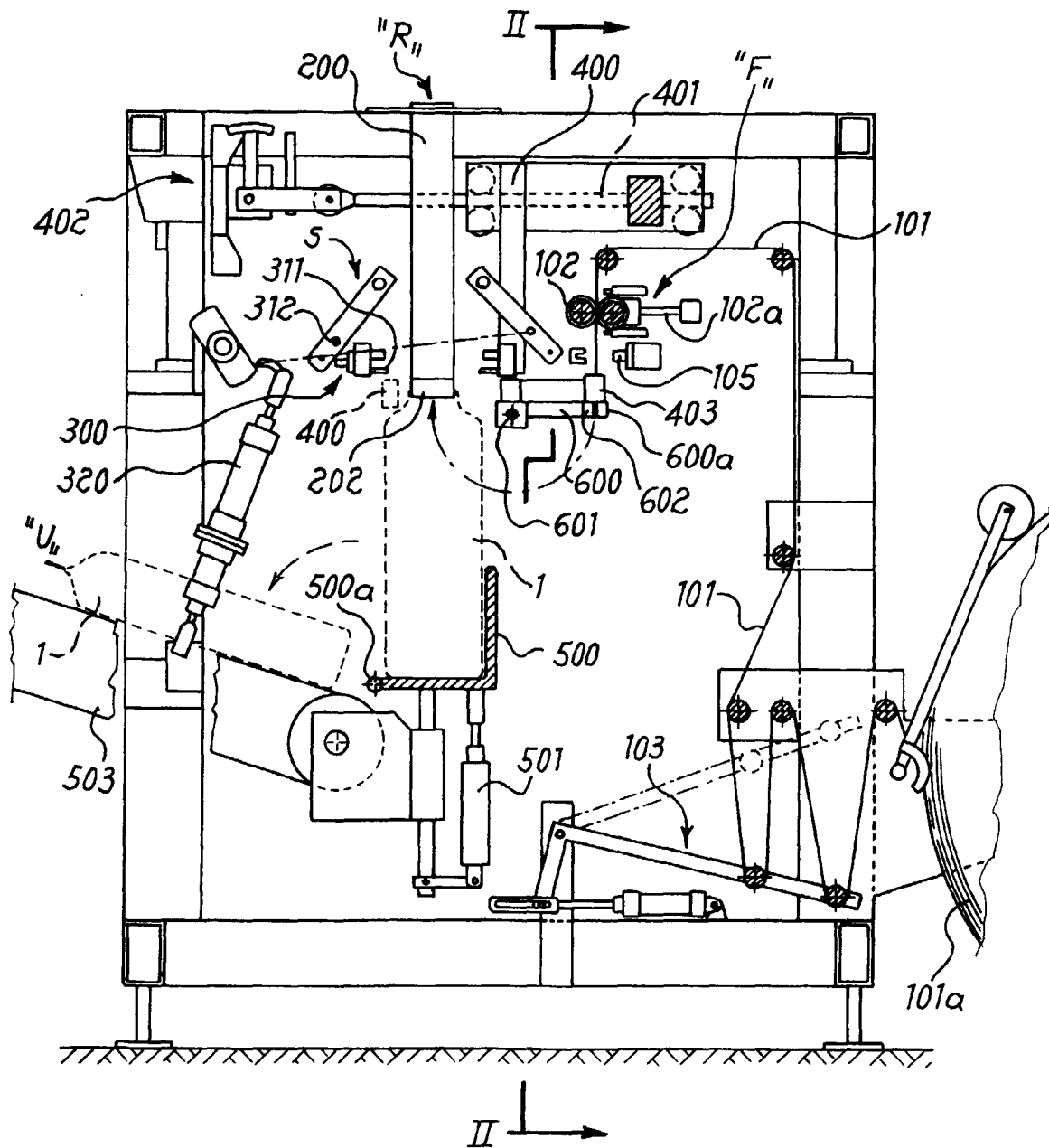
[0026] It is therefore obvious how the machine according to the invention is able to achieve a drastic reduction in the dead time of the cycle which is characteristic of those machines which, although being equipped with a

single station for welding the bottom and the mouth, must wait for completion of sealing of the latter before starting a new forming and filling cycle.

