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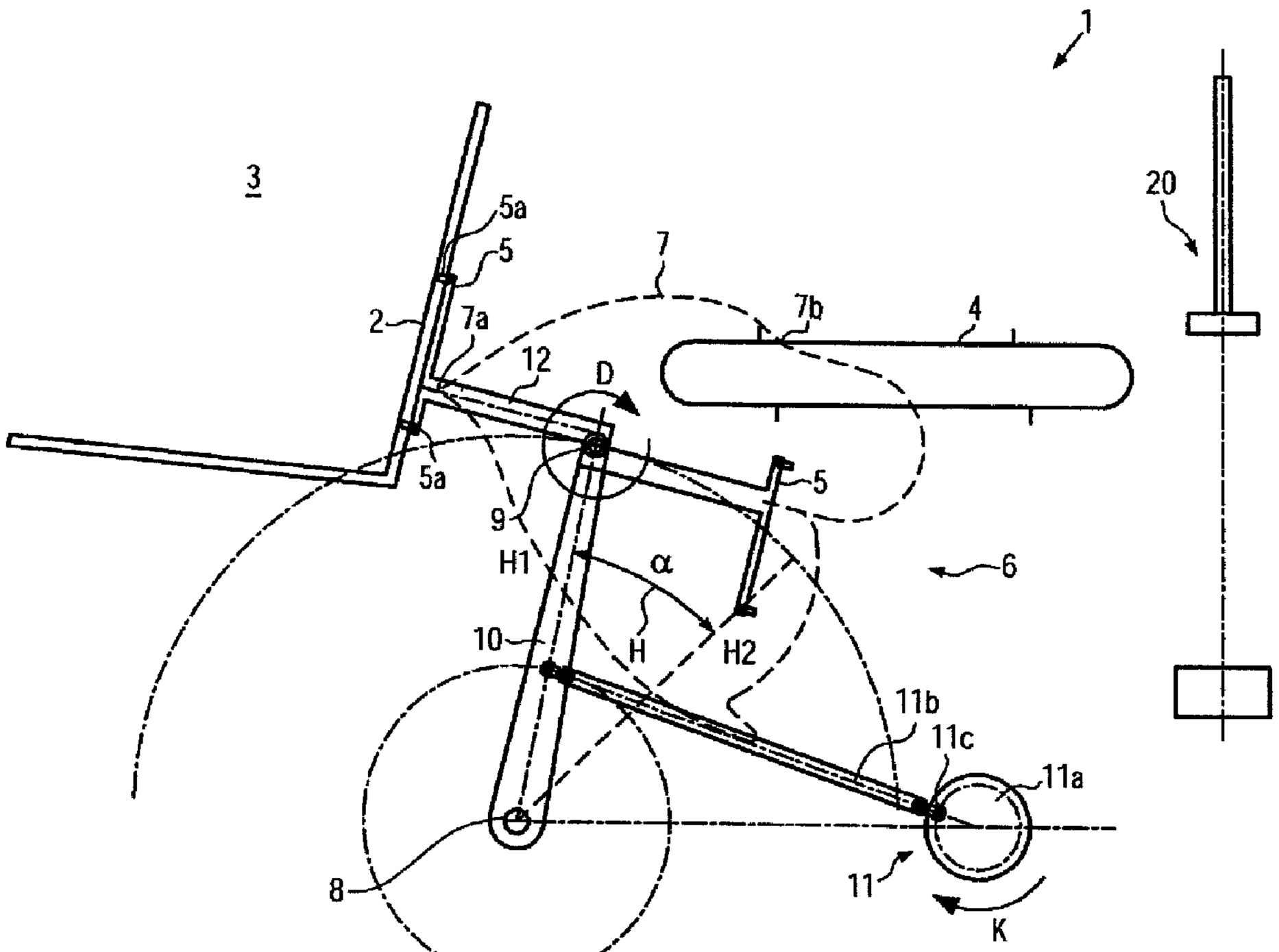
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(54) Titre : DISPOSITIF DE TRANSFERT D'OBJETS DE TYPE FEUILLE
(54) Title: APPARATUS FOR TRANSFERRING SHEET-TYPE OBJECTS



(57) Abrégé/Abstract:
Described is an apparatus (1) for transferring sheet-type objects (2), which guarantees in a constructively simple manner a careful handling of the objects. The apparatus (1) comprises a holder (5) for the objects (2) and a mover (6) defining a movement path (7)

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(57) Abrégé(suite)/Abstract(continued):
for the holder (5). The movement path (7) includes a substantially straight-lined section (7a), which extends substantially perpendicular to the sheet plane, for picking up the object (2) by the holder (5).

Abstract

Described is an apparatus (1) for transferring sheet-type objects (2), which guarantees in a constructively simple manner a careful handling of the objects. The apparatus (1) comprises a holder (5) for the objects (2) and a mover (6) defining a movement path (7) for the holder (5). The movement path (7) includes a substantially straight-lined section (7a), which extends substantially perpendicular to the sheet plane, for picking up the object (2) by the holder (5).

(Fig. 1)

EP55030

Apparatus for transferring sheet-type objects

The invention relates to an apparatus for transferring sheet-type objects.

Sheet-type objects, such as carton and other packaging blanks, single sheets, plastic bags or the like, have to be handled with great care because, due to the small material strength of the sheet-type objects, even if, for example in case of a carton blank, they consist of two or multiple layers, there is the risk that the objects get damaged. This risk particularly exists if the objects are handled at high speeds, for example, in currently available packaging machines, e.g. in packaging machines for packing filled beverage bags in covering boxes.

The invention is based on the object to provide an apparatus, by means of which sheet-type objects can be transferred reliably also at a high speed.

This object is achieved with the features defined in claim 1.

The embodiment according to the invention makes sure that no lateral forces or shearing forces, respectively, are transferred from the holder to the object when the object is withdrawn, and that no friction occurs, which could damage the object or misalign it from its proper position.

