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54 Machine using angular clips to joint frames.

57 Machine to joint frames which includes in mutual cooperation and coordination:

- a containing framework (II) having a substantially rectangular shape and comprising a base equipped with shaped means (22) to position the frames to be jointed,
 - a clamping plate (12) which slides and is guided vertically by the upright sides (III) of said framework (II),
 - drive means (13) for the vertical movement of said clamping plate (12) which are secured to said framework (II)
 - and means (14) which apply the clips and comprise a store (16) for a pack of clips (115), a head (17) with a thrusting point (21) and means (18) to actuate said head (17) together with its point,
- whereby means (19) are provided which regulate the clamping position of said clamping plate (12).

The machine to joint frames applies triangular clips (15-151) which have a special shape and are able to make a rigid joint even for small frames.

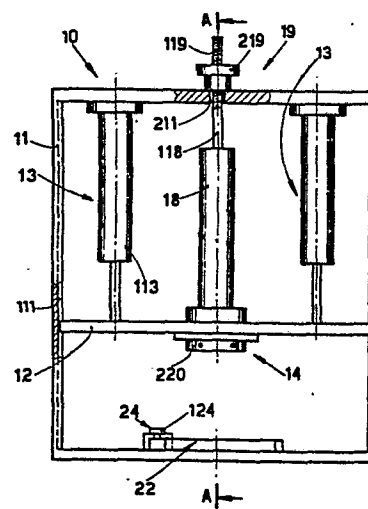


fig.1

1. Description of the invention entitled:

. "MACHINE USING ANGULAR CLIPS TO JOINT FRAMES" .

. in the name of P.I.L.M. of Remigio MUSCI at Touques Deauville .
. France .

5. submitted on

under No.

. This invention concerns a machine to joint frames. To .
. be more exact, the invention concerns a machine to joint .
. frames by using angular clips of a special shape of which .
10. the sides are located along the frames to be jointed, and .
. also concerns the angular clips of the invention. .

. Machines to joint frames are known which use metal .
. clips inserted perpendicularly to the line of the joint of .
. the frames to be united. .

15. One known type of these jointing machines consists of .
. a movable clamping plate solidly fixed to two vertical gui-
. ding uprights, which slide within guiding sleeves fixed to .
. the work bench and are anchored at one of their ends to a .
. lower plate which is located below the work bench and bears
20. a pneumatic jack, whereby the upper end of said jack is .
. equipped with a jointing head able to receive jointing clips .
. from a knurled metal tape coming from a bobbin positioned .
. at the side of said device and beneath the work bench on .
. which the frames are arranged with a suitable guide. .

25. According to this embodiment, when the jack is actuated,

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1. the lower plate is thrust downwards and thereby lowers the
. upper plate, which thus compresses and clamps the frames to
. be jointed.

. At the end of the travel of the jack a straight clip
5. is shot from below through a hole located in the work bench
. and is thrust by the jack across the line of the joint and
. therefore diagonally in relation to the frames to be joint-
. ed.

. This known jointing machine entails various shortcom-
10. ings. One of them is the overall bulk of the jointing ma-
. chine and the need to have a work bench to which the machi-
. ne is secured.

. Another shortcoming lies in the fact that the machine
. requires a bobbin of knurled metal tape.

15. A drawback is also due to the diagonal application of
. the straight clip, for this application requires wider fra-
. mes.

. Such knurled clips thus located diagonally to the fra-
. mes require also that the jack should give them a heavy
20. thrust, which can possibly damage the frames themselves,
. especially so if the frames are made of soft wood, since
. said clips are applied substantially diagonally in relation
. to the fibres of the wood, which therefore opposes a strong-
. er resistance to penetration.

25. This problem becomes even worse since an increase in
. the thrust of the jack strengthens the pressure of the clam-
. ping plates against the frames in an unfavourable manner.

. It should be emphasised that, so as to obviate the pro-
. blems concerning the diagonal clips and the bobbin of knurled
30. tape, a machine has been proposed which is of a like con-
. struction but which is provided with a store of triangular
. clips fitted at the end of the stem of the jack.

. Said known machine, which is the subject of patent FR.

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1. 23I87I5, entails substantially the same problems as regards
. excessive squeezing of the frames.

