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(54) **IMPROVED PINCER FOR A STAMPING PRESS WITH A TRANSFER SYSTEM**

(57) Improved pincer (1) for a stamping press with a transfer system, which comprises fastening arms (3) for the panel to be stamped and a support body (4) equipped with an inner cavity that houses a fluid-dynamic cylinder (5), said cylinder (5) being capable of actuating a first fastening arm (3a) of the pincer (1), which is attached articulated with said support body (4), and is characterized in that a portion (4a) of said support body (4) defines a second fastening arm (3b), such that said second fastening arm (3b) is built into the support body (4) of the pincer (1). Fig.1.

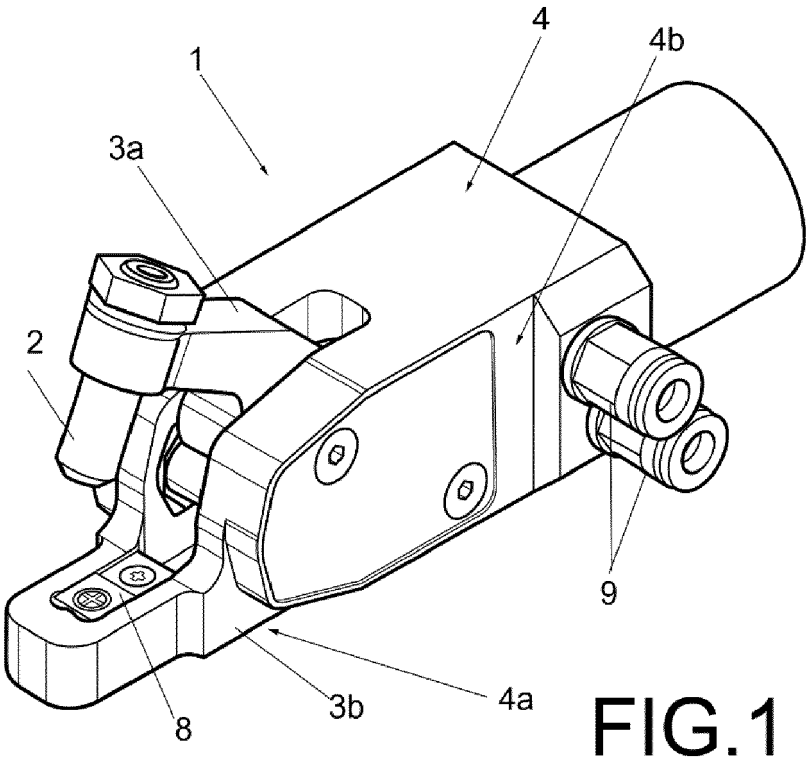

FIG.1

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Description

[0001] The present invention relates to an improved pincer for a stamping press with a transfer system, which makes it possible to significantly increase the production of the stamping press.

Background of the invention

[0002] Stamping presses are used in industry to shape metal workpieces, such as, for example, the shaped panels used in the automobile industry. These presses include an automatic panel positioning and transferring system, habitually called "transfer system", which allows for the sequential die-cutting of a panel along the plurality of dies that make up the press.

[0003] The aforementioned positioning and transferring system, hereinafter transfer system, includes a plurality of pneumatic pincers distributed along profiles located on both sides of the press dies. These pincer holder profiles are coupled to bars which are capable of performing a swing motion in the direction of travel of the panels to be stamped, such that a group of pincers associated with the same die is capable of fastening a panel to be stamped, transferring it to the following die, and returning to its respective die, whilst the panel is being stamped. This process is repeated with the subsequent panels to be stamped or die-cut.

[0004] The aforementioned pincers comprise fastening arms for the panel to be stamped and a support body equipped with an inner cavity that houses a pneumatic cylinder. The function of this cylinder is to actuate a fastening arm for the pincer, which is jointly articulated with the support body. Each of the pincers includes tubes designed to supply the pneumatic circuit of the cylinder and electric cables that supply one or several occupancy sensors of the panel to be stamped.

[0005] Stamping processes using presses that include the transfer system are intended to increase production (workpieces per minute), by increasing the working speed of the system. However, it has been demonstrated that, the greater the speed of the system, the greater the effort exerted by the pincer on the panel to be stamped, in order to prevent it from slipping. If the panel slips, the stamping process is altered and stopped, which very adversely affects the performance of the press.