The same advantages are obtained if the depositing of the object, too, is performed in a substantially straight-lined section.

Motions about axes are possible at high speed and with a reliable repeatability of the motion, and are therefore preferred for the present apparatus.

When using two axes, the straight-lined section can be realized in an easy manner in that the motion of the holder in the straight-lined section is performed about one of the axes only.

The rotary motion about both axes is preferably realized by a rocker arm and a rotor, wherein the rotor is provided with the holder. Preferably, the rotor is mounted on the rocker arm. The coupling of motions can, however, also be accomplished by other means.

The working speed of the apparatus according to the invention can be increased further if two holders are provided, which are arranged opposite each other, each with a distance towards their rotational axis.

Rocking and rotary motions may be adapted to the specific conditions and available space provided by the apparatus.

An embodiment of the invention will be explained in more detail below by means of the drawings. In the drawings:

Fig. 1 shows a schematic representation of the apparatus according to the invention,

Fig. 1A shows a perspective representation of the conveyor of Fig. 1, and

Fig. 2 – 11 show different procedural states during the operating procedure of the apparatus of Fig. 1.

Fig. 1 shows in a strongly schematic representation an apparatus 1 for transferring sheet-type objects 2 from a first location 3 to a second location 4. The apparatus 1 may be used for transferring the most various, flat, sheet-shaped objects in one or multiple layers, folded or unfolded or the like. In the embodiment shown, the apparatus 1 serves to transfer carton blanks for packing beverage containers, especially beverage bags.

The apparatus 1 may be provided to transfer the objects 2 between the most various handling devices, e.g. from a stock to a place of deposit. In the embodiment shown, the apparatus 1 serves to transfer the objects 2 from a magazine 3 to a conveyor 4

conveying them to a further processing stage, especially to a shaping or erecting machine 20 for cartons, which is represented schematically only.

In the magazine 3 the objects 2 are received substantially on edge, so as to limit the height of the stack and permit a user-friendly refilling of the magazine 3. The conveyor 4 comprises a belt conveyor with at least two individual belts 4a, 4b, which are placed in alignment side by side with a space A therebetween, perpendicular to the plane of projection of Fig. 1, with space A between them remaining free. As is shown in Fig. 1A, the individual belts 4a, 4b are embodied as chain conveyors, each having an endlessly rotating chain 40a and 40b, on which catches 41a and 41b are provided for gripping the trailing edges of the objects 2 from behind. At least one of the individual conveyors, in the embodiment shown conveyor 4b, can be displaced by a displacing means 42 to allow the adjustment of the space A, which serves the adaptation to different sizes of the objects 2.

The apparatus 1 comprises a holder 5, which is capable of automatically picking up and reliably transporting the objects 2 to be conveyed. In the embodiment shown, the holder 5 comprises one or more suction heads 5a, to which a vacuum can be applied and which pick up and hold the objects 2 by means of suction. The vacuum of the suction heads 5a is controlled separately. The holder 5 permits the handling of objects 2 over a large-format area (blank size) without retooling the apparatus 1.

The apparatus 1 further comprises a mover 6 for moving the holder 5 from the magazine 3 to the conveyor 4. The mover 6 is adapted to define a motion path 7 for the holder 5 and, thus, for the object 2 carried by the holder 5. The motion path 7 is composed of motions of the holder 5 about a first axis 8 and a second axis 9.

The mover 6 comprises a first carrier element 10, which has the form of an elongated rod and rotates about the first axis 8 provided in one end of the first carrier element 10. The carrier element 10 is constructed as a rocker arm of a crank mechanism 11 including a crank 11a (crank wheel) and a connecting rod 11b for a reciprocating motion H over an angular area α. The connecting rod 11b is connected to the crank 11a via a pivot point 11c and connects the periphery of the crank 11a to a portion of

the rocker arm 10 with a distance to the first axis 8. The crank 11a is driven in direction K by a first drive.

The mover 6 further comprises a second carrier element 12, which is provided with the holder 5. The second carrier element 12, too, is formed as an elongated rod and is rotatable about the second axis 9 in the direction of the arrow D, wherein said second axis 9 is disposed with a distance to the first axis 8 at the other end of the first carrier element 10. The second carrier element 12 is driven in the direction of rotation D by a second drive, which is controlled separately from the first drive of the first carrier element 10. In the embodiment shown, the second carrier element 12 is embodied as a rotor for a rotation (full rotation) in direction D about the second axis 9. Moreover, the second carrier element 12 is provided with two holders 5, which are arranged opposite each other, laterally reversed and with the same distance towards the axis 9. The second holder is of an identical design as the first holder.

The embodiment according to the invention allows a low construction with a deep level center of motion, so as to permit an ergonomic loading by arranging the magazine 3 on a low feeding height for the objects 2.

The operating mode of the apparatus 1 according to the invention shall be explained by means of Fig. 2 to 11, wherein Fig. 2 once again shows the position according to Fig. 1 at a reduced scale. Fig. 2 shows the starting position, in which one of the holders 5 is located at the magazine 3, in a position suitable for picking up an object 2. In this starting position, moreover, the crank mechanism 11 is in a position which defines the left reversal position H1 of the rocker arm 10, i.e. the crank 11a and the connecting rod 11b define a straight line, and the pivot point 11c of the connecting rod 11b on the crank 11a is located at the nearest point to the rocker arm 10.

If the holder 5 has picked up an object 2, the crank mechanism 11 is started and moves the crank 11a in the crank direction K in such a way that the pivot point 11c of the connecting rod 11b initially travels over an area which deviates only slightly from a parallel line towards the rocker arm 10, i.e. the rocker arm 10 initially performs a minimum motion in direction H out of the left end position H1. The motion thereby

takes place along direction H over a segment of the orbit of axis 9, which segment extends substantially perpendicular to the position of the object 2 in the magazine 3, which results in a substantially straight-lined section 7a of the motion path 7, which extends substantially perpendicular to the sheet-type object 2 in the magazine 3 or perpendicular to its sheet plane, respectively. In this way, no shearing or lateral forces, respectively, and no friction are exerted on the object 2 when withdrawing the object 2, which may cause damage to the object 2. The object 2 is rather lifted off exactly in the stack direction.