Claims

1. Machine for forming, filling and sealing bags (1) comprising at least one station (F) for forming the bag (1), at least one station (R) for filling the bag and means (300) for sealing the bottom (1b) and the mouth (1a) of the bag, arranged opposite the filling station (R), as well as means (400) for transporting a bag from one station to the next, characterized in that means (600) are provided for transporting the bottom (1b) of the bag (1) from the forming station (F) to said welding means (300), for initial sealing of the bottom itself. 10
2. Machine according to Claim 1, characterized in that said transportation means (600) comprise gripping means (602). 15
3. Machine according to Claim 1, characterized in that said means for transporting the bottom (1b) of the bag (1) consist of a pair of arms (600) arranged opposite each side of the bag (1) and rotating about a fulcrum (601) fixed to the machine. 20
4. Machine according to Claim 1, characterized in that said gripping means consist of pairs of grippers (602) which can be opened and closed upon control of associated programmable means. 25
5. Machine according to Claim 1, characterized in that said gripping means (602) are arranged at the free end of the said arms (600). 30
6. Machine according to Claim 1, characterized in that said welding means (300) are arranged in a position substantially below the hopper (200) for filling the bag (1). 35
7. Machine according to Claim 6, characterized in that said welding means (S) consist of heating bars (311) extending transversely with respect to the direction of feeding of the bag and made to close/open by associated actuating means (320,312). 40
8. Machine according to Claim 6, characterized in that said means for actuating the welding bars consist of a hydraulic cylinder (320). 45
9. Machine according to Claim 1, characterized in that said means for transporting the bag (1) comprise a carriage (400) movable translationwise along rectilinear guides (401). 50
10. Machine according to Claim 9, characterized in that said carriage (400) has opposite gripping means (403) for gripping the sides of the bag. 55
11. Machine according to Claim 10, characterized in that said gripping means perform a symmetrical movement towards/away from each other in the direction transverse to the direction of feeding of the bag during the travel movement of the carriage towards/away from the filling hopper (200).
12. Machine according to Claim 1, characterized in that it comprises suction-cup means (404) for opening the mouth of the bag.
13. Machine according to Claim 1, characterized in that it comprises an exit station (U) provided with a conveyor belt (503).
14. Machine according to Claim 1, characterized in that it comprises means for supporting the bag (1), arranged opposite the filling station (R).
15. Machine according to Claim 14, characterized in that said means for supporting the bag (1) are rotatable towards the exit station so as to cause the bag to fall onto the said conveyor belt (503).