[0006] Therefore, in light of the above, there is a clear need to obtain pincers for stamping presses with a transfer system which are capable of exerting a greater effort on the panel to be stamped, in order to increase the speed of the press (cycles per minute) and achieve an increase in production (panels per minute).

Description of the invention

[0007] The objective of the present invention is to provide an improved pincer for a stamping press with a transfer system that makes it possible to safely increase the working speed of the press and, consequently, the productivity thereof.

[0008] Following this objective, according to a first aspect, the present invention provides an improved pincer for a stamping press with a transfer system, which comprises fastening arms of a workpiece to be stamped and a support body equipped with an inner cavity that houses a fluid-dynamic cylinder, said cylinder being capable of actuating a first fastening of the pincer, which is attached articulated with said support body, and is characterized in that a portion of said support body defines a second fastening arm, such that said second fastening arm is built into the support body of the pincer.

[0009] One difference between the pincers disclosed in the prior art and the pincer of the present invention lies in that the second fastening arm is integrated within or built into the support body of the pincer, i.e. it is a part of the same support body that incorporates the articulated arm. Thanks to this, a more rigid pincer is obtained, which is capable of fastening the workpiece to be stamped more safely; this, in turn, translates into an increase in the productivity of the press (possibility to accelerate the movement of the transfer system).

[0010] In the pincers disclosed in the prior art, the second fastening arm is made up of a plate that is attached together with the support body. This configuration facilitates the insertion of the electric cabling that supplies the occupancy sensor of the panel to be stamped, but has the disadvantage that it limits the pincer's fastening capacity.

[0011] In addition to providing a greater fastening capacity, the pincer of the present invention provides other advantages, which are described below.

[0012] According to a preferred embodiment, the pincer preferably comprises an inlet and an outlet for the feed fluid of the fluid-dynamic cylinder (for example, a pneumatic cylinder), which are located on one side of said support body.

[0013] It has been observed that this feature makes it possible to save space (shorter total length of the body) and, moreover, makes it possible to place tubes with a larger diameter in order to feed a higher fluid flow rate. Using a higher fluid flow rate translates into an increase in productivity (more cycles per minute). In the prior art, the fluid inlets and outlets are located on the rear part of the body of the pincer, which conditions the length thereof.

[0014] Advantageously, according to the same preferred embodiment, the pincer comprises an occupancy sensor for the workpiece to be stamped, which includes a supply cable integrated within the portion of the support body that defines the second arm. This feature contributes to reducing the total height of the pincer, which makes it possible to save space.

[0015] Also advantageously, the first articulated fastening arm is configured in such a way that it comprises one end equipped with at least one through-hole for a fastening tip for the panel and a nut-and-bolt set config-

ured so as to affix said fastening tip at the top of the interior of said hole.

[0016] In the present invention, the fastening tip is introduced into a through-hole of the arm and affixed at the top of the interior of said hole, without the need to use an upper fixing plate, as in the case of the clamps disclosed in the prior art. This feature makes it possible to reduce both the length of the arm and the number of pincer components and, consequently, the weight thereof. Moreover, it also makes it possible to obtain an articulated arm with a smaller turn radius, which contributes to achieving a greater fastening effort.

[0017] Preferably, the end opposite the first articulated fastening arm comprises a slot which acts as a guide for an actuator bearing integrally attached with the cylinder rod that actuates said arm. It has been observed that this actuator bearing prolongs the useful life of the pincer.

[0018] Advantageously, the first fastening arm is attached articulated with the body of the pincer at an articulation point that is substantially aligned with the second fastening arm. Consequently, shorter fastening tips may be used, which contributes to reducing the total weight of the arm.

[0019] According to a preferred embodiment, the rear chamber of the cylinder designed for the inlet and outlet of fluid comprises a shock-absorbing element that acts as a stopper for the cylinder piston, said shock-absorbing element being sized such that it absorbs the kinetic energy originating from the motion of the first articulated fastening arm of the pincer and contributes to obtaining a greater speed for the upper arm.

[0020] The shock-absorbing element makes it possible to significantly reduce the noise produced by the pincer when it is in operation, which makes it possible to improve the environmental conditions at the workplace.

[0021] Advantageously, the fluid-dynamic cylinder comprises a sealing gasket that is also configured to act as a scraper gasket for the cylinder rod. In this way, the friction coefficient with the cylinder rod is reduced, which contributes to obtaining a greater working speed.

[0022] Preferably, the diameter of the fluid-dynamic cylinder is greater than 20 mm, for example, a diameter of 25 mm, which contributes to obtaining a pincer with greater fastening force.

