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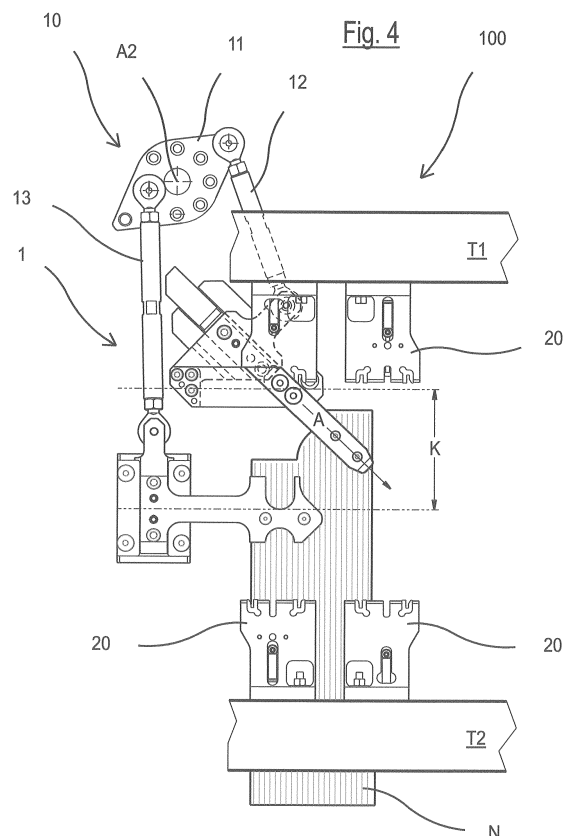
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(54) **IMPROVED PROCEDURE FOR THE RAPID SHEARING OF A BLANK FROM A METAL STRIP**

(57) The present invention relates to an improved process for the rapid shearing of a blank from a metal strip which is destined, particularly but not exclusively, for the production of a detail of a hinge for furniture.

The present invention also relates to an apparatus capable of implementing said improved process.

In particular, the improved process object of the present invention allows the rapid shearing of a blank (S1, S2) from a metal strip (N) destined, particularly but not exclusively, for the production of a hinge component for furniture, and is characterized in that it simultaneously moves both blanks (S1, S2) obtained without waste from said metal strip (N) aligning them along an advance direction (X) of the blanked pieces through the blanking station (1).



Description

FIELD OF THE INVENTION

[0001] The present invention relates to an improved process for the rapid shearing of a blank from a metal strip which is destined, particularly but not exclusively, for the production of a detail of a hinge for furniture.

[0002] The present invention also relates to an apparatus capable of implementing said improved process.

[0003] Thanks to the improved process according to the present invention, it is possible to considerably increase the productivity of the manufacturing process by shearing blanks obtained without waste material.

STATE OF THE ART

[0004] The production of a very high number of so-called blanks starting from a shearing operation of a metal strip always involves solving the technical problem of the material scrap, which must always be reduced as much as possible, increasing productivity and cost reduction, so as to be able to optimize the costs of the production process to the advantage of a reduction in the cost of the finished item.

[0005] In order to try and create a blank product by shearing from a metal strip with the lowest possible scrap of material, which negatively affects the cost especially in the production of low-cost items, various solutions have been proposed, all based on the maximum use of the metal strip through the search for an ideal blanking line, which however is also compatible with the actual processing requirements.

[0006] The most widely-used systems are those in which the blanking is effected according to a design which is such that the blanks interpenetrate each other on the metal strip, and wherein the blanking operation is effected on the strip moving either linearly or in a zigzag, so as to reduce scrap to a minimum.

[0007] As some material, necessary for being able to effect the blanking operation, must always be left between one blank and the adjacent one, in the most common systems, the various stages of the blanking operations are carried out in different blanking stations, with the drawback of having an increase in maintenance costs, which are higher with an increase in the number of blanking stations, in addition to an increase in the extension and complexity of the movement lines, a further reason for increased costs.

[0008] Between the various blanking steps, a centering operation of the blank moved towards the subsequent blanking station is in any case necessary. This phase slows down the processing, and also represents a possible source of processing inaccuracies, negatively affecting the production cost factor.

[0009] Among the solutions known from the state of the art capable of increasing the productivity of rapid shearing processes of a blank from a metal strip, in par-

ticular, but not exclusively, of a blank destined for the manufacturing of a hinge for furniture, patent EP 1197275 in the name of DI.GI.EMME S.r.l. relates to a process for the rapid shearing of a blank from a metal strip which provides for the blanking step of said at least two blanks in a single station, through a rapid succession of different blanking steps on various horizontal planes along the contours of fixed and movable matrixes, supported by progressively yielding elastic elements.

[0010] This process however is not without drawbacks.

[0011] In particular, although this known process allows a considerable saving of material, following the blanking operation, it provides for moving a profile to align it with the other along the advance direction of the blanks.

Only one profile or blank is moved, whereas the second remains stationary in its position.

[0012] This solution, illustrated by way of example in figures 1 to 3 and which, as indicated, provides for the movement of a single sheared profile, involves a certain encumbrance of the mould which influences the opening/closing movement of the transfer bars **T1**, **T2**, i.e. the bars which grip the sheared profiles **S1**, **S2** and move them in the advance direction **X** of the blanks from the blanking station **100**.

[0013] With particular reference to figure 1, the continuous metal strip **N** is in the correct position for being sheared. Figure 1 shows the strip already sheared wherein the profiles **S1** and **S2** already sheared, can be observed.

[0014] In the shearing step, the gripping elements **20** of the transfer bars **T1**, **T2** must be positioned externally with respect to the overall encumbrance, indicated with **K**, of the blanking mould, including die and punch.

[0015] Figure 1 shows the phase in which the profiles **S1** and **S2** have been sheared by the action of the die and punch, whereas figure 2 shows the alignment of the two profiles **S1**, **S2** which is effected by moving the profile **S2** from the position **P1** of figure 1 to the position **P2** of figure 2.

[0016] The movement of the profile **S2** is effected thanks to the trolley **R** which is moved, by the rotation of the handle **M1** around the axis **A1**, along the direction **A**.

[0017] Figure 3 illustrates the movement of the transfer bars **T1**, **T2** with the closing run indicated by **C1**.

[0018] The profiles **S1**, **S2** gripped by the gripping elements **20** of the transfer bars **T1**, **T2** are moved along the advance direction **X** out of the blanking station **100**.