. The known jointing machines are therefore not suitable
. for jointing frames made of a not very hard wood.

5. A purpose of our invention is to embody a jointing ma-
. chine able to eliminate the aforesaid shortcomings and draw-
. back.

. Another purpose is to embody triangular clips of a spe-
. cial shape for use together with the jointing machine of
10. our invention.

. An advantage of the invention is to obtain a stiffer
. joint.

. Another advantage is that such a stiffer joint can be
. made both with frames made of soft wood and with frames ha-
15. ving a minimum width starting at 5 mm., without any damage
. to said frames.

. A further advantage lies in the fact that the jointed
. frames can be of a type with a lengthwise groove, whereby
. the angular clips of the invention are located in said gro-
20. oves along the fibres of the wood.

. Yet another advantage is the modest overall size of the
. jointing machine of the invention and the fact that it is
. portable, these being factors which have a favourable effect
. on the overall cost of the machine and its usefulness.

25. The invention is therefore embodied with a machine us-
. ing angular clips to joint frames, said machine being char-
. acterized by comprising in mutual cooperation and coordinat-
. ion:

- . - a containing framework having a base equipped with shaped
- 30. ... means for positioning the frame to be jointed,
- . - a sliding clamping plate which is guided vertically by the
. upright sides of said framework,
- . - drive means for the vertical movement of said clamping

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1. plate, said means being anchored to said framework, and .
- means which apply angular clips and comprise a store for .
a pack of angular clips, a thrusting head with a triangu-
lar point and jack means for driving said pointed head, .
5. whereby means are envisaged which regulate the travel of .
the clamping plate. .

. According to the preferential embodiment of the invent-
ion said drive means for the vertical movement of the clamp-
ing plate consist of one or more pneumatic jacks having .
10. their upper end anchored to the upper side of the framework,
. whereas the ends of their relative stems are secured to said
. clamping plate. .

. Furthermore, according to the preferential embodiment .
the jack means which drive said pointed head also consist .
15. of a pneumatic jack anchored in an upright manner to the .
middle of the surface of said plate, whereby the upper end .
of the jack has means which regulate the travel of the pla-
te. and which cooperate with the upper side of said frame- .
work, and whereby the jack bears said triangular point on .
20. its own stem. .

. Moreover, according to the invention vertical guide * .
. means are envisaged which can guide the thrusting point du-
ring insertion of the clips, and abutting means are also en-
visaged which can hold packs of clips of various heights .
25. within the store in the right position in relation to the .
path of the thrusting point. .

. The clips of the invention are triangular and each of .
. them has two symmetrical arms which can hold a corner be- .
tween them and are joined together with a small middle port-
30. ion, which is substantially flat and forms the same angle .
with each arm; the outer ends of said arms are provided with
. an edge bent outwards. .

. According to a variant the middle portion comprises .

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1. one or more shallow grooves.

According to the invention the presence of the flat middle portion provided in said clips gives a stronger joint.

Said flat portion also serves to guide the clip vertically during its insertion in the frame, being supported at its back by the pack from which it is being detached.

This vertical guiding action is also completed owing to the cooperation of the outwardly bent edges, which cooperate with appropriate grooves provided inside the descent hole of the pointed head, as will be described hereinafter.

We shall now describe, as a non-restrictive example, a preferential embodiment of the invention with the help of the attached table, wherein:

Fig. I is a front view of the jointing machine of the invention;

Fig. 2 is a partial vertical section along the line A-A of Fig. I;

Fig. 3 is a crosswise section of the pointed head of Fig. 2 along the line B-B;

Fig. 4 shows the shaped positioning means;

Fig. 5 shows a joint made between two parts of a frame with a triangular clip of the invention;

Fig. 6 shows one shape of the triangular clip.

In the figures the same parts or parts having the same functions bear the same reference numbers.

With reference to Fig. I, IO indicates the jointing machine of the invention: II is the containing framework and I2 is the clamping plate which runs within the upright guides III provided in the upright sides of the framework II: I3 are drive means which can move the plate I2 and consist, in this instance, of two pneumatic jacks II3 anchored to the upper side of the framework II, their stems 2I3 being solidly fixed to the plate I2; said means I3 can be replaced

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1. with one single jack located in the middle of the plate I2.