[0023] Thanks to the aforementioned characteristics, an improved pincer is obtained which has a simple, compact design and presents the following advantages with respect to the pincers disclosed in the prior art:

- It presents 39% less components
- It has a 16% lower weight
- The length thereof is 33% shorter
- The fastening force thereof is 75% greater

[0024] All these advantages result in a reduction in maintenance costs and a very significant increase in the productivity of the stamping press.

Brief description of the figures

[0025] In order to contribute to a better understanding of the above, a set of drawings is attached wherein, schematically, and only as a non-limiting example, an embodiment is represented.

[0026] The drawings in Figures 1 to 6 represent the pincers of the present invention, whereas Figures 7 and 8 represent a pincer disclosed in the prior art.

Figures 1 and 2 show perspective views of a pincer with a single fastening tip, in the open position and closed position, respectively.

Figures 3 and 4 show perspective views of a pincer with two fastening tips, in the open position and closed position, respectively.

Figures 5 and 6 show two longitudinal sections of the pincer of Figures 1 and 2, in the open and closed positions, respectively.

Figures 7 and 8 show two longitudinal sections of a pincer disclosed in the prior art, in the open and closed positions, respectively.

Description of a preferred embodiment

[0027] Below we describe an embodiment of a pincer of the present invention by referring to Figures 1 to 8. Figures 7 and 8 correspond to a pincer already known in the prior art. Figures 1 to 6 show an embodiment of the pincer wherein the fastening arms are actuated by a pneumatic cylinder by means of an actuator bearing associated with the cylinder rod. The pincer described in this embodiment is equipped with a support body made of treated steel and a pneumatic cylinder with a diameter of 25 or 32 mm.

[0028] Figures 1 to 4 represent several perspective views of the pincer 1 of the present invention, in the open and closed positions, with one or two fastening tips 2 for the panel to be stamped. Each pincer 1 includes two fastening arms 3 of the workpiece to be stamped and a support body 4 equipped with an inner cavity that houses a pneumatic cylinder 5 (see also Figures 5 and 6). This fluid-dynamic cylinder 5 actuates a first fastening arm 3a, which is attached articulated with one axis 17 of the support body 4.

[0029] In the embodiment described herein, the rear chamber 18 of the pneumatic cylinder 5 comprises a shock-absorbing element 20 that acts as a stopper for the piston 19 of the cylinder 5. This shock-absorbing element absorbs the kinetic energy originating from the motion of the first fastening arm 3a, thereby reducing the noise produced by the pincer 1 when it is in operation.

[0030] The pincer 1 of the present invention is characterized in that a portion 4a of the support body 4 defines the second fastening arm 3b of the pincer, such that said

arm 3b is built into the support body 4 of the pincer 1. Thanks to this, a pincer 1 is obtained that is more rigid and with a shorter height, which makes it possible to fasten the workpiece to be stamped more safely, without the risk of slippage and with a high fastening force. In particular, in the embodiment described herein, it has been demonstrated that the pincer with a piston diameter provides a fastening force of up to 180 decanewtons (daN) for a working pressure of 6 bar.

[0031] The sections of Figures 7 and 8 represent a pincer 1' disclosed in the prior art, wherein the second fastening arm 3b' is configured by a plate 6 attached to the support body 4', which causes the total height of the pincer 1' to be greater; for example, a height of 58 mm vs. a height of 40 mm for the pincer 1 claimed herein.

[0032] As may be seen in Figures 7 and 8, corresponding to pincers 1' disclosed in the prior art, the electric cable 7' that supplies the occupancy sensor 8' of the panel to be stamped is placed between the plate 6 and the support body 4'. Unlike the pincers 1' disclosed in the prior art, in the pincer 1 of the present invention, the cable 7 of the occupancy sensor 8 is integrated within the portion 4a of the support body 4 that defines the second fastening arm 3b, which contributes to obtaining a shorter total height and provides a more compact design (see Figures 5 and 6).

[0033] The pincer 1 claimed herein comprises an air inlet and an air outlet 9, which are located on one side 4b of the support body 4 (see Figures 1 to 6), instead of being located on the rear part (see Figures 7 and 8), as in the case of the pincers 1' disclosed in the prior art. Thanks to this, the length of the pincer 1 is shorter than that of the pincers 1' disclosed in the prior art; for example, a length of 130 mm vs. a length of 150 mm (see Figures 5 and 7). Moreover, this lateral location makes it possible to use air inlet and outlet tubes with a greater diameter, in order to provide a higher air flow rate, which results in greater productivity.

