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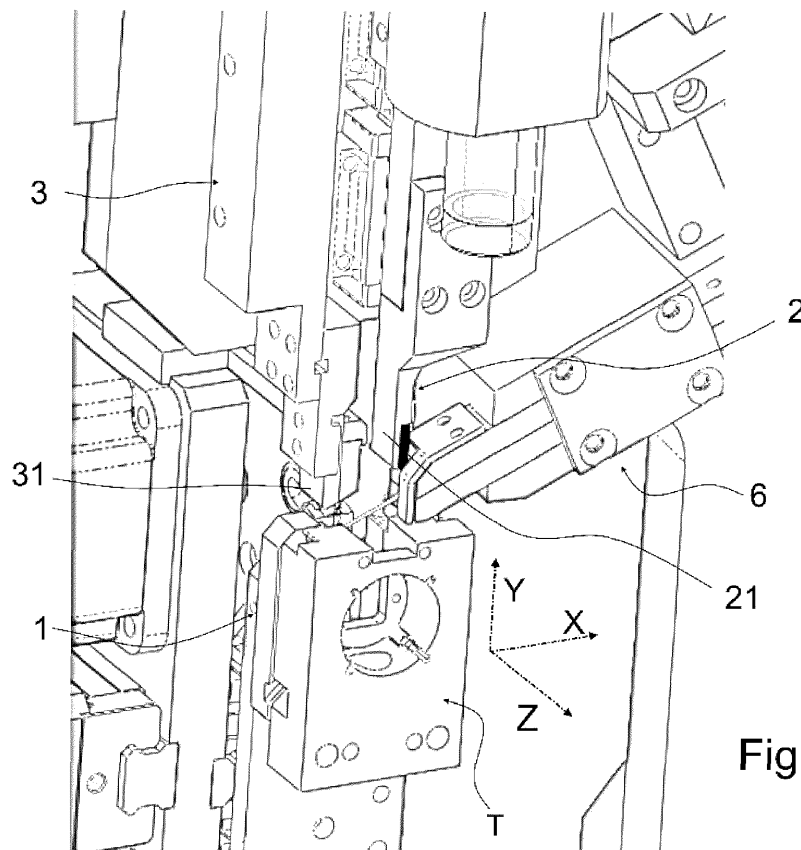
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(54) APPARATUS AND METHOD TO MANUFACTURE MUSELET BELTS FOR BOTTLE CORKS

(57) The present invention relates to the field of manufacturing bottle corking systems, and in particular relates to apparatuses for manufacturing wine retention muselets for bottles of *spumante*, champagne, beer and sparkling wines in general. More specifically, the inven-

tion relates to an apparatus which, in one of the above-mentioned apparatuses, is responsible for manufacturing (inserting and tying) the belts of the above-mentioned muselets.

**Fig. 1****EP 4 501 484 A1**

Description

[0001] The present invention relates to the field of manufacturing bottle corking systems, and in particular relates to apparatuses for manufacturing retention muselets to equip bottles of *spumante*, champagne, beer and sparkling wines in general. More specifically, the invention relates to an apparatus which, in one of the above-mentioned apparatuses, is responsible for manufacturing (inserting and tying) the belts of the above-mentioned muselets.

[0002] Bottle cork muselets, generally consist of a body and a lower belt each formed from a respective piece of metal wire. The body comprises a top ring member, intended for making direct contact with the upper surface of the bottle cork or that defines a housing seat for a cap made of thin metal plate, intended for coupling with the said surface of the cork. The body also comprises a plurality of legs, normally four, which extend from the ring-shaped element, in equally angularly spaced apart position, slightly diverging and provided with respective end eyelets.

[0003] The belt in turn has an annular extension and is mounted during processing by insertion through the eyelets of the legs. It is used to allow the muselet to be clamped around the neck of the bottle during use.

[0004] Muselets are made in automatic machines comprising a plurality of work stations through which the semi-worked products are fed in steps. In particular, a first work station makes the body; the bodies are then fed to a conveyor, generally of the rotary table type, which transports the bodies through the following stations for the subsequent processing, i.e. the shaping of the eyelets, the insertion of the belt, of the cap, and calibration.

[0005] Referring in particular to the step of inserting and closing the belt, it involves feeding the wire by inserting it into the eyelets at the ends of the legs. In this step, and in the relevant work station, the muselet body is properly secured in place in a transport cup, and co-operates with a guide element that is for directing the path of the wire through the eyelets. The insertion of the wire ends with a cut, made by a knife, that defines the length of the segment intended to form the belt. After this cut, two end portions of the segment remain free extending from the guide element and the cup, and in order to complete the execution of the belt, they are twisted together so that the belt takes on the desired closed-ring shape.