The clamping plate I2 bears at its middle the means I4 for applying angular clips I5; said means I4 (shown in Figs. 2 and 3) comprise a store I6 for the pack II5 of angular clips and a head I7 with a triangular point 2I, whereby the store I6 and head I7 are located below said plate I2; said means I4 also comprise means I8 to drive said head means I7, said means I8 being in this instance a pneumatic jack anchored to the upper surface of said plate I2; the opposite end of said jack I8 comprises the part II8 which cooperates with the upper side of the framework II through the means I9 that regulate the travel of the plate I2; said regulating means I9 consist of a threaded portion II9 of the part II8 passing through a hole 2II provided on the upper side of the framework II and also consist of a flanged abutting knob 2I9 screwed onto said threaded portion II9.

So as to adjust the travel of the plate I2, the vertical position of the flanged abutting knob 2I9 is adjusted so that it rests on the outer surface of the upper side of the framework, thus hindering the further forward movement of the plate and determining the end of the run thereof. This procedure prevents the plate I2 from buckling the frame to be jointed.

With reference to Figs. 2 and 3, the means I4 which apply the clips consist of one single support 20 located beneath the plate I2 and having a middle part 2I0 which comes into contact with the joint when the clamping plate I2 goes down, and also having a part 320 which juts out sideways.

The jutting part has a groove 420 which forms the store of the pack II5 loaded by means of the spring I6.

Said groove 420 communicates with an upright hole 520 having a rectangular section and located in the middle part 220 of the support 20.

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1. Near the outlet of the groove 420 and in the upright
hole 520 pressure means 25 are located higher than the gro-
ve itself and are able to keep packs II5 of clips I5-I5I
of various heights in the right position in relation to the
5. bottom of the groove 420 so as to ensure at all times the
proper detachment of a clip I5-I5I from its pack II5.

In our example the pressure means 25 consist of a slid-
ing block I25 lodged above the groove 420 and equipped with
an inducting surface 225 and with thrust spring means 325
10. able to keep it pressed against the upper surface of the
pack II5.

The plate I2 includes a hole II2 through which passes a
stem 2I8 of the pneumatic jack I8, to which is anchored the
head I7 with its point having a triangular section 2I; said
15. head I7 is guided by the walls of the hole 520 and is able
to detach one angular clip I5 at a time from the pack II5
and to apply it to the joint of the frame 2I5 already clam-
ped by the plate I2 by means of the middle part 220 of the
support 20 in suitably shaped means 22 anchored to the base
20. of the framework II so as to position the frames to be join-
ted.

Said point having a triangular section is equipped at
its side with a jutting surface 26 able to cooperate with a
groove 27 provided in said hole 520 so as to guide the des-
25. cent of said point 2I still farther.

According to a variant of the preferential embodiment,
while the characteristics of the elements composing the join-
ting machine remain substantially unchanged, the fixed part
of the jacks II3 can be anchored below to the base holding
30. the frames to be jointed, said jacks II3 can be operated so
as to contract instead of extending for the descent of the
clamping plate I2, the means I4 applying the clip I5 can be
located upside down below said base holding the frames to be

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1. jointed and a hole can be provided in said base which will
be the natural continuation of the hole 520.

According to said variant the clip is inserted into the
joint from underneath, thereby permitting advantageously, in
5. the case of frames having a complex section, the support of
the frames on said base by means of the flat rear surface of
the frames, thus retaining all the advantages belonging to
the preferential embodiment.

With reference to Fig.5, the clips of the invention are
10. triangular and each of them has two symmetrical arms 7I5 to
hold a corner between them; said arms 7I5 are connected to-
gether with a small middle portion 4I5 which is substantial-
ly flat and forms the same angle with each arm 7I5; said arms
7I5 are equipped at their outer end with an edge 3I5 bent
15. outwards.

According to the variant of Fig.6 the middle portion
4I5 of the clip I5I has one or more shallow grooves 6I5.
According to the invention the presence of said flat middle
portion 6I5 envisaged in said clips I5I gives a stronger
20. joint.

Said flat portion 4I5 also serves to guide the clip I5-
I5I vertically while it is entering the frame 2I5 and is be-
ing supported at its back by the pack II5 from which it is
being detached.