The term “substantially straight-lined” or “substantially rectangular” is to enclose slight curvatures resulting from that the radius of curvature of the orbit performed by the second axis 9 about the first axis 8 cannot be made infinitely large. The radius of curvature of the motion of the second axis 9 about the first axis 8 should, however, be chosen large enough to prevent, as was mentioned above, greater shearing forces from acting on the object.

If the holder 5 with the picked up object 2 is slightly spaced away from the succeeding object 2 in the stock 3, which is shown, for example, in Fig. 3., the drive of the second carrier element 12 is engaged and the second carrier element 12 starts rotating about the second axis 9, wherein the rocking motion H of the rocker arm 10 and the rotary motion D of the rotor 12 are overlapping. Thus, the holder 5 moves above the position between the two individual conveyor belts 4a, 4b of the conveyor 4, which is shown in Fig. 4, or above the conveyor 4, which is shown in Fig. 5, wherein the object 2, prior to its reaching the conveyor 4, passes through a flat, shortcutting curve. The second axis 9 then comes to a downward sloping segment of its orbit about the first axis 8, and the drive of the second carrier element 12 is stopped as soon as the object is positioned parallel to the conveyor 4, which is shown in Fig. 6. As the rocker arm 10 rotates further into the right end position H2, thus, the rotor 12 with the object moves in a next substantially straight-lined and substantially perpendicular section 7b of the movement path 7 downwards, until the object 2 lies on the conveyor 4 and the holder 5 is released, which is shown in Fig. 7, so that, in spite of the flat supply curve, the objects 2 are lowered substantially perpendicular.

Upon releasing the holder 5, the rocker arm 10 moves further downwards, while the drive for rotor 12 is still blocked, until the holder 5 is freed from the object 2, which is then conveyed on the conveyor 4 in the direction of the carton shaping and erecting machine 20, which is shown in Fig. 8. Upon reaching the right end position H2 (Fig. 9), the drive for the second carrier element 12 is engaged again, and the rocker arm 10 returns to the left end position H1. The rotating speed of the second carrier element 12 is thereby adjusted to the speed of the first carrier element 10 in such a way that now the second holder 5 is brought via the positions shown in Fig. 10 and 11 into the position shown in Fig. 1 and 2, i.e. into the withdrawal position at the stock 3. Then, the cycle described starts anew, this time with the second holder.

In a modification of the embodiment described and illustrated, the drive of the carrier elements may also be accomplished differently. The carrier elements, too, may have another shape than the elongated, rod-like one.

Claims

1. Apparatus (1) for transferring sheet-type objects (2), comprising a holder (5) for the objects (2) and a mover (6) defining a movement path (7) for the holder (5), wherein the movement path (7) includes a substantially straight-lined section (7a), which extends substantially perpendicular to the sheet plane, for picking up the object (2) by the holder (5).

2. Apparatus according to claim 1, characterized in that the movement path (7) includes a substantially straight-lined section (7b), which extends substantially perpendicular to the sheet plane, for depositing the object (2) by the holder (5).

3. Apparatus according to claim 1 or 2, characterized in that the movement path (7) of the holder (5) is composed of rotary motions about a first and a second axis (8, 9) being spaced away from each other.

4. Apparatus according to claim 3, characterized in that the motion of the holder (5) in the straight-lined section (7a, 7b) is performed about one of the axes (8) only.

5. Apparatus according to claim 3 or 4, characterized in that the mover (6) comprises a first carrier element (10) movable about the first axis (8) and a second carrier element (12) movable about the second axis (9) and provided with the holder (5).

6. Apparatus according to one of claims 3 to 5, characterized in that the second axis (9) is disposed on the first carrier element (10) with a distance to the first axis (8).

7. Apparatus according to claim 5 or 6, characterized in that the second carrier element (12) comprises two holders (5), which are arranged on opposite sides of the second axis (9).

8. Apparatus according to one of claims 5 to 7, characterized in that the second carrier element (12) is embodied as a rotor for a full rotation (D) about the second axis (9).

9. Apparatus according to one of claims 5 to 8, characterized in that the first carrier element (10) is embodied as a rocker arm for a reciprocating rocking motion (H) about the first axis (8).

10. Apparatus according to one of claims 5 to 9, characterized in that the motions of the first and second carrier elements (10, 12) can be controlled independently of each other.