[0006] In a known solution, disclosed by Italian patent n. 1401614, application n. TO2010A000699 (102010901866554), the entirety of these operations, and in particular the twisting operation, is transferred, in addition to a twisting device, to the reciprocating movement of the aforementioned knife (which also serves as an end portion locking means), and of a locking element (which operates on the other end portion). A series of reciprocating movements of these elements, in coordination with those of the twisting device, exert the neces-

sary holding and release effects on the wire that allow to counteract the twisting action of the twisting device.

[0007] However, this system, precisely because of the laborious sequence of reciprocating movements just mentioned, is relatively time-consuming and cumbersome, being in particular affected by downtime that plagues productivity.

[0008] The object of the present invention is to overcome the above-mentioned state of the art by providing an apparatus and a process for manufacturing muselet belts for bottle corks which makes it possible to reduce the movements of the elements involved and at the same time make the operation more efficient, productive, and less affected by potential malfunctions and failures.

[0009] These and other ancillary objects are achieved by the apparatus and method for manufacturing muselet belts for bottle corks according to the invention, whose essential features are defined by the first and eighth of the appended claims, respectively.

[0010] The characteristics and advantages of the apparatus and method for manufacturing muselet belts for bottle corks according to the invention will appear more clearly from the following description of one embodiment thereof, made by way of example and not limitation, with reference to the accompanying drawings in which:

- Figure 1 is an axonometric view of a processing station of an apparatus according to the invention;
- Figure 1a shows, from an angle different from the axonometric view in Figure 1, the apparatus in a support region of a dowel for locking the muselet belt;
- Figure 2 is a front plane view of a belt wire guide of the apparatus in Figure 1, with the wire in a position prior to the twisting and closing of the belt;
- Figures 3 to 9 show again, and in a more enlarged view, the processing station of the apparatus as in Figure 1, at later steps of the belt manufacturing process.

[0011] With reference to said figures, the apparatus according to the invention comprises a belt wire guide, indicated by 1 and shown in isolation in Figure 2, to which a wire F is fed by a feeding system 6 of a known type. The guide 1 defines by means of a groove 12, obtained on a plate-shaped body 11, a substantially ovoid open-ring path for the wire F, which is in particular tangentially fed by the system 6 and slid into the groove 12, along which there are seats 13, typically four, to receive the eyelets of the legs of a pre-formed muselet still without the belt. Thus, when a muselet is fed to the processing station at and near the guide 1, from a cup intended for that purpose, with the central symmetry axis of the muselet orthogonal to the plane of the groove 12, the eyelets can be received by the seats 13, and the wire F being slid into the groove 12 can be forced into the eyelets, one after the other. The interaction between the guide 1 and the aforementioned cup, which is shown and indicated by T in Figure 1 and Figures 3 to 9, will be discussed in more

detail hereinafter.

[0012] As still visible in Figure 2, at the end of an insertion step, the belt is open with so-called "end portions" F1 and F2 which come out of the ends of the groove 12, crossing each other, and which are intended to be mutually twisted to close the belt. More precisely, a first end portion F1 can be distinguished, representing the tail of the wire segment F generated by the cut made at the end of the insertion step (as will be seen shortly), and a second end portion F2 representing the head of this segment, i.e. the head end in the insertion direction, indicated by arrow D in the figure. The first end portion F1 (tail) thus protrudes from an inlet end of the groove 12, indicated by 12a, evolving to approximately the outlet end 12b, while the second end portion F2 (head) protrudes from said outlet end 12b of the groove, evolving to approximately the inlet end 12a. At these ends, the guide 1 forms respective anvil surfaces 14', 14", against which the wire can be clamped, as will be seen shortly. The anvil surfaces are spaced by a central through-hole 15 of the body 11, which is thus subtended by the end portions F1 and F2 and intended to allow the insertion of a twisting device 5.

[0013] The aforementioned plane of the groove 12, i.e. the plane of the relative surface of the plate-shaped body 11, is defined by a pair of Cartesian axes X-Y, where Y is the axis of symmetry of the groove 12 and of the recess 15 (as shown in Figure 2), and a third axis Z that completes a Cartesian triplet is the axis orthogonal to the plane, or frontal axis, which corresponds to the axis of the muselet when it is in the processing position (with the eyelets received by the seats 13). As a rule, without this being considered as limiting, the axis Y is a vertical axis. In relation to the processing movements, the axis X is the one closest to the direction along which the wire is fed to the guide 1, in the plane XY, while the axis Y is the direction along which the wire is cut; the guide 1 also moves slightly closer to the cup T along the axis Z supported for this purpose by a known mechanism.