[0019] As can be seen, therefore, this known solution implies that the encumbrance of the mould influences the opening/closing movement of the transfer bars **T1**, **T2**, which must effect a closing run **C1** in order to grip the profiles **S1**, **S2**.

SUMMARY OF THE INVENTION

[0020] In the light of the above, the undertaking of the present invention is to solve the drawbacks that affect the processes and apparatuses for the rapid shearing of

a blank from a metal strip without scraps of material, in particular by proposing an improved process and apparatus which allow a higher production rate, and therefore a higher productivity.

[0021] Within this undertaking, the objective of the present invention is to provide an improved process for the rapid shearing of a blank from a metal strip, without waste material, which minimizes the run of the transfer bars so as to increase the rate with which the blanks already sheared are moved out of the blanking station.

[0022] Again, an objective of the present invention is to provide an apparatus capable of implementing the improved rapid shearing method from a metal strip according to what is described herein.

[0023] The above-mentioned undertaking, as also the above-mentioned objectives and others which will become more evident hereunder, are achieved by an improved process for the rapid shearing of a blank from a metal strip according to the enclosed claim 1, and also an apparatus for the rapid shearing of a blank from a strip metal according to claim 6, suitable for implementing this process.

[0024] Further characteristics of the preferred embodiments of the process and apparatus according to the present invention described in the present patent application are the subject of the dependent claims.

LIST OF FIGURES

[0025] Further characteristics and advantages will become more evident from the description of a preferred, but non-exclusive, embodiment of the improved process for the rapid shearing of a blank from a metal strip and also the apparatus suitable for implementing said process, illustrated by way of non-limiting example, with the aid of the attached drawings in which:

figures 1 to 3 show an apparatus capable of implementing a process known from the state of the art in different functioning steps;

figure 4 shows a schematic drawing of a part of the blanking station of the apparatus for rapid shearing from a metal strip according to the present invention in a condition of the metal strip ready to be sheared; figure 5 shows the apparatus of figure 4 in a subsequent step of the improved process for the rapid shearing of a blank from a metal strip according to the invention, wherein the metal strip has been sheared and the two profiles obtained by the blanking operation are gripped by the respective trolleys but not yet moved;

figure 6 shows the step following the shearing step shown in figure 5 wherein the two blanked profiles are both moved simultaneously;

figure 7 shows the step following the movement step of the blanks shown in figure 6 wherein the blanks are gripped by the gripping elements of the transfer bars;

figure 8 shows the step following the gripping step of the blanks shown in figure 7 wherein the blanks gripped by the gripping elements of the transfer bars are moved along the advance direction out of the blanking station.

DETAILED DESCRIPTION OF THE INVENTION

[0026] With particular reference to the attached figures from 4 to 8, an apparatus is described for the rapid shearing of a blank **S1**, **S2** from metal strip **N** destined, particularly but not exclusively, for the production of a hinge component for furniture.

[0027] The apparatus according to the invention comprises a blanking station **1** which in turn comprises movement means **10** suitable for simultaneously moving a first blank **S1** along a first direction **Y**, preferably but not necessarily parallel to the advance direction of the strip, and a second blank **S2** along a second direction **A**.

[0028] With reference to figure 4, the continuous metal strip **N** is fed along the direction **Y** to the blanking station **1** and is positioned in the correct position to be sheared.

[0029] Figure 5 shows the strip showing the profiles **S1** and **S2** already sheared.

[0030] In the shearing step, the gripping members **20** of the transfer bars **T1**, **T2** are positioned externally with respect to the overall dimensions indicated with **K** in the figure of the blanking mould comprising die and punch.

[0031] Again with reference to figure 5, the profiles or blanks **S1** and **S2** have been sheared by the action of the die and punch, and are moved respectively by the trolleys **R2** and **R1**.

[0032] The blanking station **1** of the apparatus according to the present invention in turn comprises movement means **10** suitable for simultaneously moving the first of said blanks **S1** along a first direction **Y** and the second of said blanks **S2** along a second direction **A**.

[0033] Said first direction **Y** and said second direction **A**, according to what is shown in the attached figures, advantageously form an angle α with respect to each other, which is determined by the dimensions of the blanks and by the distance "**d**" between the blanks in the subsequent steps (figure 8).

[0034] The means **10** for moving said blanks **S1**, **S2** more preferably comprise at least one crank **11** suitable for rotating around an axis **A2** and to which a first connecting rod **12** and a second connecting rod **13** are connected in correspondence with their first end, the first connecting rod **12** being in turn connected, at its opposite end with respect to the end connected to the crank **11**, to the first trolley **R1** suitable for gripping said second blank **S2**, and said second connecting rod **13** being connected, in correspondence with its opposite end with respect to the end connected to the crank **11**, to the second trolley **R2** suitable for gripping the first blank **S1**.

[0035] Thanks to this configuration of the apparatus according to the present invention, and in particular of the blanking station **1**, the simultaneous movement of

the two blanks **S1** and **S2** can be obtained in different directions.

[0036] The blanking station **1** according to the present invention, further comprises, according to what is known from the state of the art, transfer bars **T1**, **T2** movable along both the feeding direction **Y** for gripping said blanks **S1**, **S2** once they have been sheared and oriented, and also along the advance direction **X** for moving the blanked pieces **S1**, **S2** previously aligned towards the outlet of the blanking station **1**.

[0037] The improved process according to the present invention for the rapid shearing of a blank **S1**, **S2** from a metal strip **N** destined, particularly but not exclusively, for the production of a hinge component for furniture, and implemented by the apparatus described above by way of example, comprises at least the following steps:

- feeding a continuous metal strip **N** along a feeding direction **Y** into a blanking station **1** comprising at least one die and a punch movable with respect to each other along a direction **Z** substantially orthogonal to the plane **XY** wherein said continuous metal strip **N** lies and suitable for at least partially penetrating each other to effect the blanking operation of the strip **N**;
- shearing from said metal strip **N**, without waste, two blanks **S1**, **S2** in a single station and with a single blanking operation;
and also comprises a step consisting in simultaneously moving each of said at least two blanks **S1**, **S2** aligning them along an advance direction **X** of the blanks through the blanking station **1**, towards the outlet from said station.