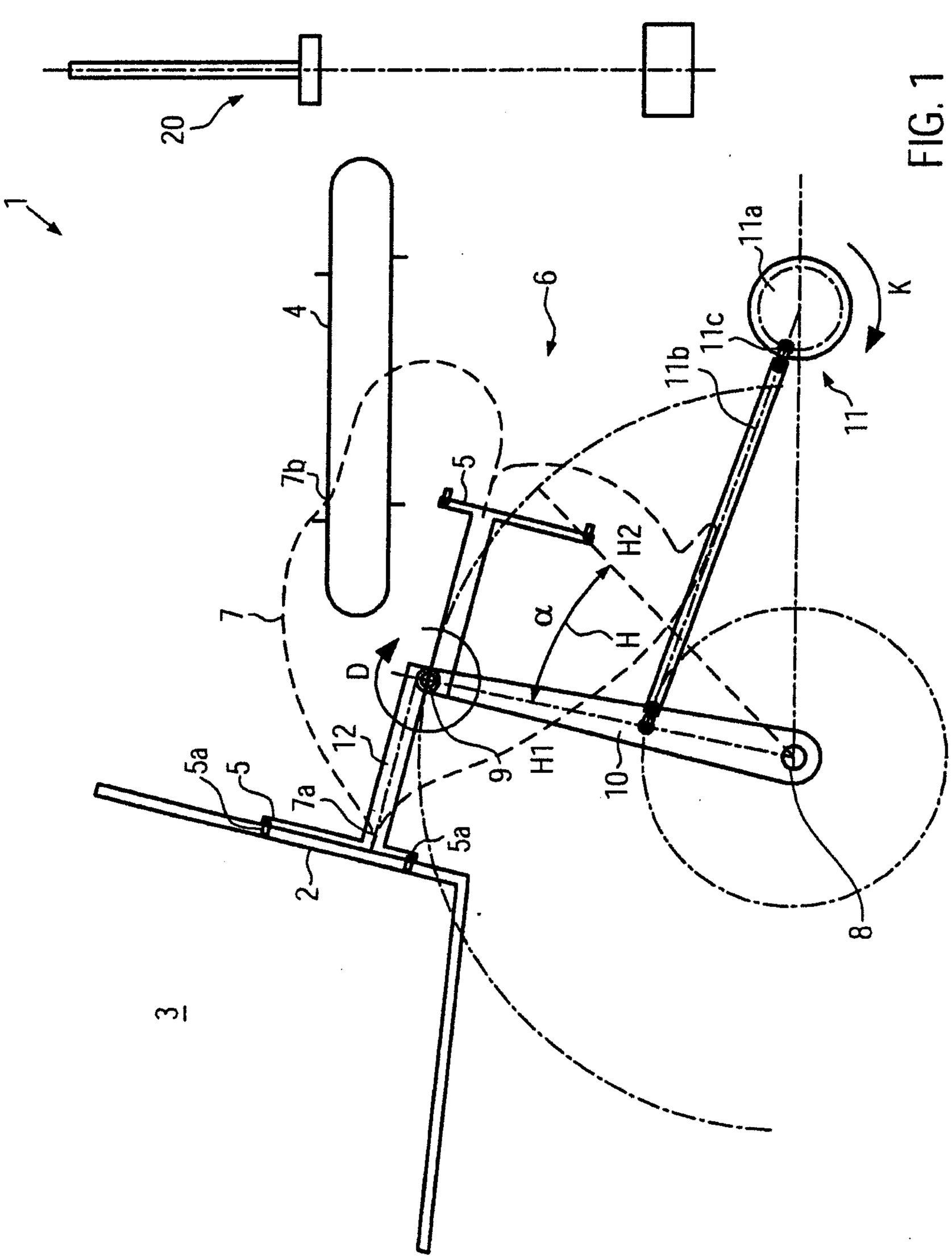


FIG. 1

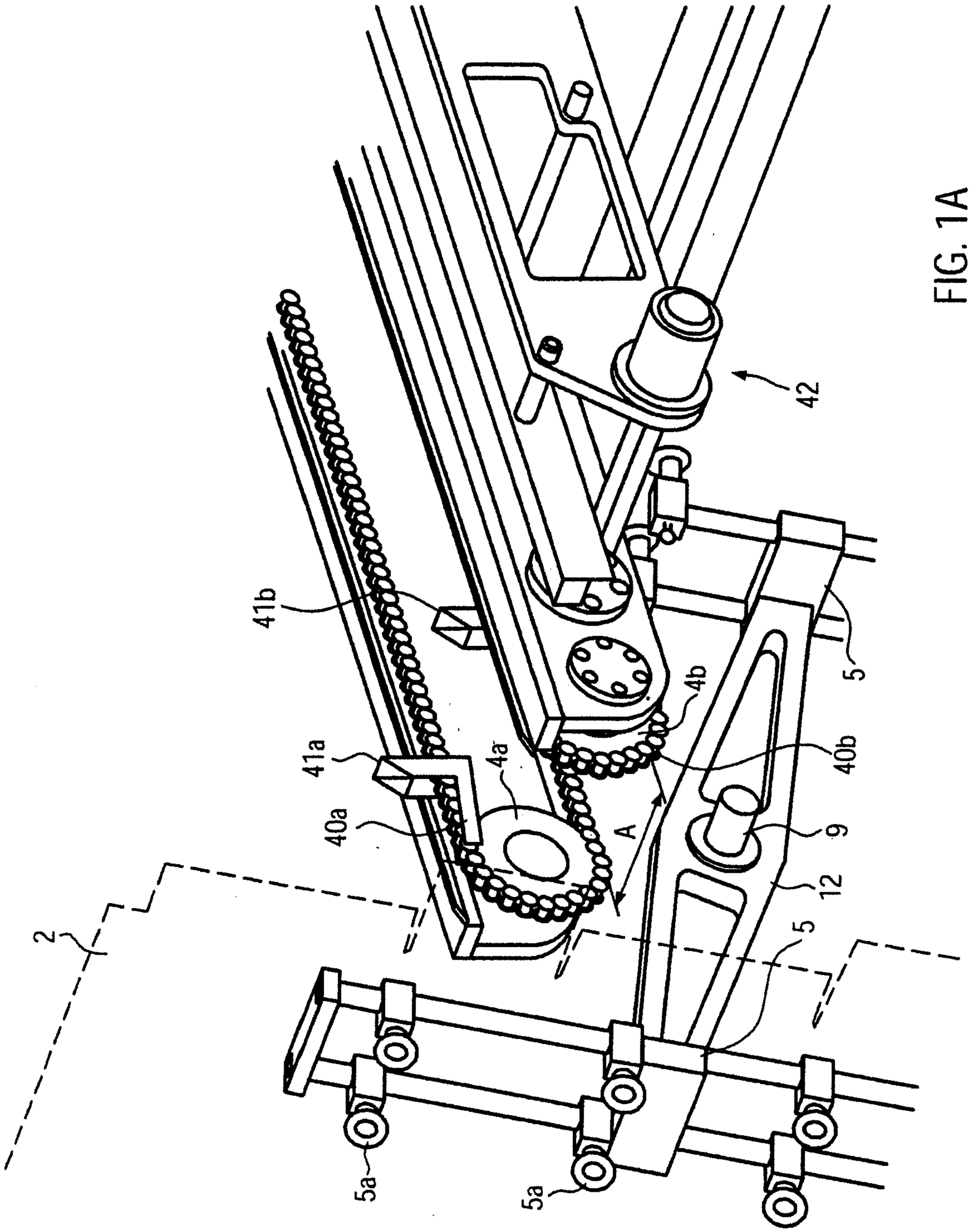


FIG. 1A