[0014] In fact, a knife 2 moves reciprocating along the cutting direction Y, with an operating head 21 which is, as known, designed to exert both the action of cutting the wire, to define the aforementioned first end portion, or tail end portion, F1, and an action of locking the wire against the relative anvil surface 14" at the outlet end 12b. A locking arm 3, adjacent to the knife 2, then moves reciprocating still according to the direction Y, and through an end dowel 31, also designed as known, is apt to lock the wire to the other anvil surface 14', i.e. the one facing the inlet end 12a of the groove 12. As shown in Figure 1a, according to one aspect of the present invention, the arm 3 (and with it the dowel 31) is also apt to perform a forward advancement motion according to the axis Z, at an advancement end-of-stroke segment towards the guide 1 along the axis Y. This is achieved, for example, by the engagement of one or more pins 32 integral with the arm with respective S-shaped guide slots 41 formed on a fixed structural element 4, or - another non-limiting example -

with a mirror-like solution.

[0015] The apparatus, for what pertains to the invention and which is relevant herein, is finally completed by the aforementioned twisting device 5, configured to twist the two end portions F1 and F2 to each other, and positioned, in a mobile manner along the frontal axis Z to advance between an inactive position, retracted in substantial alignment with the head 21 and the dowel 31, and an active position, extracted beyond said elements and within the recess 15 of the plate-shaped body 11, in order to be able to engage the wire guided as said by the relative groove. Such a device is also manufactured, as such, according to traditional teachings known to the person skilled in the art which do not need to be further detailed. A control system will indeed be provided, with an obvious implementation, to control the operation of the apparatus as detailed hereinafter.

[0016] Operationally, with particular reference to Figures 3 to 9, the cycle which makes it possible to manufacture the belt according to the invention is therefore described hereinafter. Starting from the condition in Figure 3, a cup T with the preformed muselet (without the belt) is transported to the processing station, e.g. via a carousel system with the axis parallel to the axis Z, so that the muselet is aligned with the groove 12 of the guide 1. Both the dowel 31 of the locking arm 3 and the head 21 of the knife 2 are raised; the guide 1 is in a retracted position.

[0017] The guide 1 is then moved forward along the axis Z and brought closer to the cup T (Figure 4), and in this way the eyelets of the muselet can penetrate into the relative seats 13.

[0018] At this point (Figure 5), the wire F forming the belt is fed to be inserted into the groove 12, by the feeding system 6 brought into suitable position and orientation. The wire inserted from the inlet end 12a projects out of the outlet end 12b following the sliding direction D, gradually penetrating the eyelets of the muselet legs, up to the situation in Figure 6, which coincides with that in Figure 2, wherein the two end portions F2, F1 are visible above the guide 1 (the tail end portion F1 being here still joined to the remaining part of the feeding wire upstream).

[0019] With reference to Figure 7, the knife 2 now moves downwards and cuts the wire with the head 21, releasing the actual tail end portion F1, which is simultaneously locked the same head 21 against the guide 1 (anvil surface 14"). Similarly, the locking arm 3 also starts to move downwards (Figures 7 and 8).

[0020] As mentioned, due to the action of the pins 32 and the slots 41 engaging each other, the dowel 31 of the locking arm 3 as it moves towards its downward end-of-stroke along the axis Y, also performs a forward motion on the axis Z, which interferes with the end portion F2 to cause it to move inwards of the cup, i.e. in the direction of the muselet cap. In the meantime, but before the dowel reaches the end-of-stroke locking (also) the end portion F2 against the anvil surface 14' (Figure 9), the twisting device 5 (Figures 8 and 9) is advanced to take action.

[0021] There is therefore, according to one aspect of

the invention, a step in which the advancement (according to the front axis Z) of the end portion F2 by the dowel 31 (which is not yet clamping) and the beginning of the tying between the two end portions by the twisting device 5, take place simultaneously and in a coordinated manner. The duration of this first twisting step is quantified by a rotation angle, for example and preferably of about 180°, occurring in the first step of the rotary motion of the twisting device, an angular displacement corresponding to several mm of displacement towards the stop or end-of-stroke of the dowel 21, with simultaneous advancement along the axis Z. This functional coordination between the two components makes it possible, in practice, that both ends of the wire F are positioned between the belt and the inside of the cup/muselet, i.e. towards the muselet cap, and that the first step of the rotation of the twisting device can provisionally ensure the belt closure.

[0022] The twisting rotation of the device 5 then continues with a second twisting step, in two alternating half-rotations, typically for a total of 720°, until the tying is complete, creating a mutual helical wrap between the two end portions and thus the desired permanently closed belt. The extent of these rotations can, however, be varied and adjusted according to specific requirements, and in particular to the hardness of the wire used.

[0023] The realization of the belt is thus completed. At the same time the arm 3 and knife 2 can go up. The twisting device moves back and the previous steps are run over in the opposite way, until the guide rail 1 is carried back, allowing the cup-holder carousel to rotate and restart the cycle with the next cup and new muselet body.

[0024] The main advantageous aspect of the invention thus consists in the possibility of correctly tying the two ends of the wire without having to raise and lower the two end portion restraining systems, which in the present case are lowered and raised only once per cycle, but rather by coordinating the single movement (composite, which also includes an advancement along the frontal axis Z) of the dowel with that of the twisting device, reducing "dead time" and consequently increasing production efficiency.