Fig.1



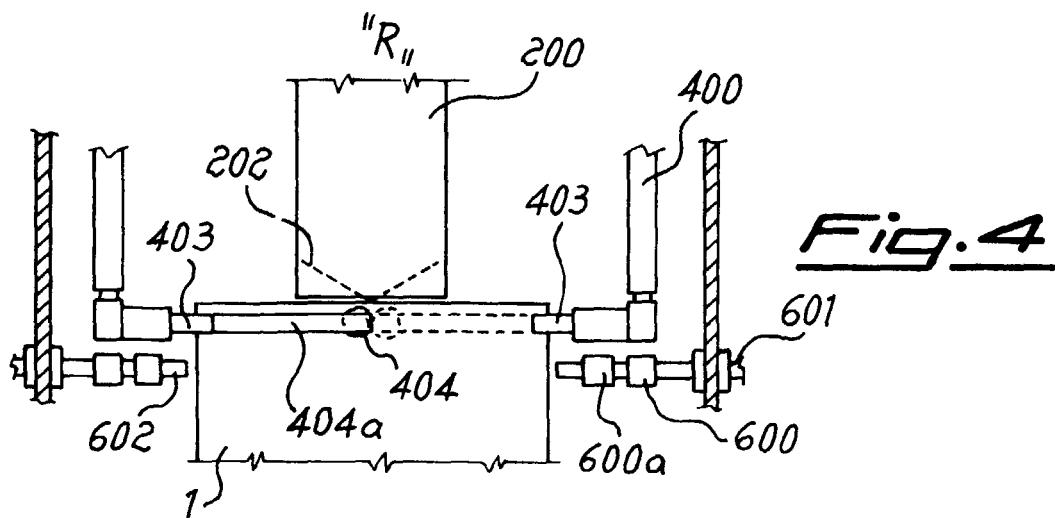
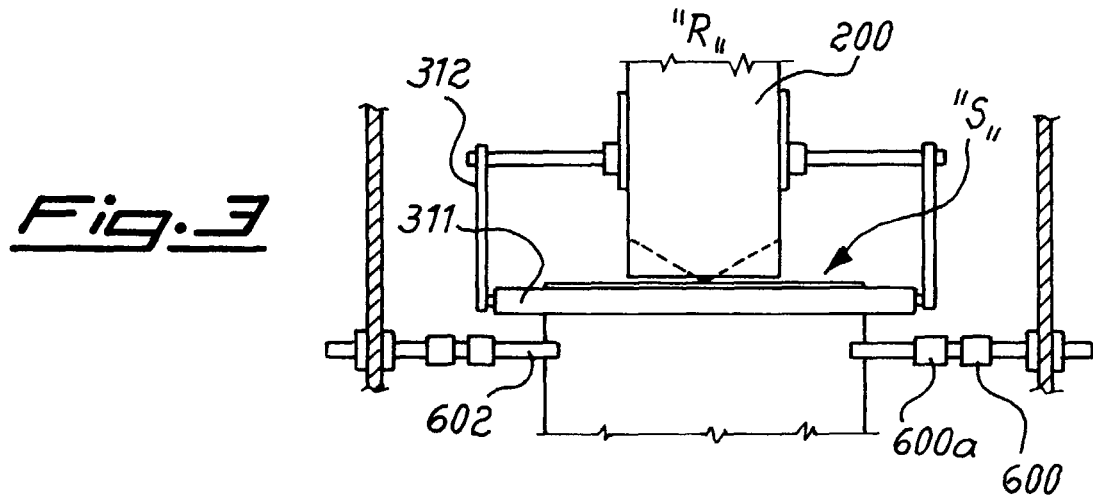
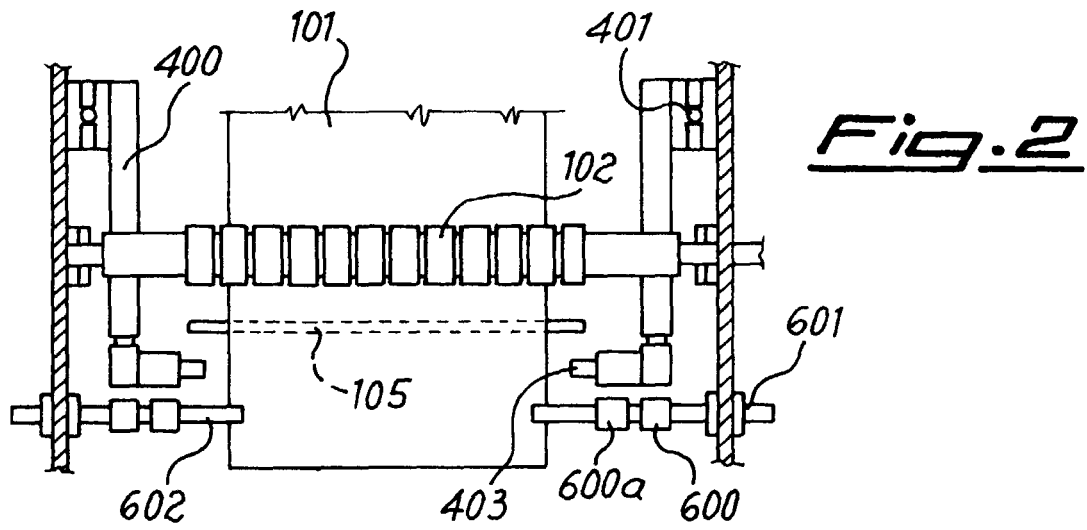
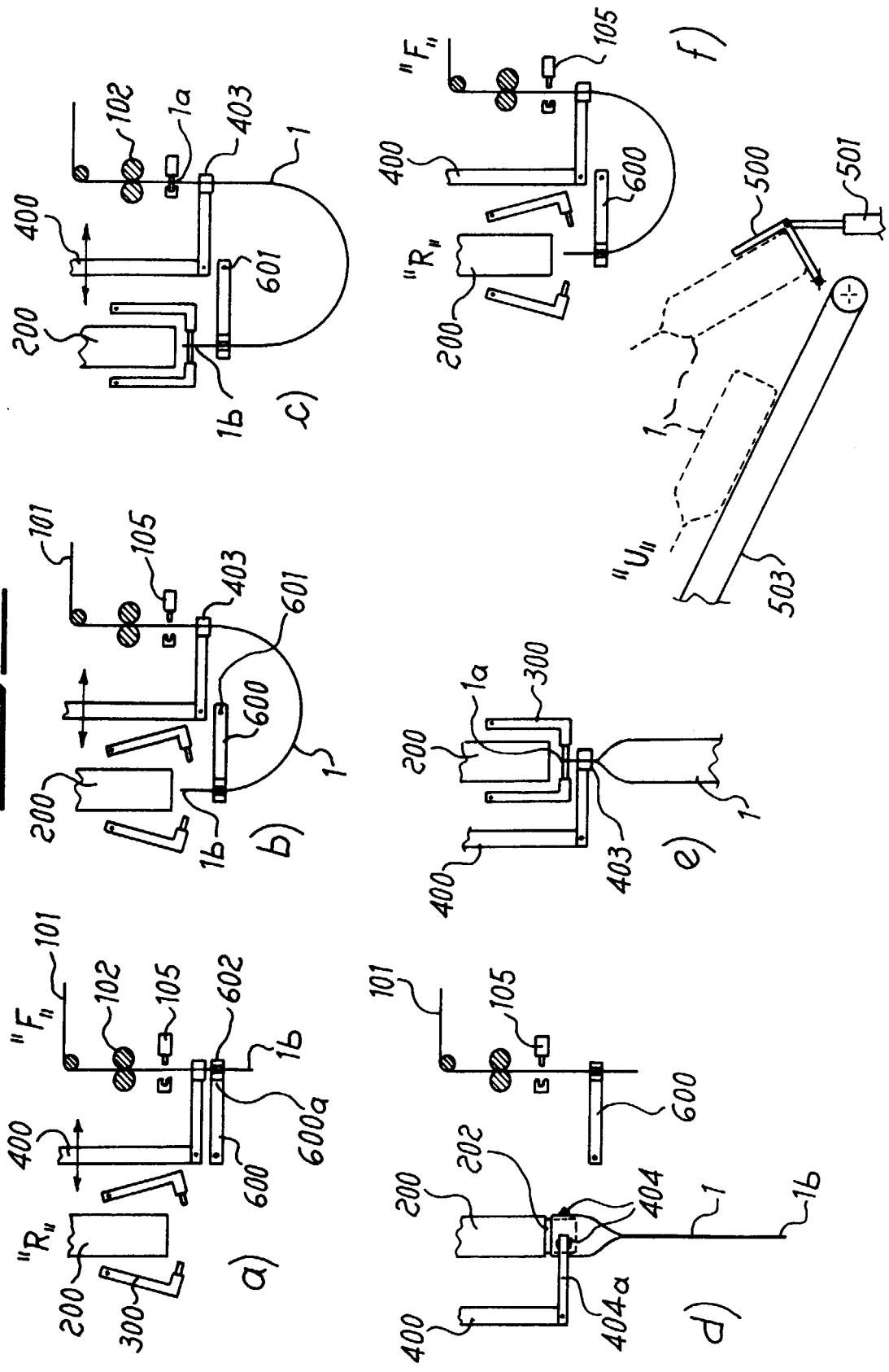


Fig. 5





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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 2331

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X	FR 2 676 990 A (GARACCI PATRICE) 4 December 1992 (1992-12-04) * figures 1,2,5,6 *	1,2,6-8, 12	B65B1/02
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65B
Place of search		Date of completion of the search	Examiner
BERLIN		3 November 1999	Béraud, F
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 99 20 2331

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03-11-1999

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