[0034] Another characteristic of the pincer 1 of the present invention lies in the particular configuration of the geometry of the articulated arm 3a, which includes the presence of one or more throughholes 11 at the free end thereof. The fastening tip 2 of the pincer 1 is affixed at the top of the interior of these holes by means of a nut-and-bolt set, without the need to use an additional fixing plate 13, as in the case of the pincers 1' disclosed in the prior art (see Figures 5 and 6, as compared to Figures 7 and 8). This feature facilitates designing an articulated arm 3a with a smaller turn radius, which contributes to increasing the fastening effort of the pincer 1.

[0035] The opposite end of the first articulated arm 3a of the pincer 1 has a slot 14 that acts as a guide for the actuator needle bearing 15, which is integrally attached with the rod 6 of the pneumatic cylinder 5 that actuates the articulated fastening arm 3a. Figures 5 and 6 represent the articulation axis 17 of the arm 3a. This axis 17 is substantially aligned with the second fastening arm 3b, which makes it possible to use a shorter fastening tip 2 (see, once again, Figures 5 and 6 as compared to Figures 7 and 8).

[0036] When the stamping press is in operation, the articulated fastening arm 3a of the pincer 1 opens at an approximate angle of 25º, actuated by the actuator bearing 15, until the piston 19 of the pneumatic cylinder 5 is stopped by the shock-absorbing element 20 (see Figure 6). In order to fasten a workpiece, the same articulated arm 3a closes upon detecting the workpiece by means of the occupancy sensor 8 integrated within the support body 4 of the pincer 1 (see Figure 5). Once the workpiece has been fastened, the pincer 1 moves jointly with the workpiece actuated by the motion bar of the transfer system.

[0037] As has been described, the pincer 1 claimed herein guarantees perfect fastening of the workpiece to be stamped, even at high accelerations. When the working speed increases, the productivity very significantly increases.

[0038] Although we have referred to a specific embodiment of the invention, it is evident for persons skilled in the art that the pincer 1 described herein is susceptible to numerous variations and modifications, and that all the features mentioned may be replaced with other technically equivalent ones, whilst maintaining the scope of protection defined by the attached claims.

Claims

1. Improved pincer (1) for a stamping press with a transfer system, which comprises fastening arms (3) of a workpiece to be stamped and a support body (4) equipped with an inner cavity that houses a fluid-dynamic cylinder (5), said cylinder (5) being capable of actuating a first fastening arm (3a) of the pincer (1), which is attached articulated with said support body (4), **characterized in that** a portion (4a) of said support body (4) defines a second fastening arm (3b), such that said second fastening arm (3b) is built into the support body (4) of the pincer (1).

2. Improved pincer (1) according to claim 1, comprising two feed fluid inlet and outlet (9) located on one side (4b) of said support body (4).

3. Improved pincer (1) according to claim 1, wherein said first fastening arm (3a) is attached articulated with the body (4) of the pincer (1) on an articulation axis (17) that is substantially aligned with the second fastening arm (3b).

4. Improved pincer (1) according to any of claims 1 to 3, wherein said first fastening arm (3a) is configured in such a way that it comprises one end equipped with at least one through-hole for a fastening tip (2) for the workpiece and a nut-and-bolt set designed to affix said fastening tip (2) at the top in the interior of

the hole.

5. Improved pincer (1) according to claim 4, wherein the end opposite said first fastening arm (3a) comprises a slot (14) which acts as a guide for an actuator bearing (15) that is integrally attached with the rod (16) of the actuator cylinder (5) of said articulated arm (3a).

6. Improved pincer (1) according to any of the preceding claims, wherein the rear chamber (18) for the inlet and outlet of fluid comprises a shock-absorbing element (20) that acts as a stopper for the piston (19) of the cylinder (5), said shock-absorbing element being sized so as to absorb the kinetic energy originating from the motion of the first articulated fastening arm (3a) of the pincer (1).

7. Improved pincer (1) according to claim 6, wherein the cylinder (5) comprises a sealing gasket configured so as to also act as a scraper gasket for the rod (16) of the cylinder (5).

8. Improved pincer (1) according to any of claims 1 to 7, comprising an occupancy sensor (8) for the workpiece to be stamped, which includes a supply cable (7) integrated within the portion (4a) of the support body (4) that defines said second fastening arm (3a).