[0025] In fact, according to the present invention, no provisional closing step is carried out, but the wire and the first end portion F1 are locked onto the anvil surface 14" by the knife 2, and then it is sufficient to lower and align (horizontally) the second end portion F2 (without locking it) by the dowel 31. After that, the twisting device, translating along Z, receives the two end portions and the tying cycle can be finished by coordinating the actuation of this device with the descent/translation of the dowel 31, which will finish its movement by locking the wire and the end portion F2, thus rotating this end portion like the end portion F1 in the second twisting step mentioned above.

[0026] The present invention has been described hereto with reference to preferred embodiments thereof. It is intended that other embodiments may exist which relate to the same inventive core, within the scope of protection

of the attached claims.

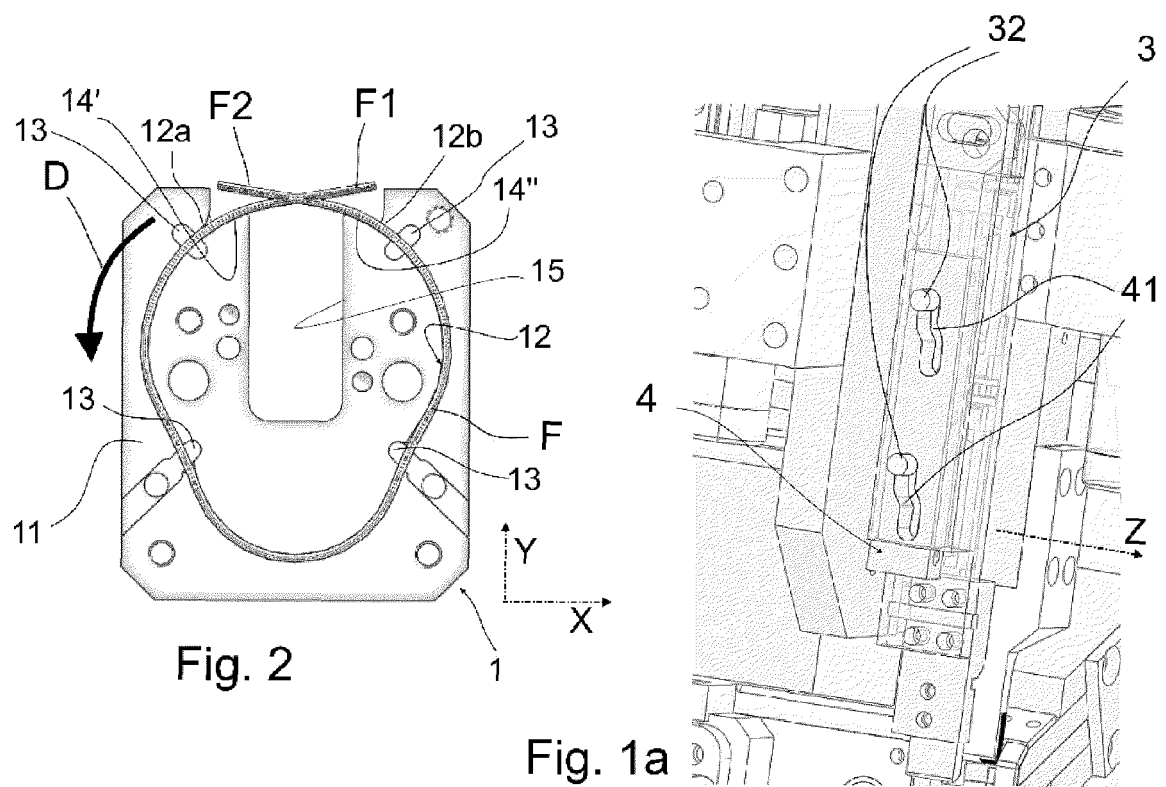
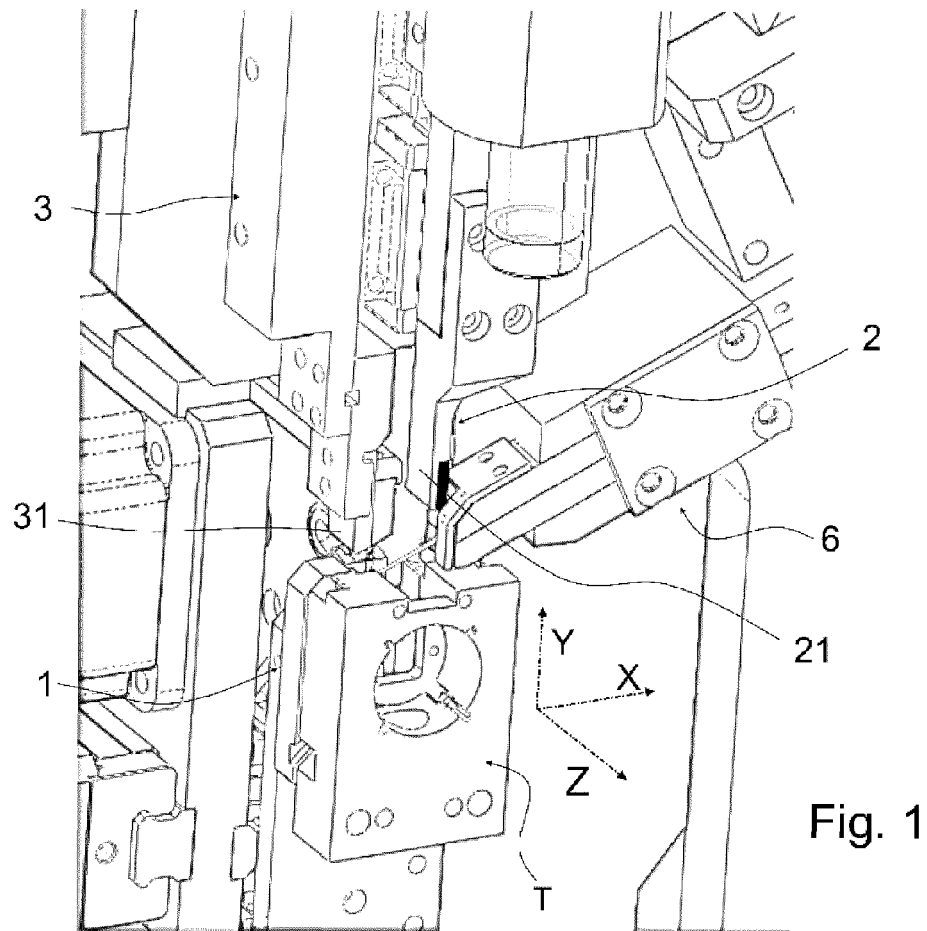
Claims