[0038] The shearing process according to the present invention further provides that the step for moving the two blanks **S1**, **S2** to align them along the advance direction **X** be effected by movement means **10** suitable for simultaneously moving a first of said blanks **S1** along a first direction **Y** and a second of said blanks **S2** along a second direction **A**.

[0039] A first of said two blanks **S1** is advantageously moved along a direction **Y** advantageously but not necessarily orthogonal with respect to the advance direction **X** of the blanks, and a second of said two blanks **S2** is simultaneously moved along a direction **A** tilted by an angle α with respect to said movement direction **Y** of said first blank **S1**.

[0040] The rapid shearing process according to the present invention is advantageously characterized in that the movement of said blanks **S1**, **S2** along said advance direction **X** of the blanks through the blanking station **1** is effected by means of transfer bars **T1**, **T2** movable both along the feeding direction **Y** so as to be able to grip the blanks **S1**, **S2** once they have been sheared and oriented, and also along the feeding direction **X** for moving the blanks **S1**, **S2** through the blanking station **1**, exiting from the same.

[0041] With reference to the attached figures from 4 to 8, according to the preferred embodiment of the process according to the present invention described herein by way of non-limiting example of the invention, the alignment of the two blanks **S1**, **S2** is effected by moving the second blank **S2** from position **P8** in figure 5 to position **P10** in figure 6, with a movement along the direction **A** which is, as already indicated, tilted by the angle α with respect to the advance direction **Y** of the metal strip **N** inside the blanking station, and by moving the first blank **S1** from position **P7** of figure 5 to position **P9** of figure 6 along the direction **Y**.

[0042] These movements of the profiles **S1**, **S2** are effected, as already mentioned, by the crank **11** which rotates around the axis **A2** and moves the connecting rods **12** and **13**.

[0043] The improved process according to the present invention therefore introduces, with respect to the known process described with reference to the apparatus of figures 1-3, the movement of the trolley **R2** of the profile **S1** which has enabled the run of the trolley **R1** of the second profile **S2** along the direction **A** to be reduced, with respect to the case of the trolley **R** which moved the profile **S2** in the process shown in figures 1 to 3.

[0044] Again, with respect to the closing run of the transfer bars **T1**, **T2** indicated with **C1** in figure 3, with the improved process of the present invention with the apparatus shown in figures 4 to 8 which implements this process, the closing run of the transfer bars **T1**, **T2** has been distributed on both sides of the station with respect to the profiles **S1**, **S2**. In particular, the run **C2** which the bar **T1** completes for gripping the profile **S2** and the run **C3** which the bar **T2** completes for gripping the profile **S1** are reduced with respect to what is the case of the apparatus of figures 1-3. In particular, the sum of the runs **C2** + **C3** equals the run **C1** indicated in figure 2. In other words, whereas with the known method, the bar **T1** had to effect the run **C3** for gripping the blanks **S1**, **S2**, with the improved process object of the present invention it only needs to complete the run **C2** as the difference **C1**-**C2** corresponding to the run **C3** is effected by the trolley **R2** for the movement of the profile **S1**, whereas it is obtained by a shorter run in the direction **A** of the trolley **R1** of the second profile **S2**.

[0045] It has thus been shown from the description provided so far how the improved rapid shearing process and the apparatus capable of implementing the process according to the present invention achieve the intended undertaking and objectives. In particular, the steps of the process and the characteristics of the apparatus object of the present invention are evident, as also the relative advantages.

[0046] Thanks to the improved process according to the present invention, a higher productivity of the machine is obtained, as the production rate can be increased. In particular, by moving both profiles **S1**, **S2** the run of the second profile **S2**, which was the only one that was moved in the known process, is reduced with respect

to the process known from the state of the art, and this allows a greater frequency in the blanking operation.

[0047] Furthermore, the solution object of the present invention allows a better distribution of the overall dimensions **K** of the mould, thanks to a reduced run of the first trolley **R1**, so as to allow a shorter run of the transfer bars **T1, T2** in opening and closing, which allows higher frequencies and therefore a higher rate of the machine and a higher productivity, to be reached.

Claims

1. An improved process for the rapid shearing of a blank (S1,S2) from a metal strip (N), destined, particularly but not exclusively, for the production of a hinge component for furniture, comprising the following steps:

- feeding a continuous metal strip (N) along a feeding direction (Y) into a blanking station (1) comprising at least one die and a punch movable with respect to each other along a direction (Z) substantially orthogonal to the plane (XY) in which said continuous metal strip (N) lies and suitable for at least partially penetrating each other;
- shearing two blanks (S1,S2) from said metal strip (N), without waste, in a single station and with a single blanking operation;

characterized in that each of said at least two blanks (S1,S2) are moved simultaneously, aligning them along an advance direction (X) of the blanks through the blanking station (1).

2. The rapid shearing process according to the previous claim, **characterized in that** the movement step of said at least two blanks (S1,S2) for aligning them along the advance direction (X) is carried out by movement means (10) suitable for simultaneously moving a first of said blanks (S1) along a first direction (Y) and a second of said blanks (S2) along a second direction (A).
3. The rapid shearing process according to the previous claim, **characterized in that** a first (S1) of said two blanks is moved along a direction (Y) substantially orthogonal with respect to the advance direction (X) of the blanked pieces, and a second (S2) of said two blanks is simultaneously moved along a direction (A) tilted by an angle (α) with respect to said movement direction (Y) of said first blank (S1).
4. The rapid shearing process according to one or more of the previous claims, **characterized in that** the movement of said blanks (S1,S2) along said advance direction (X) of the blanked pieces through the blanking station (1) is effected by means of trans-

fer bars (T1,T2) movable both along the feeding direction (Y) for gripping said blanked elements (S1, S2) once sheared and oriented, and also along the feeding direction (X) for moving the blanked pieces (S1,S2) through the blanking station (1).

5. An apparatus for the rapid shearing of a blank (S1, S2) from a metal strip (N), destined, particularly but not exclusively, for the production of a hinge component for furniture, comprising a blanking station (1), in turn comprising movement means (10) suitable for simultaneously moving a first of said blanks (S1) along a first direction (Y) and a second of said blanks (S2) along a second direction (A).
6. The apparatus according to the previous claim, **characterized in that** said movement means (10) comprise at least one crank (11) suitable for rotating around an axis (A2) and to which a first connecting rod (12) and a second connecting rod (13) are connected, said first connecting rod (12) being connected in turn at its opposite end to a first trolley (R1) suitable for gripping said second blank (S2), said second connecting rod (13) being connected in turn at its opposite end to a second trolley (R2) suitable for gripping said first blank (S1).
7. The apparatus according to the previous claim, **characterized in that** it further comprises transfer bars (T1, T2) movable along both the feeding direction (Y) for gripping said blanked elements (S1,S2) once sheared and oriented, and also along the advance direction (X) for moving the blanked pieces (S1,S2) previously aligned towards the outlet of the blanking station (1).