9. Improved Pincer (1) according to claim 8, wherein said fluid-dynamic cylinder is a pneumatic cylinder (5) with a diameter greater than 20 mm.

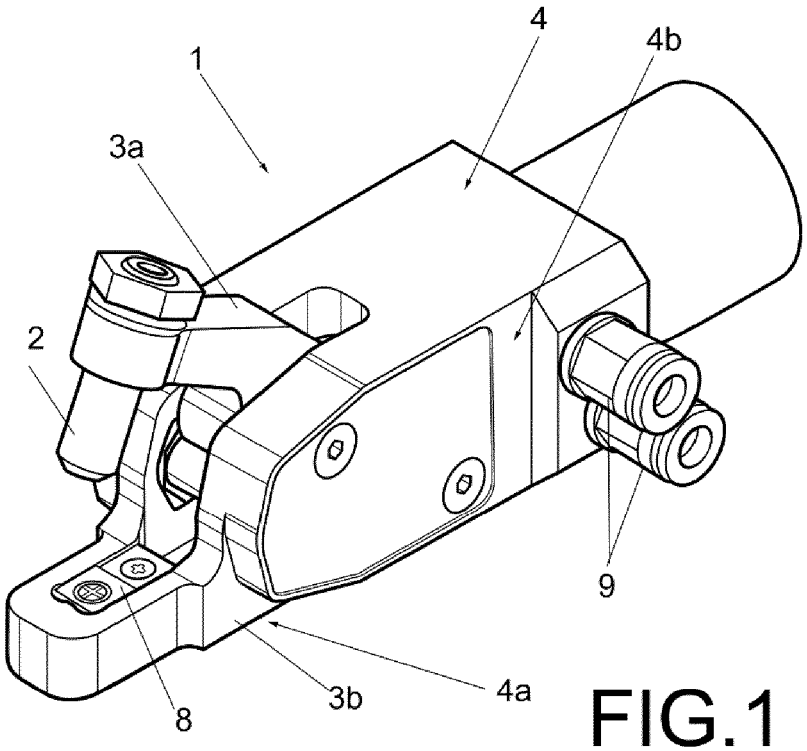


FIG.1

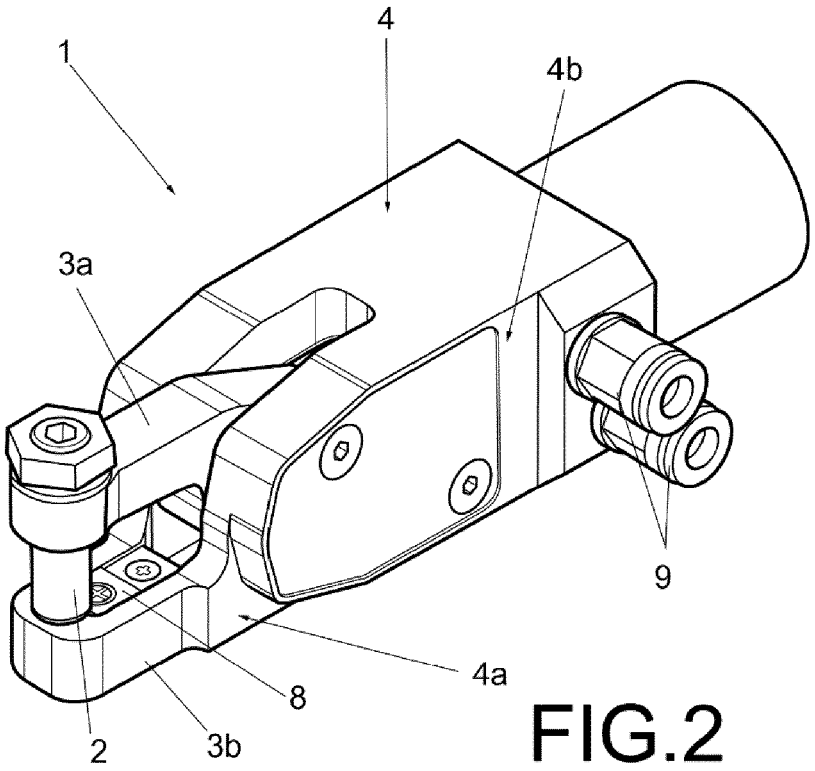