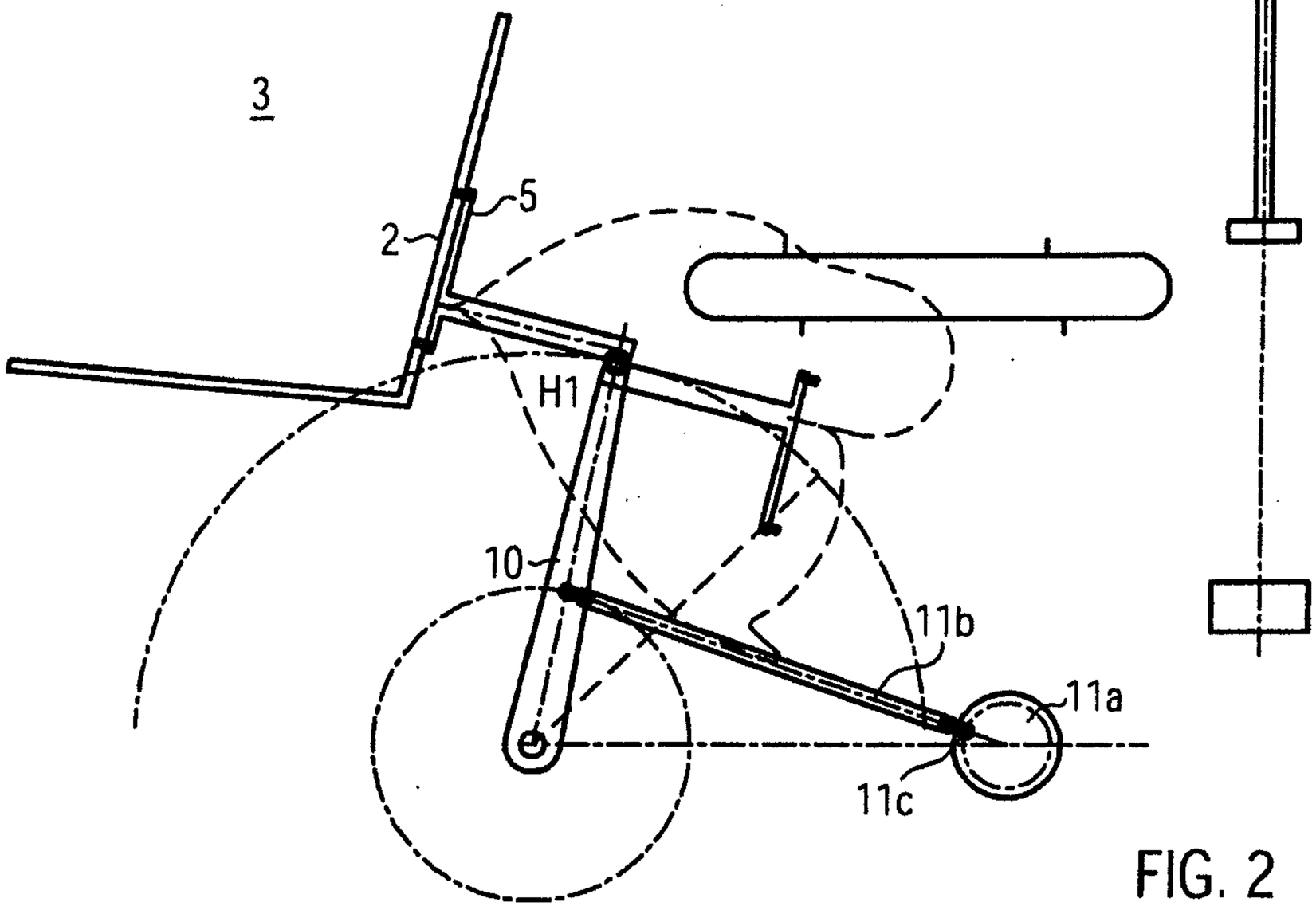


FIG. 2

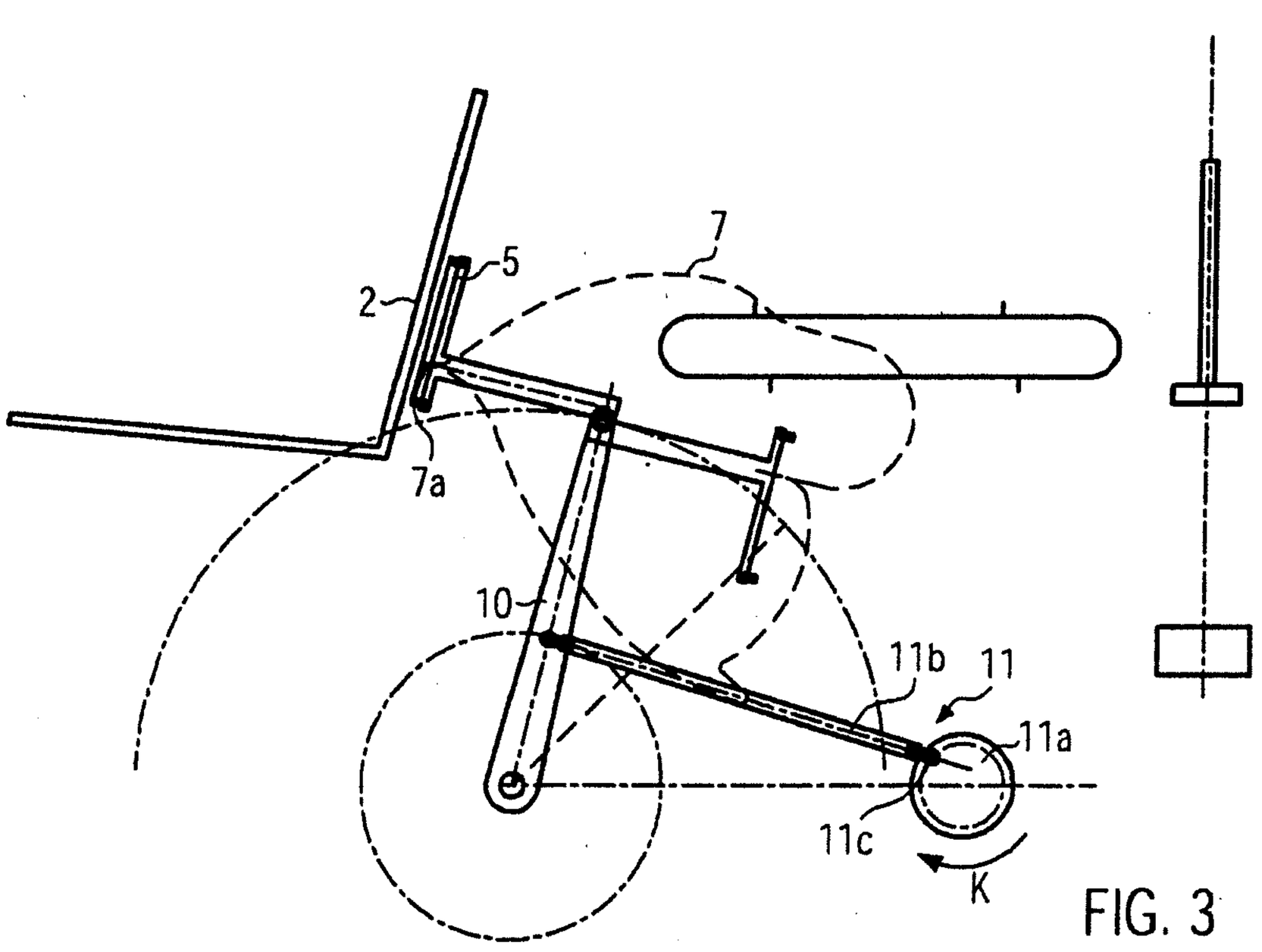