Fig. 1

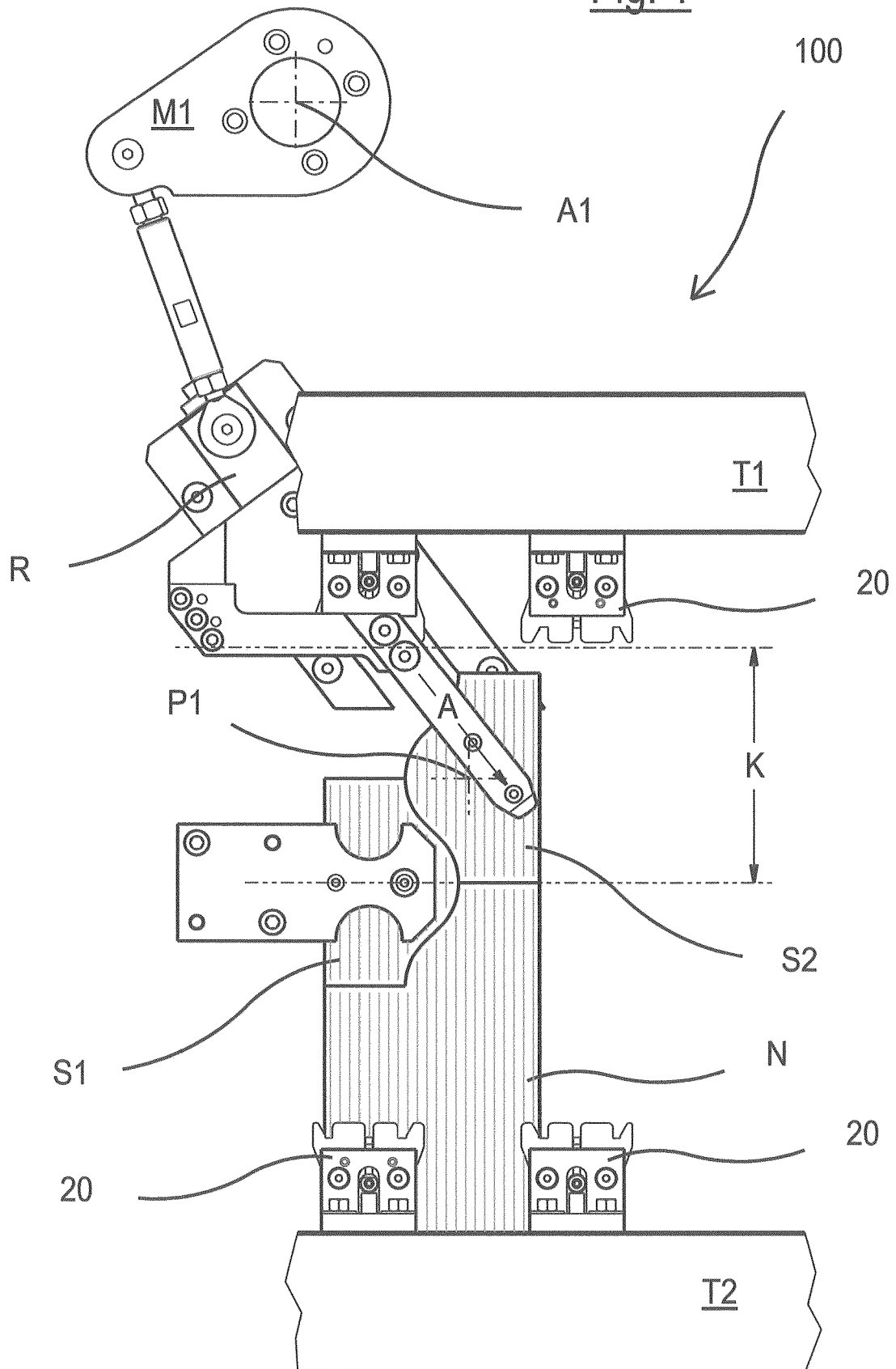


Fig. 2