FIG.2

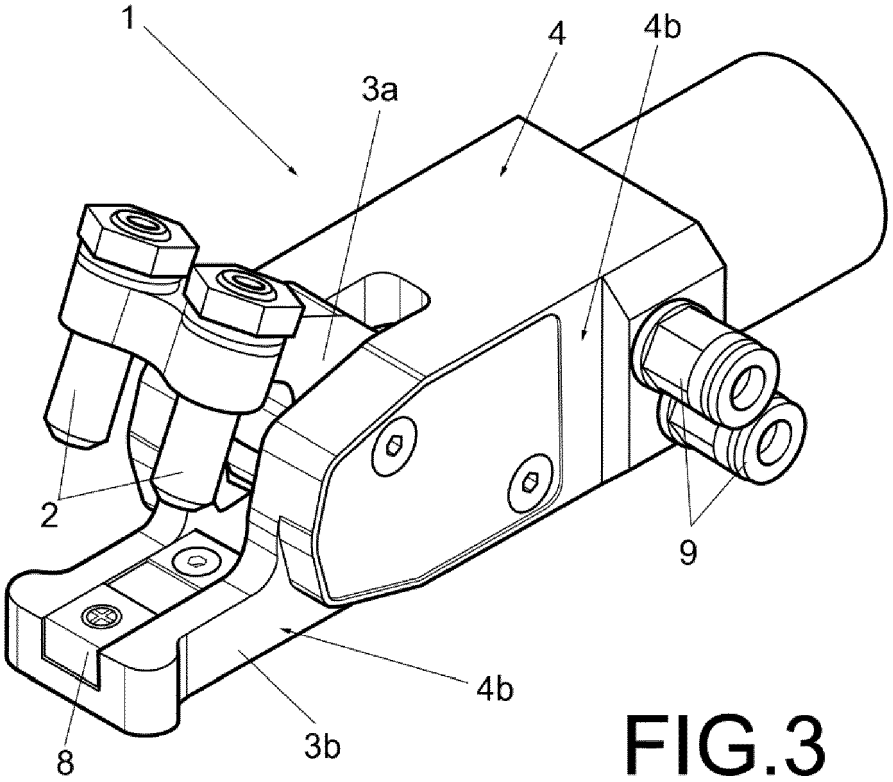


FIG.3

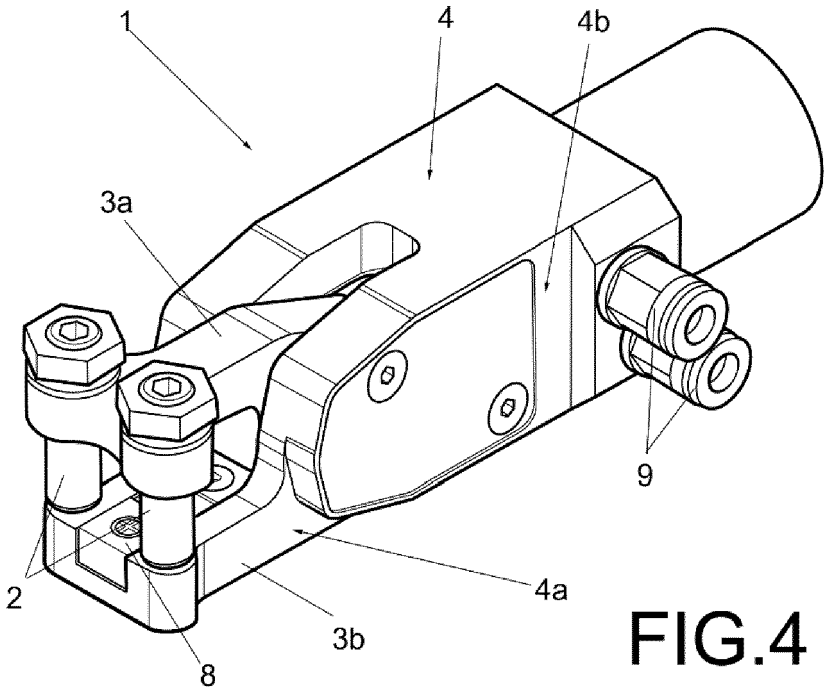


FIG.4

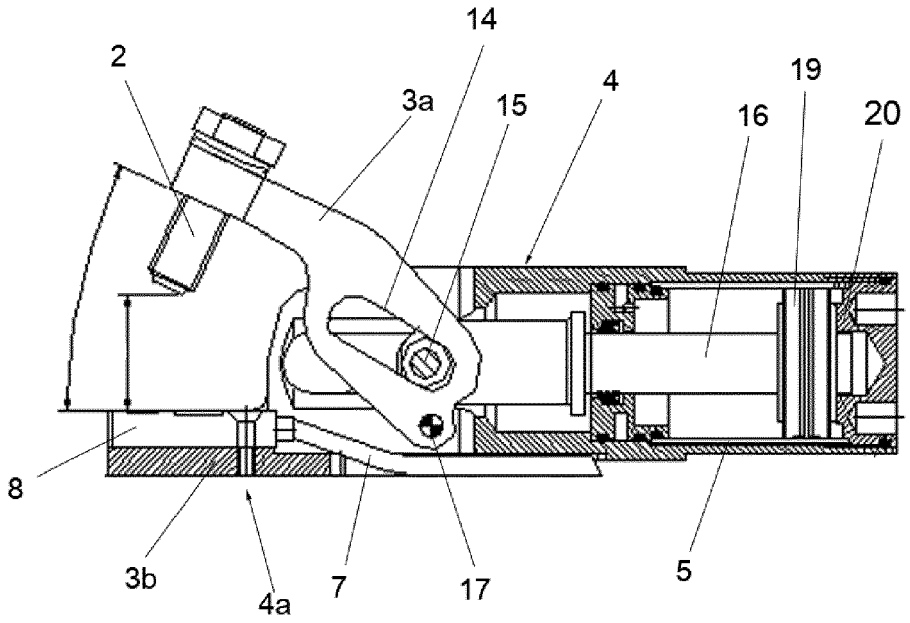


FIG.5

FIG.6

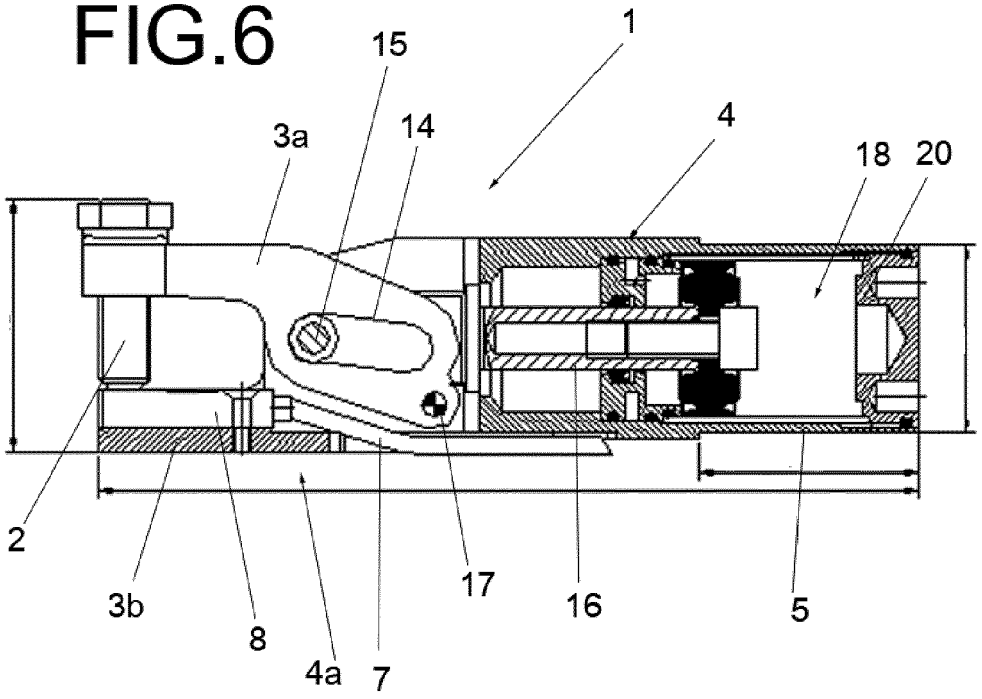


FIG.7