25. This vertical guiding action is also completed owing to
the cooperation of the outwardly bent edges 3I5 with approp-
riate grooves 620 envisaged inside the hole 520.

Said shaped means for positioning the frames are shown
in Fig.4 and consist of a bar having a frontal angled shape
30. able to position the frames in relation to each other in the
jointing position shown in Fig.5.

Said shaped positioning means 22 are provided with a
portion 222 shaped like the form of the joint and with an al-

1. alignment arm 322 stretching rearwards in relation to said
.shaped portion 222 and cooperating with guide means 23 secu-
.red to the framework, whereby said guide means are equipped
.with clamping means 24 consisting of a locking screw I24
5. able to clamp said alignment arm within the guide means 23.

. According to the invention the pneumatic means are pro-
.vided with suitable actuation and control means, which are
.helpfully of a known pedal type and are therefore not shown.

. Moreover, according to the invention the clips I5 are
10. angled and comprise outwardly bent end edges able to hinder
.displacement of the relative sides of the clip after its ap-
.plication; said edges also cooperate with grooves provided
.in the head so as to guide the clip while the latter is go-
.ing downwards.

15. As a safety measure the front and perhaps also the rear
.side of the jointing machine will be equipped with a sheet
.metal cover.

. At the front this cover will leave uncovered the lower
.part, which will instead be closed with a transparent cover,
20. thus allowing the machine operator to check the prior posit-
.ioning and execution of the joint visually.

. Let us now see the method of working; the machine oper-
.ator positions the frames to be jointed and keeps them still
.with the help of the positioning means 22.

25. When the pedal, which is not shown here, is operated,
.the pneumatic means I3 are actuated and lower the plate I2
.down to the end of its run, which is regulated by the adjust-
.ment means I9.

. At the end of the run of the plate I2 the lower surface
30. of the support 20 lies just in contact with the upper surface
.of the joint.

. The means I4 which apply the clip I5 are now operated
.with the drive of the pneumatic jack I8.

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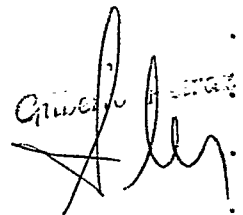
1. In this way the head 17 with the triangular point 21
is thrust as far as the surface of the joint so as to insert
the clip into the frame without having to squeeze said frame,
thus preventing it from being damaged by compression.

5. Moreover, according to the invention the clips 15 can
be right-angled or else can be formed at any angle between
30 and 150 degrees.

Furthermore, the shaped positioning means 22 can have
a positioning shape 222 which is not right-angled but is
10. comprised between 30 and 150 degrees to suit the type of
frame to be formed, that is, so as to enable a joint to be
made between parts of the frame which are sloped but not per-
pendicular to each other.

We have described here a preferential but not restrict-
15. ive embodiment of the invention, but other variants are pos-
sible for a person skilled in this field.

Thus the shape, proportions and sizes can be changed
and the pneumatic means can be replaced with hydraulic or
other means, the whole being possible for a person skilled
20. in this field without departing thereby from the scope of
the invention.



25 .

30 .

C L A I M S

1.

I. Machine to joint frames, characterized by including in mutual cooperation and coordination:

- a containing framework (II) having a substantially rectangular shape and comprising a base equipped with shaped means (22) to position the frames to be jointed,
 - a clamping plate (I2) which slides and is guided vertically by the upright sides (III) of said framework (II),
 - drive means (I3) for the vertical movement of the clamping plate (I2) which are secured to said framework (II)
 - and means (I4) which apply the clips and comprise a store (I6) for a pack of clips (II5), a head (I7) with a thrusting point (2I) and means (I8) to actuate said head (I7) together with its point,
- whereby means are provided (I9) which regulate the clamping position of said clamping plate (I2).

2. Machine to joint frames as in Claim I, characterized by the facts that the means (I4) which apply the clip (I5) are located underneath the clamping plate (I2) and that the clip (I5) is inserted from above the joint.

