Abstract: The device (1) for forming binding elements (2), for winding around at least one element to be bound (3,4) comprises a support structure or framework (5), a forming unit (10) carrying a forming member (11) mobile with respect to the framework (5) between an inoperative position and an operative forming position, a unit (20) for feeding binding elements (2) adapted to be formed in suitable binding means (2') by the forming member when it is activated in the operative forming position.
1. Device for forming binding elements, said binding elements being intended for winding around a first element (3) and a second element (4) to be bound at one or more superimposition or binding areas, said device comprising a support structure (5), a unit (20) for feeding at least one binding element (2) at a time along a feed direction (A), a forming unit (10) bearing a forming member (11) mobile with respect to said structure (5) according to a forming motion at least between an inoperative configuration, at which said forming member (11) is spaced apart from said feed direction (A) and an operative forming configuration at which said forming member (11) intercepts said feed direction (A) to form said at least one binding member (2) around said first element (3) and said second element (4), characterised in that it comprises a binding unit (40) provided on said structure (5), configured for tightening respective portions of said formed binding element (2') against each other around said first element to be bound (3) and said second element to be bound (4), and for mutually twisting said tightened portions around a longitudinal axis of said binding unit (40); and a guide unit (30) carried by said structure (5), obtained through a slide or carriage (31), and provided with guide means respectively sliding or rolling, shaped according to said first element (3) to be bound, for engaging said first element to be bound (3) and guiding the relative continuous displacement of said device (1) from one binding area to an adjacent binding area along said first engaged element to be bound (3).

2. Forming device according to claim 1, characterised in that said binding unit (40) comprises a gripper-like member (43) which can be alternatingly actuated between an open configuration and a closed configuration for tightening said respective portions of said formed binding element (2'), as well as a rotary motion around said longitudinal axis, to perform said twisting.

3. Forming device according to claim 2, characterised in that said binding unit (40) comprises an outer casing (41) containing said gripper-like member (43), provided with an opening (42) for inserting said respective portions of said formed binding element (2') to be twisted, said insertion opening (42) having an edge flared towards the internal of said casing (41), to facilitate said insertion.

4. Forming device according to one of the preceding claims, characterised in that said forming member (11) comprises a forming element (13) adapted to serve as a bending or calendering pin, for deforming said at least one fed binding element (2), when said forming member (11) is in said operative configuration or in motion through said operative configuration.
5. Forming device according to claim 4, **characterised in that** said forming motion is an oscillating motion, said forming member \((11)\) being hinged, at a pin \((14)\), to said support structure \((5)\).

6. Forming device according to one of the preceding claims, **characterised in that** it also comprises a mobile positioning member \((15)\), forming a shaped reference portion \((16)\), adapted to engage at least one of said elements to be bound \((3, 4)\), for locking said device \((1)\) on said binding area during the forming step, allowing the correct positioning of said at least one formed binding element \((2')\) on said binding area.

7. Forming device according to claim 6, **characterised in that** said forming member \((11)\) and said positioning member \((15)\) are mobile according to an approaching motion, between a position spaced apart from said binding area and a position approached to the same area, at which said forming member \((11)\) is inserted into the said binding area and said positioning member \((15)\) intercepts at least one of said elements to be bound \((3, 4)\), in the binding area, for positioning said device \((1)\) with reference to said intercepted element to be bound \((3, 4)\).

8. Forming device according to one of the preceding claims, **characterised in that** said forming member \((11)\) is split into a pair of levers spaced by a space adapted for the insertion of one of said elements to be bound \((3, 4)\).

9. Forming device, according to one of the preceding claims, **characterised in that** said feed unit \((20)\) comprises a loading member \((21)\), on which there are adapted to be provided said binding elements \((2)\) to be formed, a feed channel \((22)\) arranged along said feed direction \((A)\), to receive one or more binding elements \((2)\) from said loading member \((21)\), as well as pushing means \((23)\) acting along said feed direction \((A)\) to feed said binding area with said at least one binding element \((2)\) to be formed.

10. Forming device according to claim 9, **characterised in that** said loading member \((21)\) conforms a chute \((24)\) on which said binding elements \((2)\) are adapted to be arranged in succession, awaiting to be loaded along said feed channel \((22)\), through an inlet section.

11. Forming device according to claim 10, **characterised in that** said loading member \((21)\) is mobile by a loading motion in said feed direction \((A)\), alternatingly between a support position, at which said loading member \((21)\) is separated from said feed channel \((22)\) and a loading position, at which said loading member \((21)\) is in communication with said inlet section of said feed channel \((22)\).

12. Forming device according to claim 11, **characterised in that** said feed channel \((22)\) conforms respective magnetic walls, to guarantee the insertion of said at least one fed bending element \((12)\).

13. Method for forming a binding element \((2)\) around a first element to be bound \((3)\) and a second element to be bound \((4)\) at at least one superimposition area of said first element

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to be bound (3) and said second element to be bound (4) or binding area, characterised in that it comprises the steps of:

a. providing a device (1) for forming said binding element (2) provided with a support structure (5), with a feed unit (20) of said binding element (2) along a feed direction (A), with a forming unit (10) carrying a forming member (11), mobile according to a forming motion between an inoperative configuration, at which said forming member (11) is spaced apart from said feed direction (A) and an operative forming configuration, at which said forming member (11) intercepts said feed direction (A), said forming member (11) being provided in said inoperative configuration, with a binding unit (40) provided on said structure (5), configured for tightening, against each other, respective portions of said formed binding element (2') around said first element to be bound (3) and said second element to be bound (4) and for mutually twisting said tightened portions around a longitudinal axis thereof and with a guide unit (30) carried by said structure (5), obtained through a slide or carriage (31) and provided with guide means respectively sliding or rolling, shaped according to said first element (3) to be bound, for engaging said first element to be bound (3) and guiding the relative continuous displacement of said device (1) from one binding area to an adjacent binding area along said first engaged element to be bound (3);

b. guiding said device (1) along said first element to be bound (3) and positioning the same on a said binding area by means of said guide unit (30);

c. feeding said binding element (2) on said binding area along said feed direction (A);

d. activating said forming member (11) from said inoperative configuration to said operative configuration, deforming said binding element (2) intercepted by said forming member (11) on said feed direction (A), so as to performing the forming thereof around said first element to be bound (3) and second element to be bound (4);

e. activating said binding unit (40) so as to tighten the respective portions of said formed binding element (2') to be twisted, to each other;

f. activating said binding unit (40) for the mutual twisting of said portions tightened around said longitudinal axis, thus said binding element (2'”) being securely wound and closed around said first element to be bound (3) and said second element to be bound (4) superimposed.