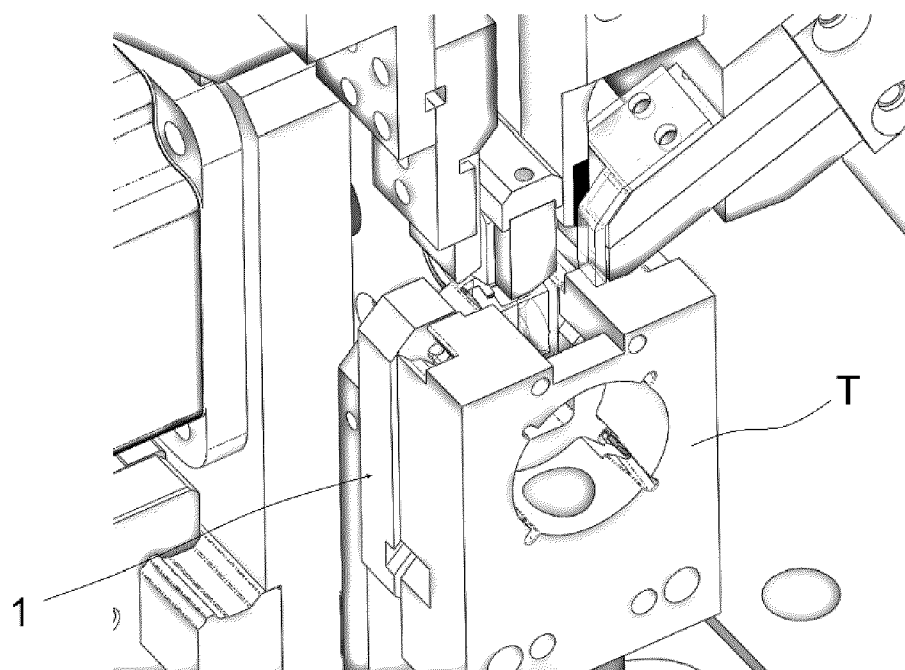
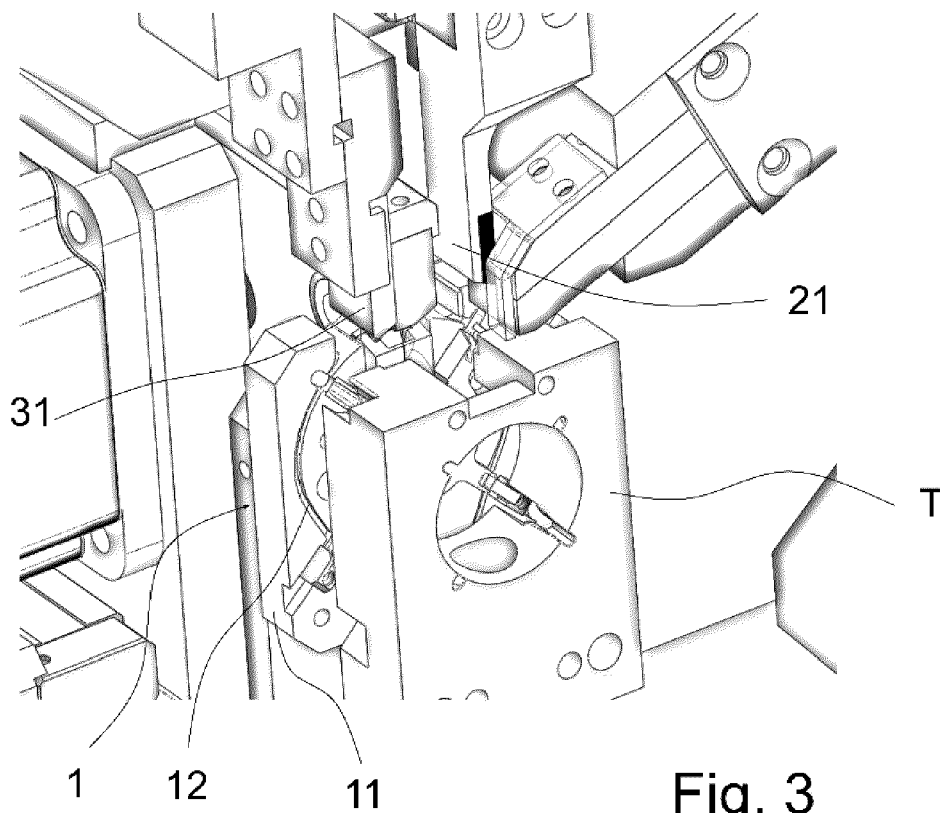
1. Method for manufacturing muselet wire belts, the method comprising, in a processing station:

- accommodating a preformed muselet, without the belt, at said station;
- - feeding a belt forming wire (F) in insertion within a guide groove (12), causing it to form a substantially ovoid open ring, penetrating in succession a plurality of eyelets of respective legs of said preformed muselet, said ring lying on a ring lying plane (X-Y);
- - with a movable knife parallel to an axis of symmetry (Y) of the ring, lying on said ring lying plane (X-Y), cutting the wire (F) so as to define a first end portion (F1) representing the tail of the wire segment (F) generated by the cut made after the insertion step, wherein a second end portion (F2) representing the head of said segment and said first end portion (F1) come out, crossing each other, from respective ends of said guide groove, at which are defined respective anvil faces (14', 14"), against which the wire can be clamped;
- - in the cutting phase generating said first end portion (F1), blocking said first end portion against the adjacent anvil face (14"), through said movable knife;
- - engaging said second end portion (F2) with a locking arm, in turn reciprocating parallel to said axis of symmetry (Y) and furthermore moving in a forward advancement motion according to a frontal axis (Z) orthogonal to said plane (X-Y), thereby promoting a displacement of said second end portion (F2) along said frontal axis (Z);
- - before said clamping arm finally locks said second end portion (F2) against the adjacent anvil face (14'), engaging said end portions with a twisting device and twisting them one to each other in a first twisting step;
- - with both end portions locked, twisting them one to each other in a second twisting step, again with said twisting device;
- disengaging said twisting device, said locking arm and said knife from the belt thus formed, and disengaging the latter, joined to the preformed muselet, from said groove;
- - transporting said muselet away from the processing station.

2. Method according to claim 1, in which in said first twisting step the twisting device performs a twisting rotation of about 180°.

3. Method according to claim 1 or 2, wherein in said advancement motion of said locking arm, with the displacement of said second end portion (F2) along said frontal axis (Z), both ends of said wire (F) are displaced to the inside of said muselet. 5
4. Method according to any of the previous claims, in which in said second twisting stage the twisting device performs a twisting rotation of about 720°. 10
5. Method according to any of the previous claims, in which the preformed muselet is received at said processing station and transported away according to a carousel motion about an axis parallel to said frontal axis (Z). 15
6. Method according to any of the previous claims, in which said groove (12) is formed in a guide (1) that is advanced and carried back, respectively, before the wire feeding (F) and when the belt formed by the groove is disengaged by the same groove. 20
7. Apparatus for manufacturing wine muselet belts, comprising, at a processing station: feeding means (6) for feeding a belt forming wire (F); a guide (1) with a groove (12) for the insertion of said wire (F) fed by said feeding means (6), in an open ring fashion, and provided with a plurality of slots (13) for a plurality of eyelets of respective legs of a preformed muselet, said groove evolving in a ring lying plane (X-Y), at respective ends of said groove said guide forming wire clamping anvil faces (14', 14"); a knife (2) movable parallel to an axis of symmetry (Y) of the groove (13), lying on said ring lying plane (X-Y) and apt to cut the wire (F) and clamp a first end portion (F1) thereof so generated, by cooperating with one of said anvil surfaces (14"); a locking arm (3), in turn reciprocating parallel to said axis of symmetry (Y), to clamp a second end portion (F2) of said wire by cooperating with another of said anvil surfaces (14'); a twisting device (5) apt to engage with said end portions (F1, F2) of said wire to twist them one to each other; the apparatus being **characterized by** the fact that said locking arm (3) is also movable in an advancement motion according to a frontal axis (Z) orthogonal to said ring lying plane (X-Y) to promote a displacement of said second end portion (F2) along said frontal axis (Z), and by the fact that it further comprises a control system configured to activate said twisting device engaged on said end portions in coordination with said advancement motion of said locking arm (3), before the locking arm finally clamps said second end portion (F2) against its anvil face. 25
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8. The apparatus according to claim 7, wherein said locking arm (3) comprises one or more integral pins (32), engaging with respective S-shaped guide slots (41) formed in a fixed structural member (4) of the apparatus, or vice versa.