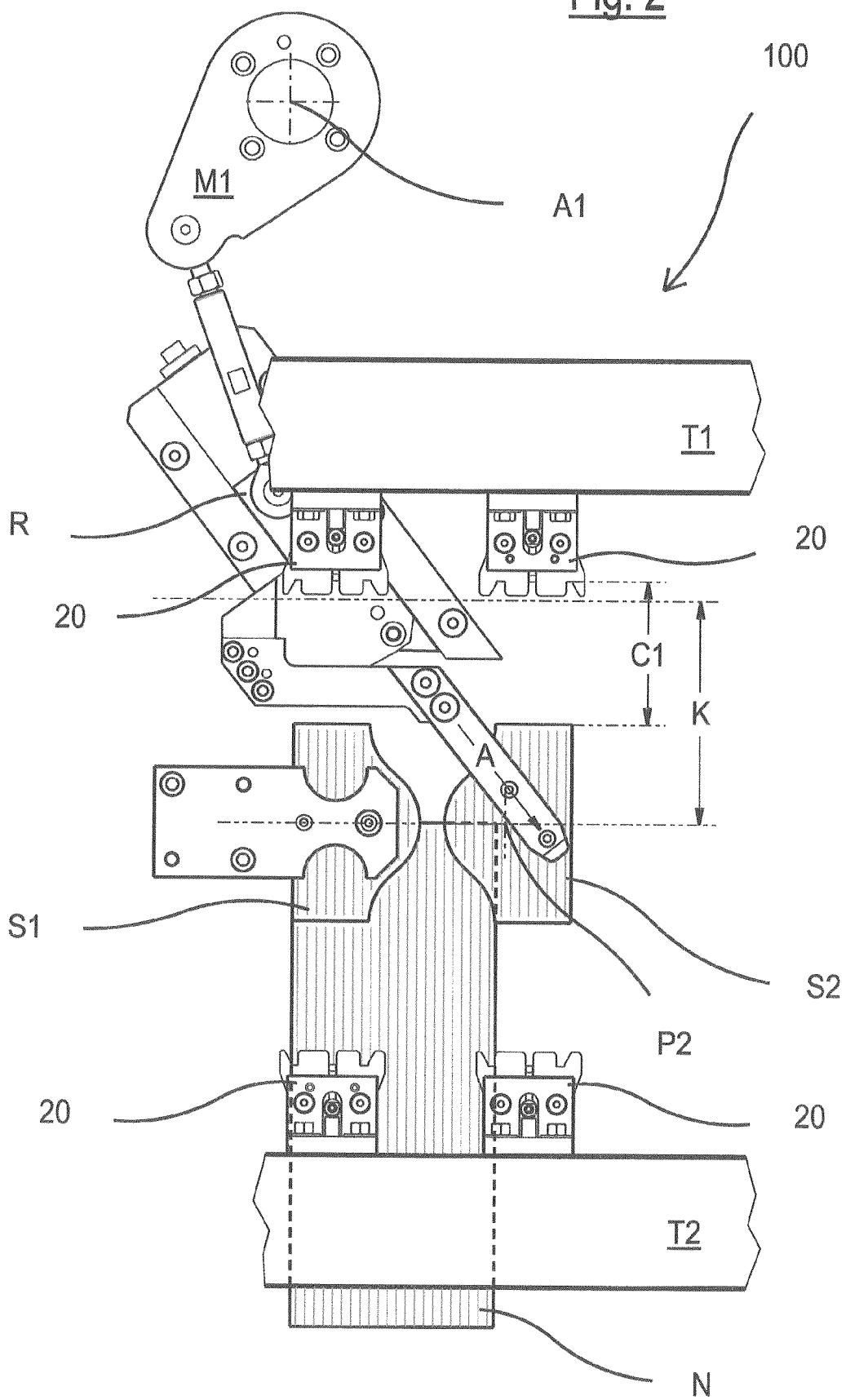
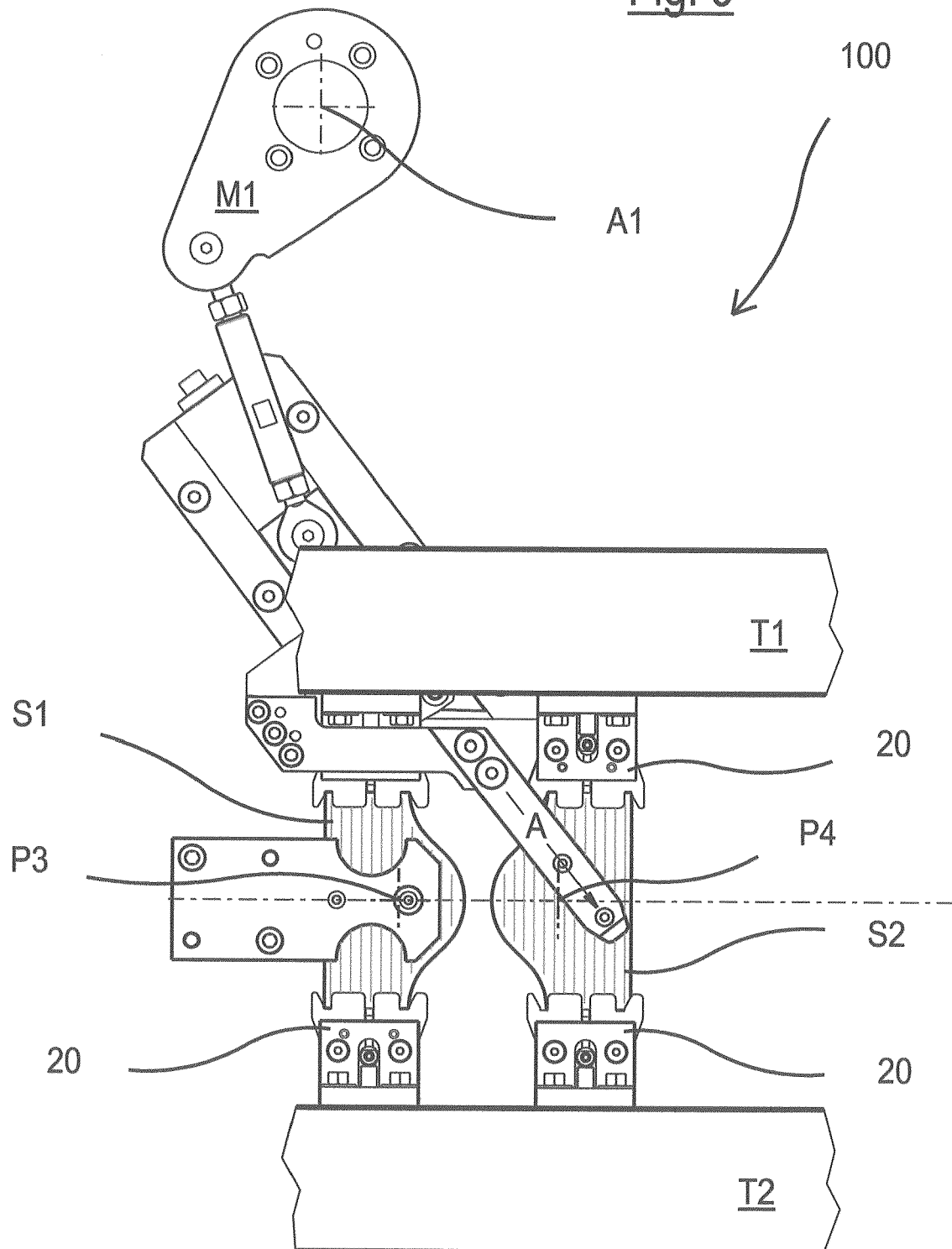