3. Machine to joint frames as in Claims I and 2, characterized by the fact that said drive means (I3) for the vertical movement of the plate (I2) consist of one or more pneumatic jacks (II3) actuated so as to extend, anchored at one end to the upper side of said framework (II) and having their relative stems (2I3) anchored at their ends to the upper surface of said plate (I2).

4. Machine to joint frames as in Claim I and in one or the other of the Claims thereafter, characterized by the fact that said means (I8) for the actuation of said head (I7) consist of a pneumatic jack (I8) anchored at its upper end to said plate (I2) in such a way as to correspond with a central hole (II2) envisaged in said plate, whereby the stem (2I8) of

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1. said pneumatic jack (I8) protrudes through said hole (II2).

5. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the facts that the means (I4) which apply the clip are located beneath the base which holds the frames to be jointed, and that the clip (I5) is inserted from below the joint, whereby a hole which forms a natural continuation of the hole (520) guiding the head (I7) and clip (I5) is provided in said base.

6. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact that said drive means (I3) for the vertical movement of the plate (I2) consist of one or more pneumatic jacks (II3) actuated so as to contract, having their fixed part anchored below the base holding the frames to be jointed and having their stems anchored to the lower side of the plate (I2).

7. Machine to joint frames as in Claim I and in one or another of the Claims thereafter up to Claim 5 inclusive, characterized by the fact that the means (I8) to actuate said head (I7) consist of a pneumatic jack (I8) anchored at the lower end of means (I4) which apply a clip and which are provided below the base holding the frames.

8. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the means (I4) which apply the clip consist of a support (20) anchored below said plate (I2), whereby said support (20) has a middle part (220) with a central hole (520) in which is lodged the head (I7) with the thrusting point (2I) anchored to the end of the stem (2I8) of said pneumatic jack (I8), and whereby said support (20) has a part (320) jutting out sideways and comprising a groove (420) which forms said store (I6) and communicates with said hole (520).

9. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact

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1. that said thrusting point (2I) has a triangular section.

IO. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact that said pneumatic jack (I8) has an extension (II8) which can be moved vertically in relation to said framework (II) and which moves in a guide hole (2II) provided in said framework (II).

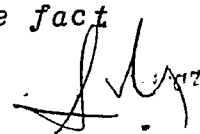
II. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact that said extension (II8) has a threaded portion (II9) which cooperates with said means (I9) that regulate the clamping position of the plate (I2).

I2. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact that said regulating means (I9) consist of a flanged knob (2I9) which is threaded inside and which cooperates with said threaded portion (2II) of said extension (II8) of said pneumatic jack (I8).

I3. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the head (I7) is provided at its side with a raised surface (26) able to cooperate with an appropriate groove (27) made in the hole (520) so as to guide the descent of the point (2I) of said head (I7) still farther.

I4. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact that near the outlet of the groove (420) into the up-right hole (520) there are provided above said groove some pressure means (25) able to keep packs (II5) of clips (I5-I5I) of differing heights in the right position in relation to the end of the groove (420).

I5. Machine to joint frames as in Claim I and in one or another of the Claims thereafter, characterized by the fact



1. that said pressure means (25) consist of a sliding block
. (I25) lodged above the groove (420) and equipped with an in-
. ducting surface (225), and also of thrust spring means (325)
. able to keep said block (I25) pressed against the upper sur-
5. face of the pack (I15).

. I6. Machine to joint frames as in Claim I and in one or
. another of the Claims thereafter, characterized by the fact
. that each of said triangular clips (I5-I5I) has two symmet-
. rical arms (7I5) which hold a corner between them and are
10. connected together by a small middle portion (4I5) that is
. substantially flat and forms the same angle with each arm
. (7I5), said arms (7I5) being equipped at one of their ends
. with outwardly bent edges (3I5).

. I7..Machine to joint frames as in Claim I and in one or
15. another of the Claims thereafter, characterized by the fact
. that said clips (I5I) have one or more lengthwise grooves
. (6I5) in their middle portion (4I5).

. I8. Machine to joint frames as in Claim I and in one or
. another of the Claims thereafter, characterized by the fact
20. that the triangular clips (I5-I5I) form an angle that varies
. between 30 and I50 degrees.

. I9. Machine to joint frames as in Claim I and in one or
. another of the Claims thereafter, characterized by the fact
. that the triangular clips (I5-I5I) form a right angle.