FIG. 3

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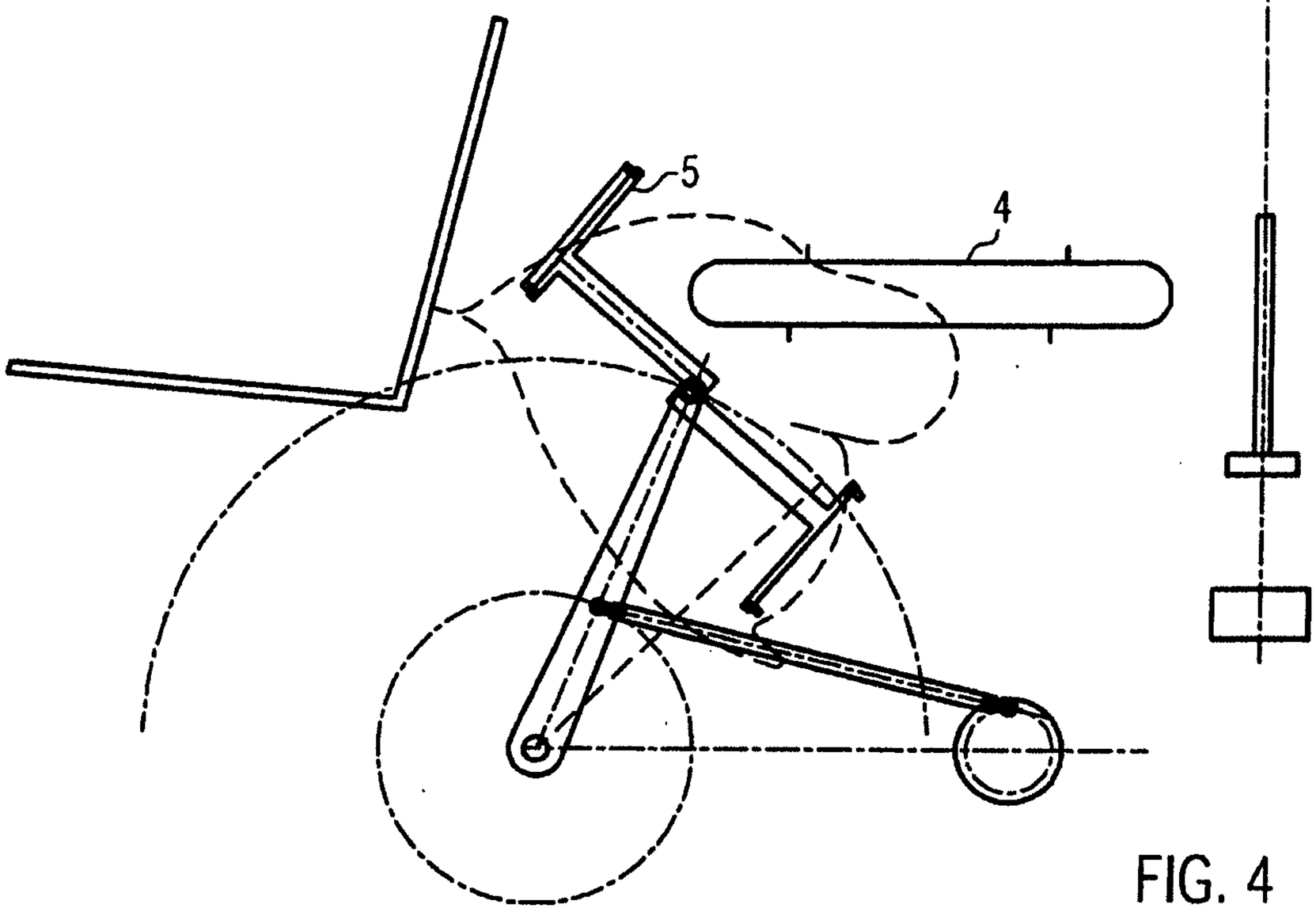