Fig. 3



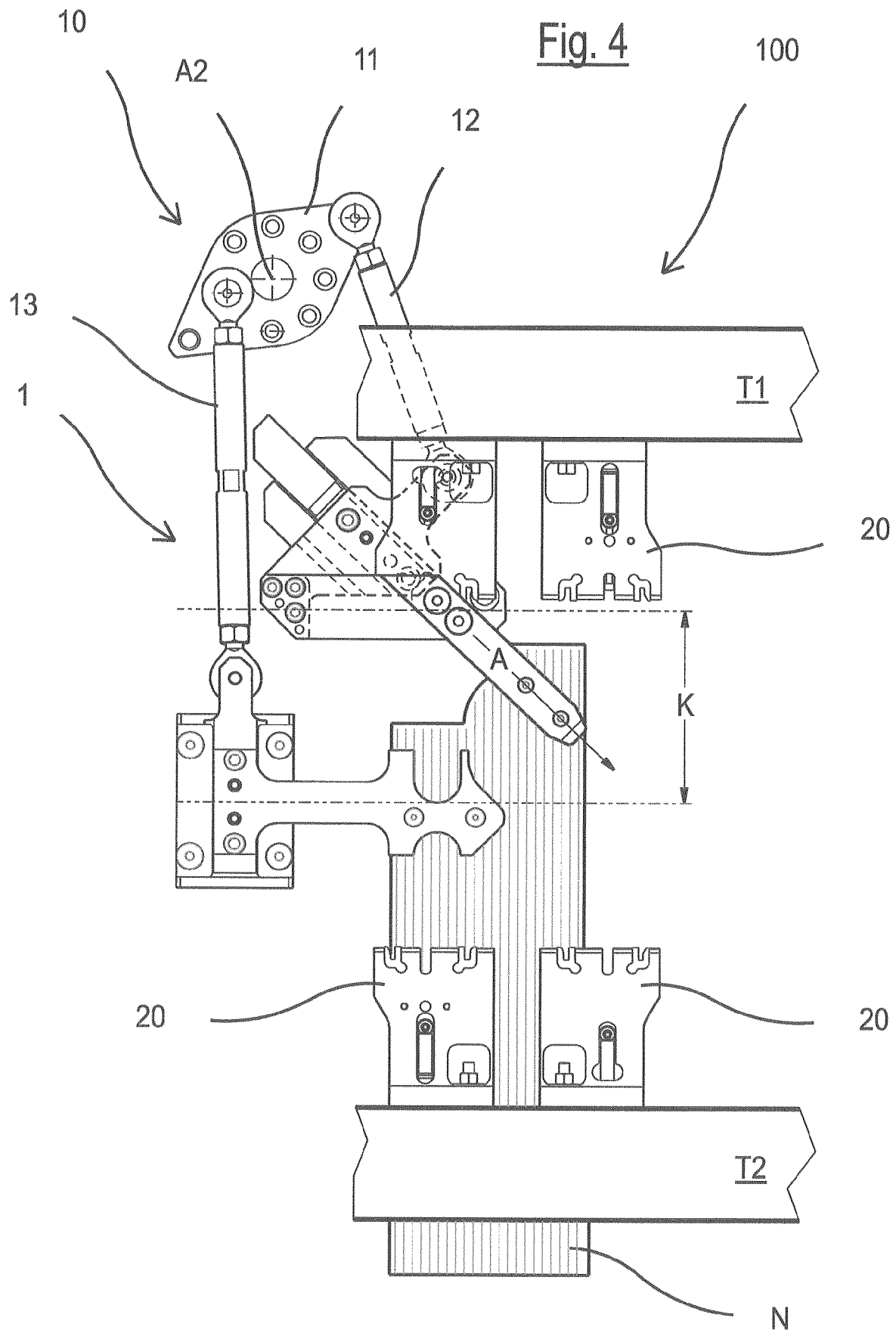


Fig. 5