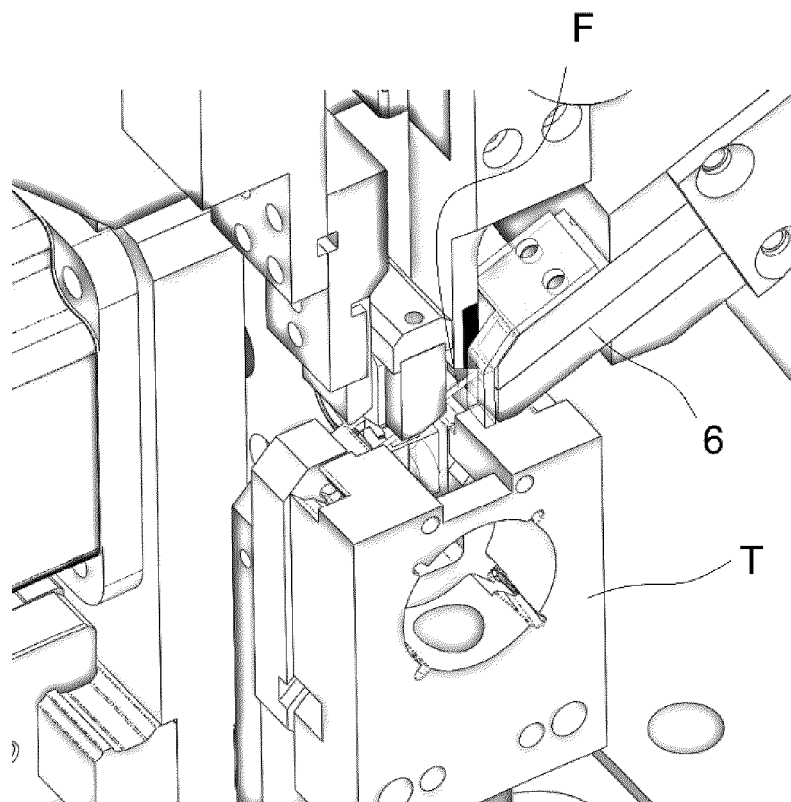


Fig. 5

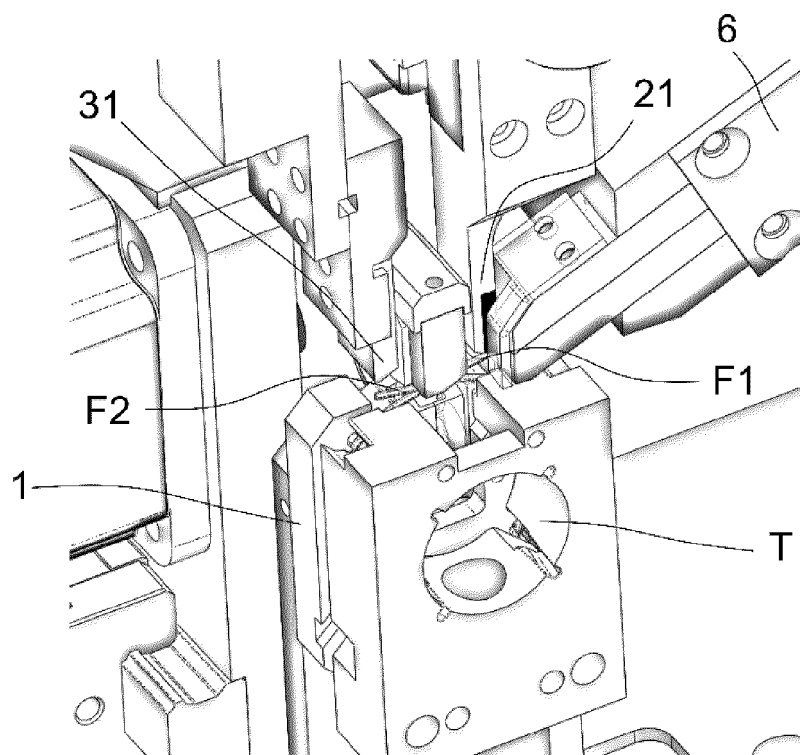


Fig. 6

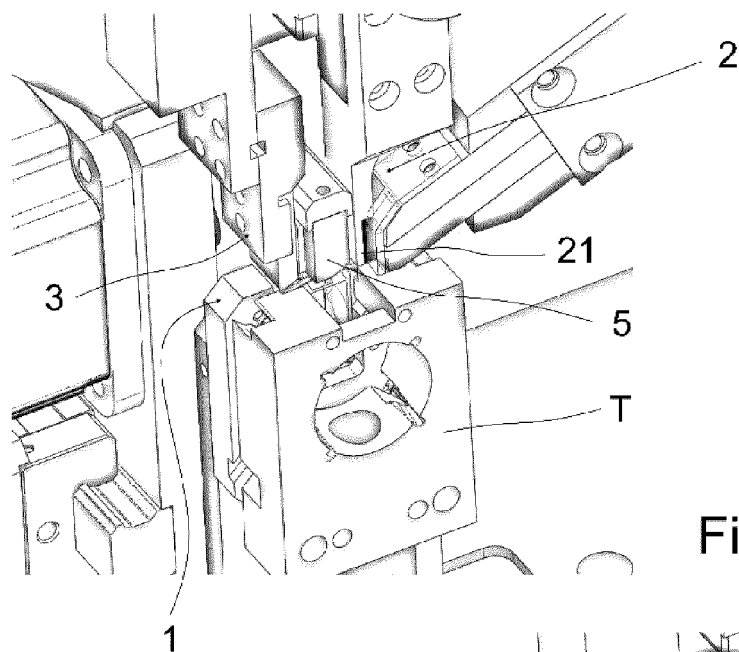


Fig. 7

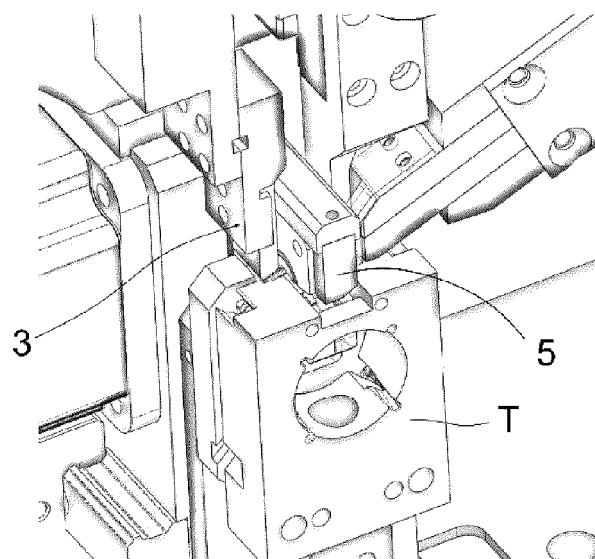


Fig. 8

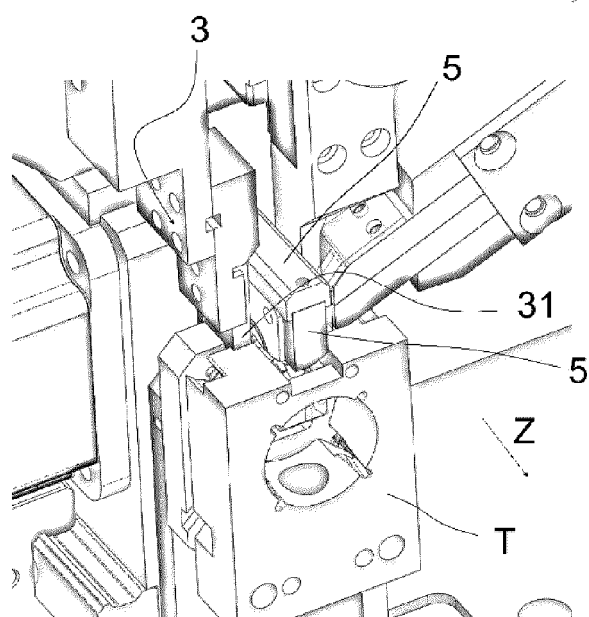


Fig. 9



EUROPEAN SEARCH REPORT

Application Number

EP 24 19 1279

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	IT TO20 100 699 A1 (NUOVA TECNOLOGIA MECCANICA S R L) 17 February 2012 (2012-02-17) * the whole document *	1 - 8	INV. B21F15/04 B21F45/04
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			TECHNICAL FIELDS SEARCHED (IPC)
			B21F B65D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		27 November 2024	Charvet, Pierre
CATEGORY OF CITED DOCUMENTS			
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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			

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EP 24 19 1279

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27 - 11 - 2024

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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