FIG. 4

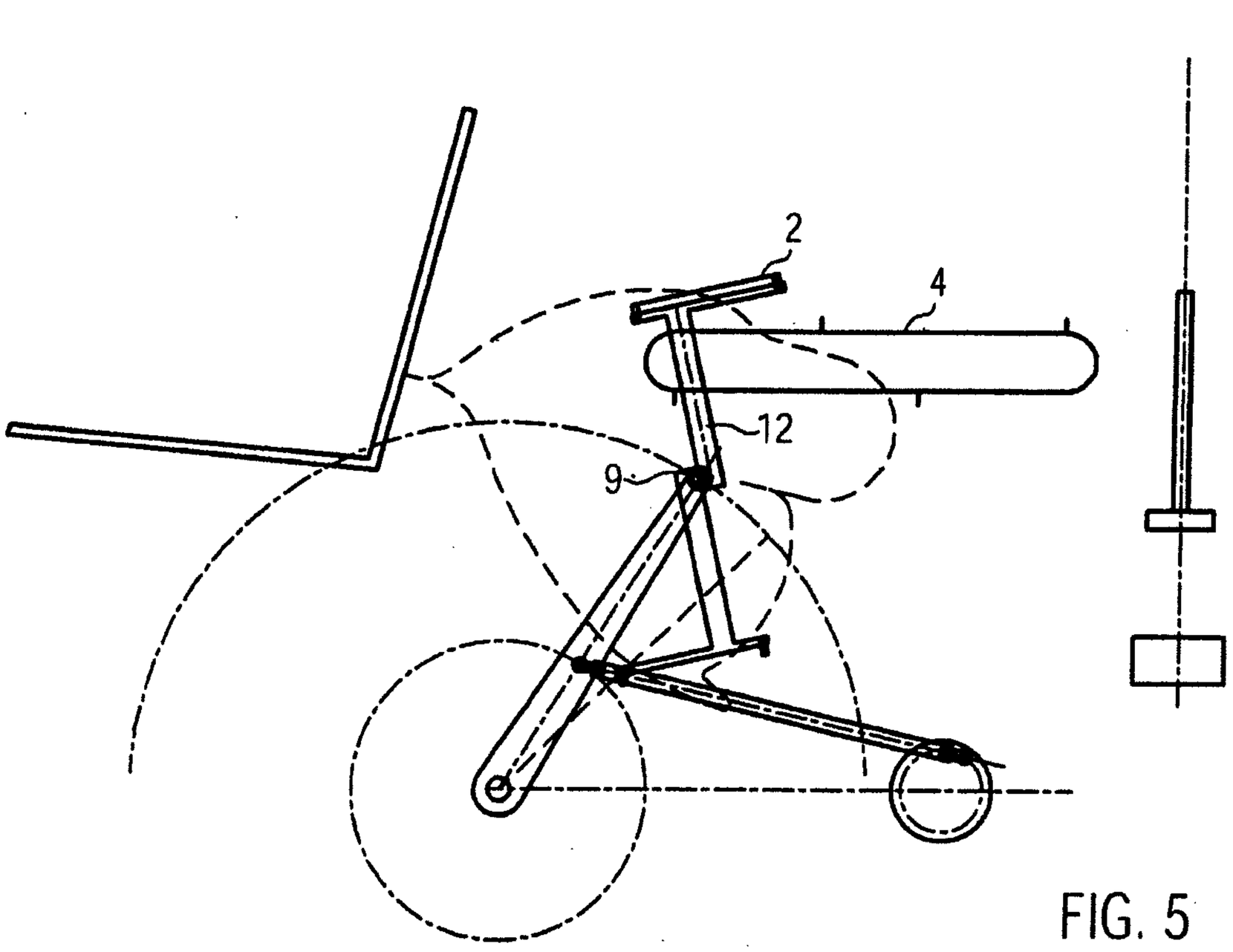


FIG. 5

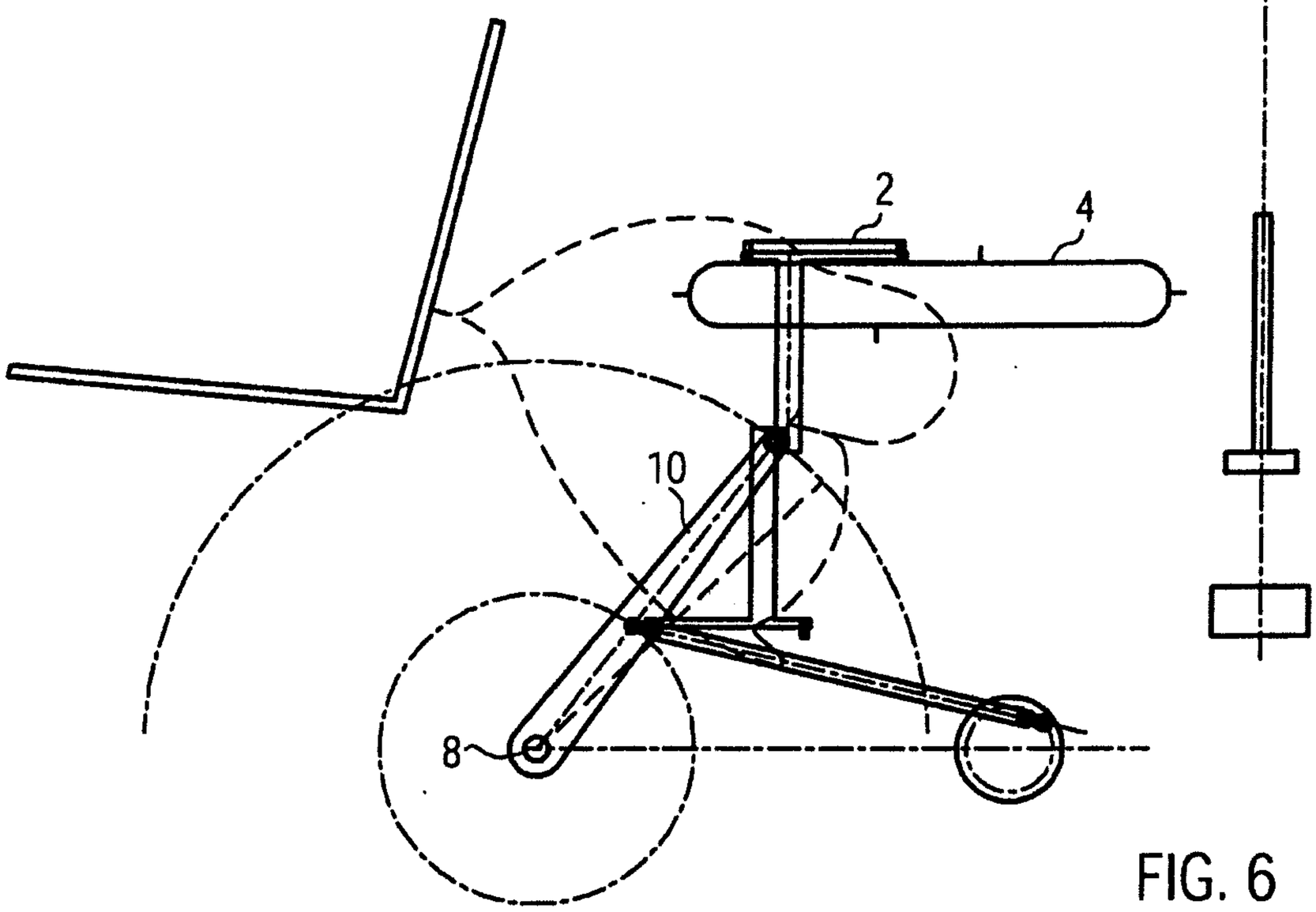