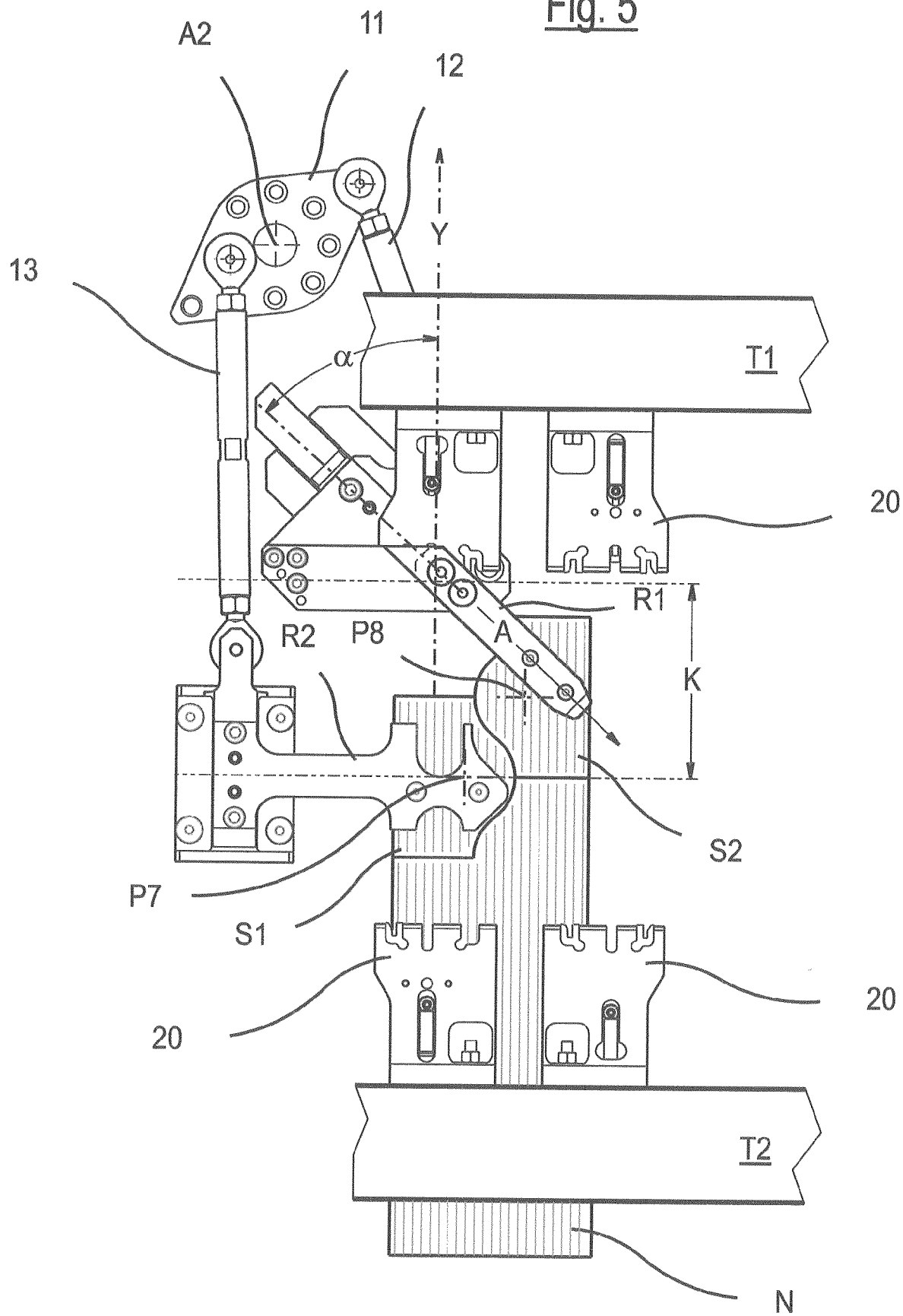
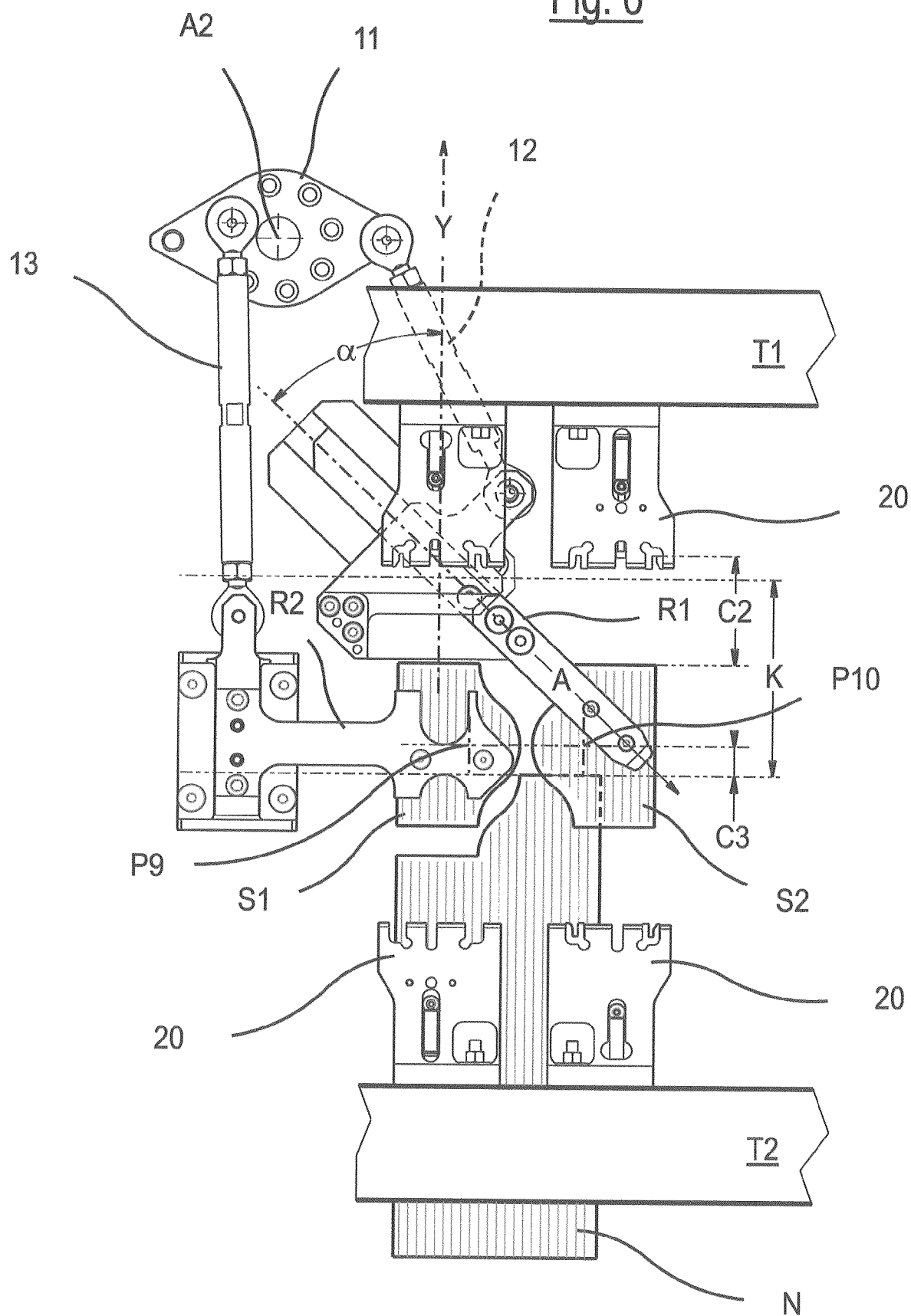