25. 20. Machine to joint frames as in Claim I and in one or
. another of the Claims thereafter, characterized by the fact
. that said head (I7) with a point comprises two upright gro-
. oves (620) made in the surface opposite the groove (420) and
. within the hole (520), whereby said grooves (620) can lodge
30. and guide said outwardly bent edges (3I5) of said clips (I5-
. I5I).

. 2I. Trinagular clips (I5-I5I) substantially as described,
. shown and claimed and for the purposes allowed.

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22. Machine to joint frames, substantially as described,
shown and claimed and for the purposes allowed.

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5.

10 .

15 .

20 .

25 .

30 .

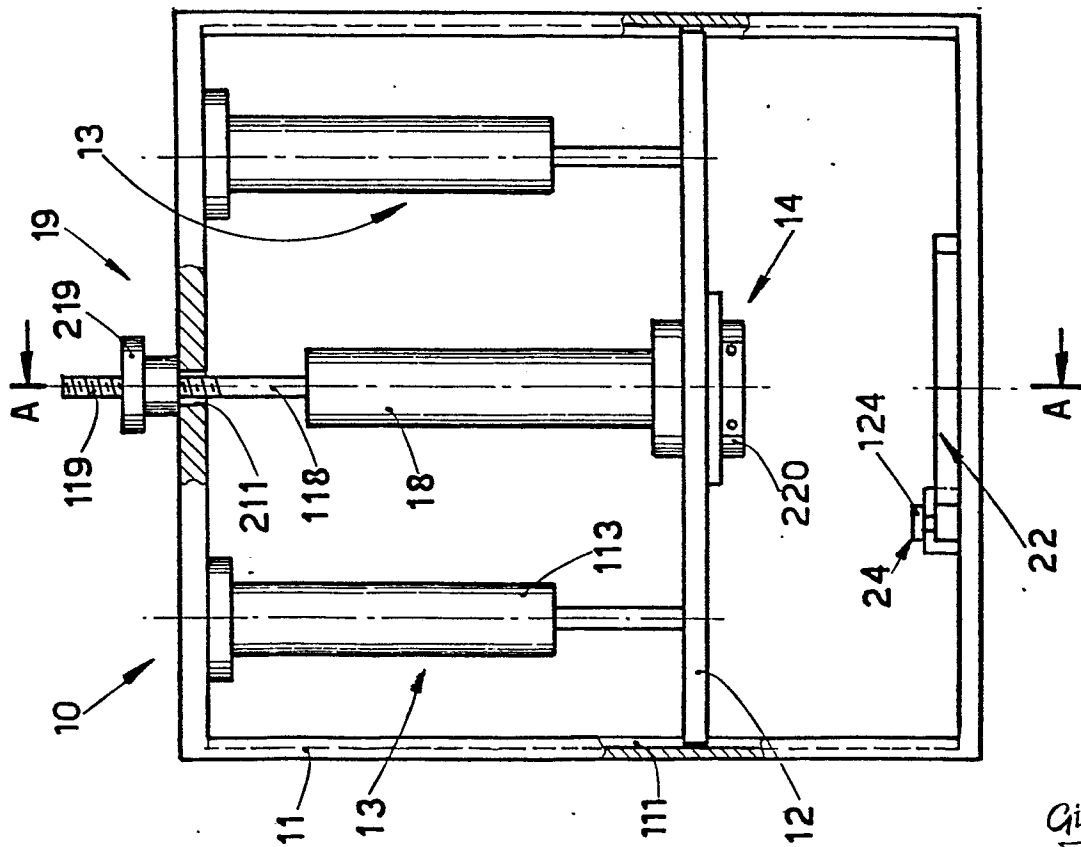


fig.1

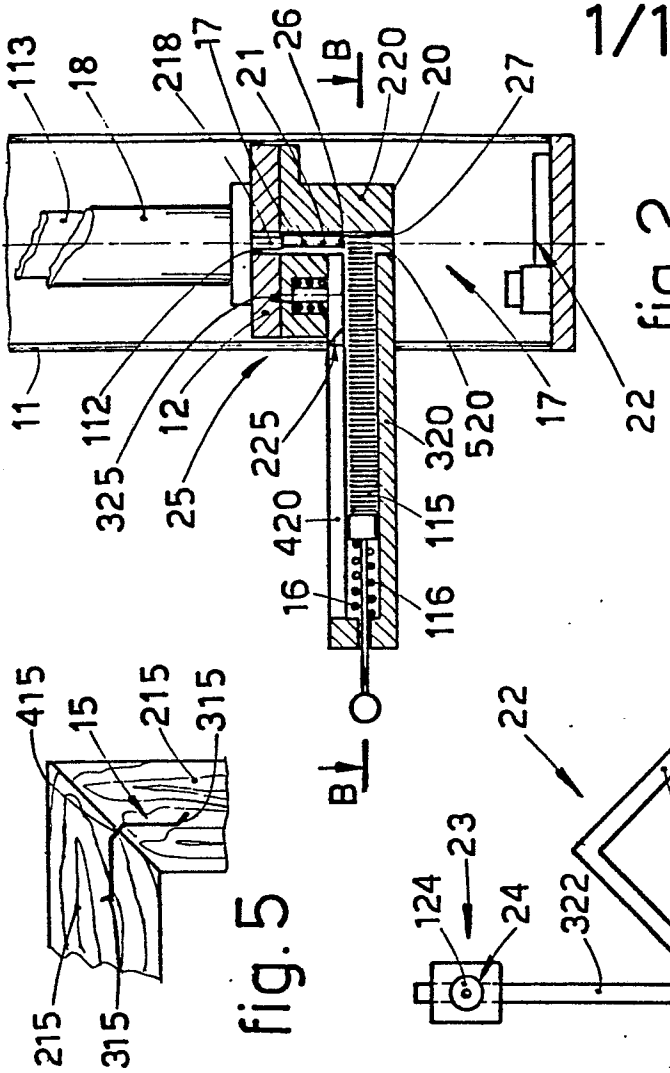


fig.2

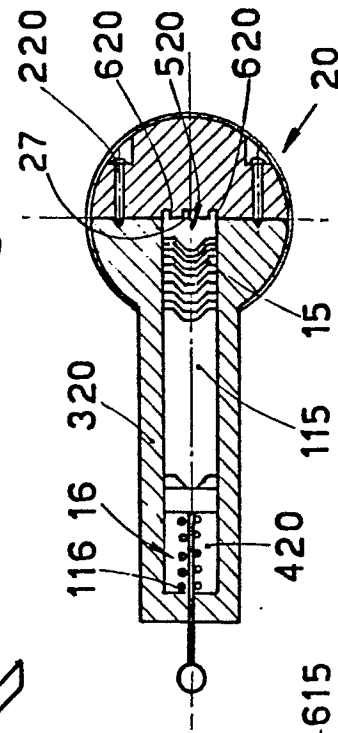


fig.3

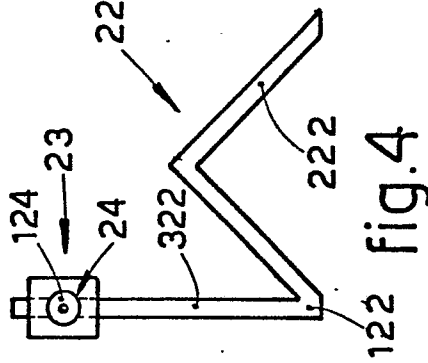


fig.4

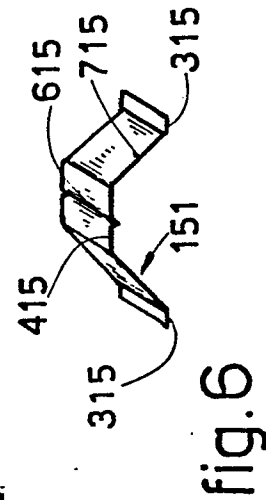


fig.5

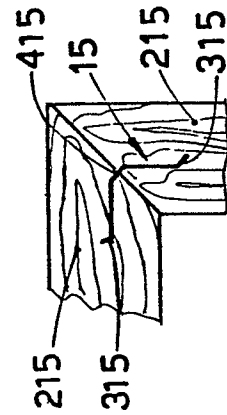


fig.6

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