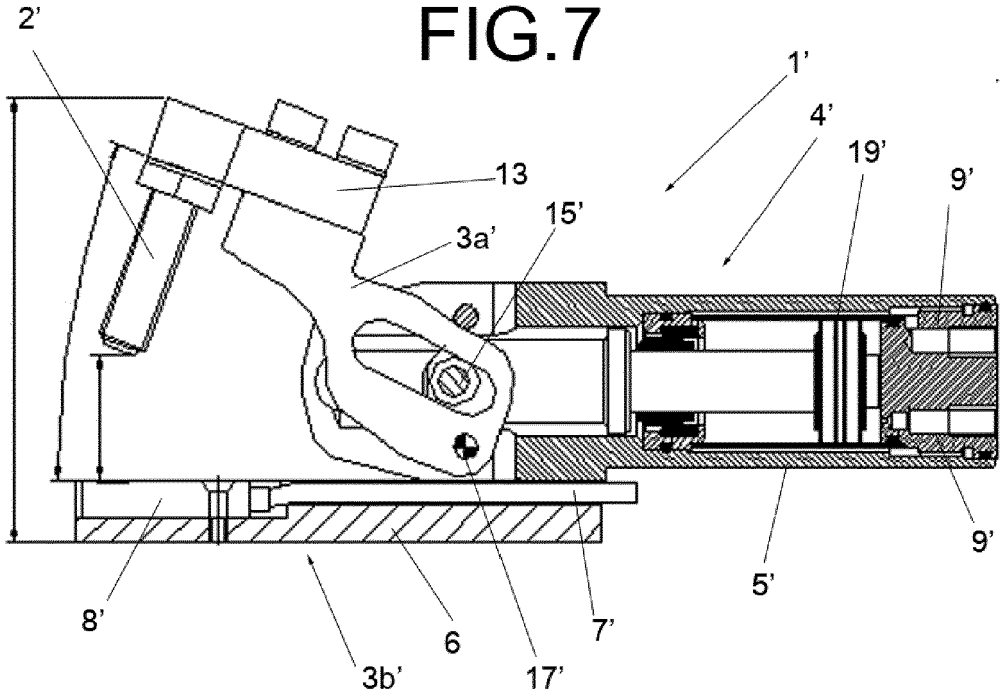
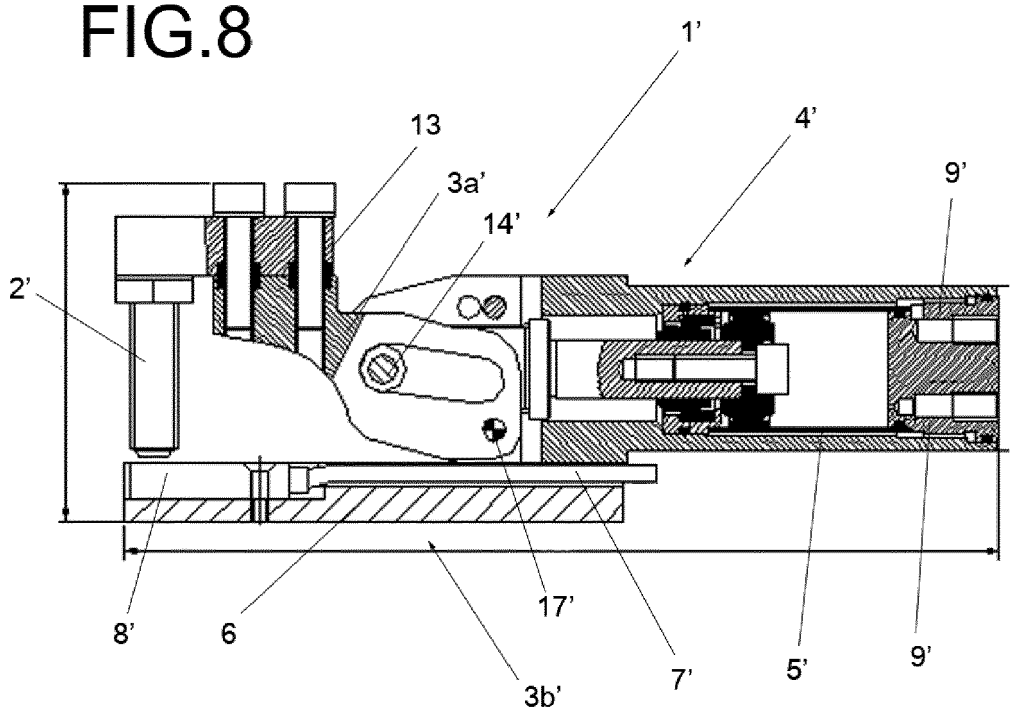


FIG.8



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EUROPEAN SEARCH REPORT

Application Number
EP 16 38 2259

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			B21D B23K B25J B25B B23Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 October 2016	Vinci, Vincenzo

CATEGORY OF CITED DOCUMENTS

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