Fig. 6



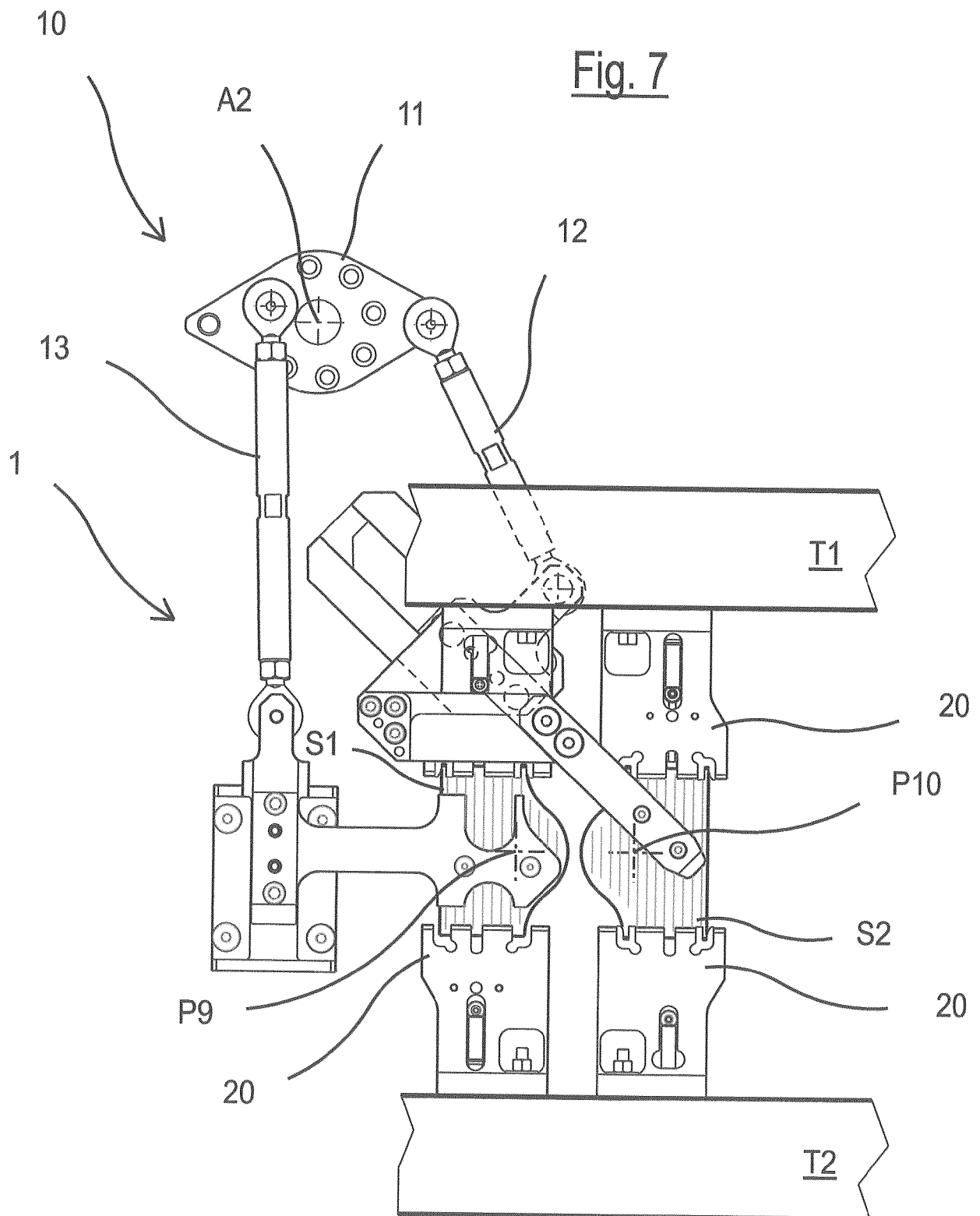
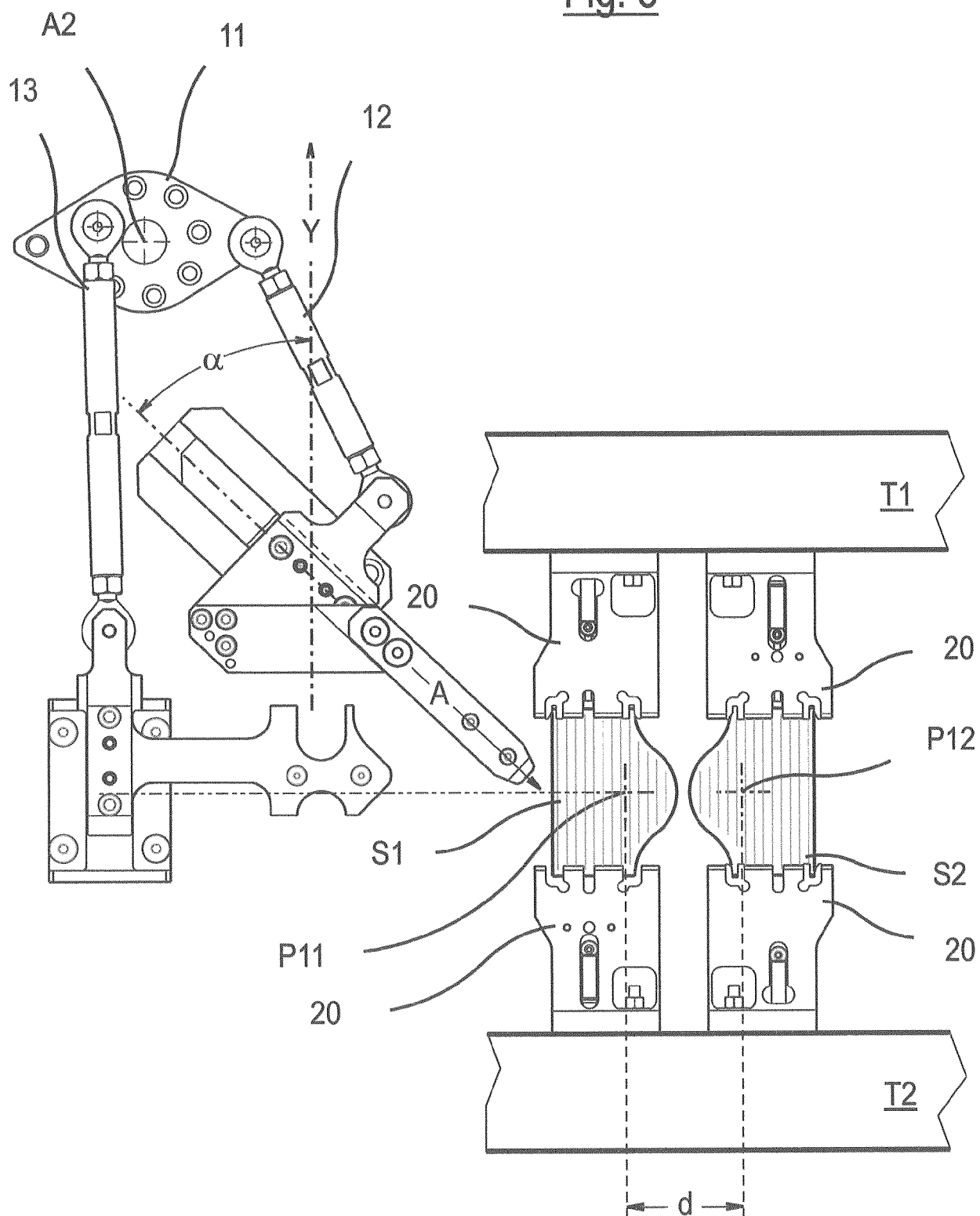


Fig. 8





EUROPEAN SEARCH REPORT

Application Number
EP 20 21 3014

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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X	JP S58 9729 A (AIDA ENG LTD) 20 January 1983 (1983-01-20) * abstract; figures * -----	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			B21D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 April 2021	Examiner Knecht, Frank
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 21 3014

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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06-04-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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REFERENCES CITED IN THE DESCRIPTION

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