FIG. 6

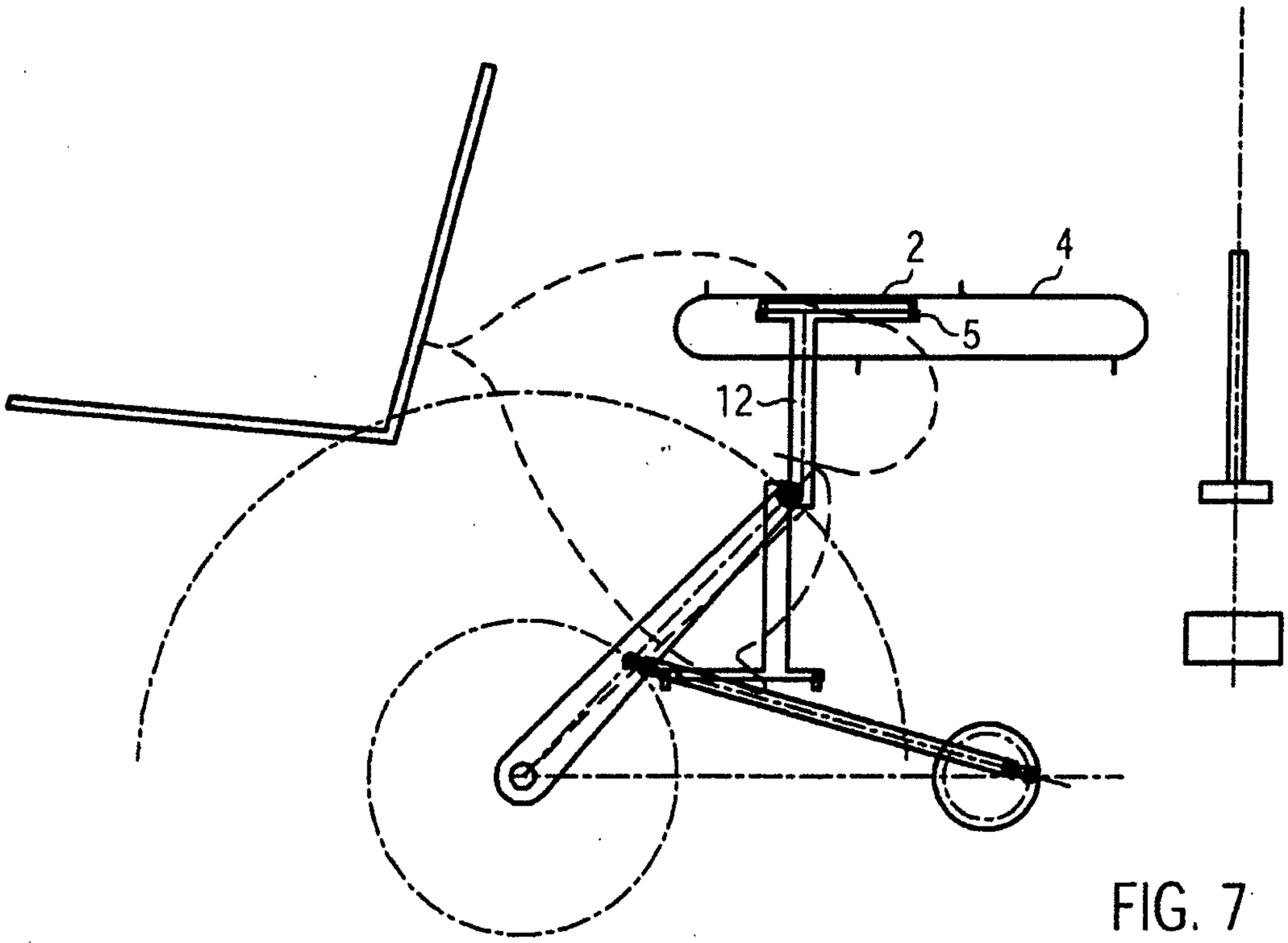


FIG. 7

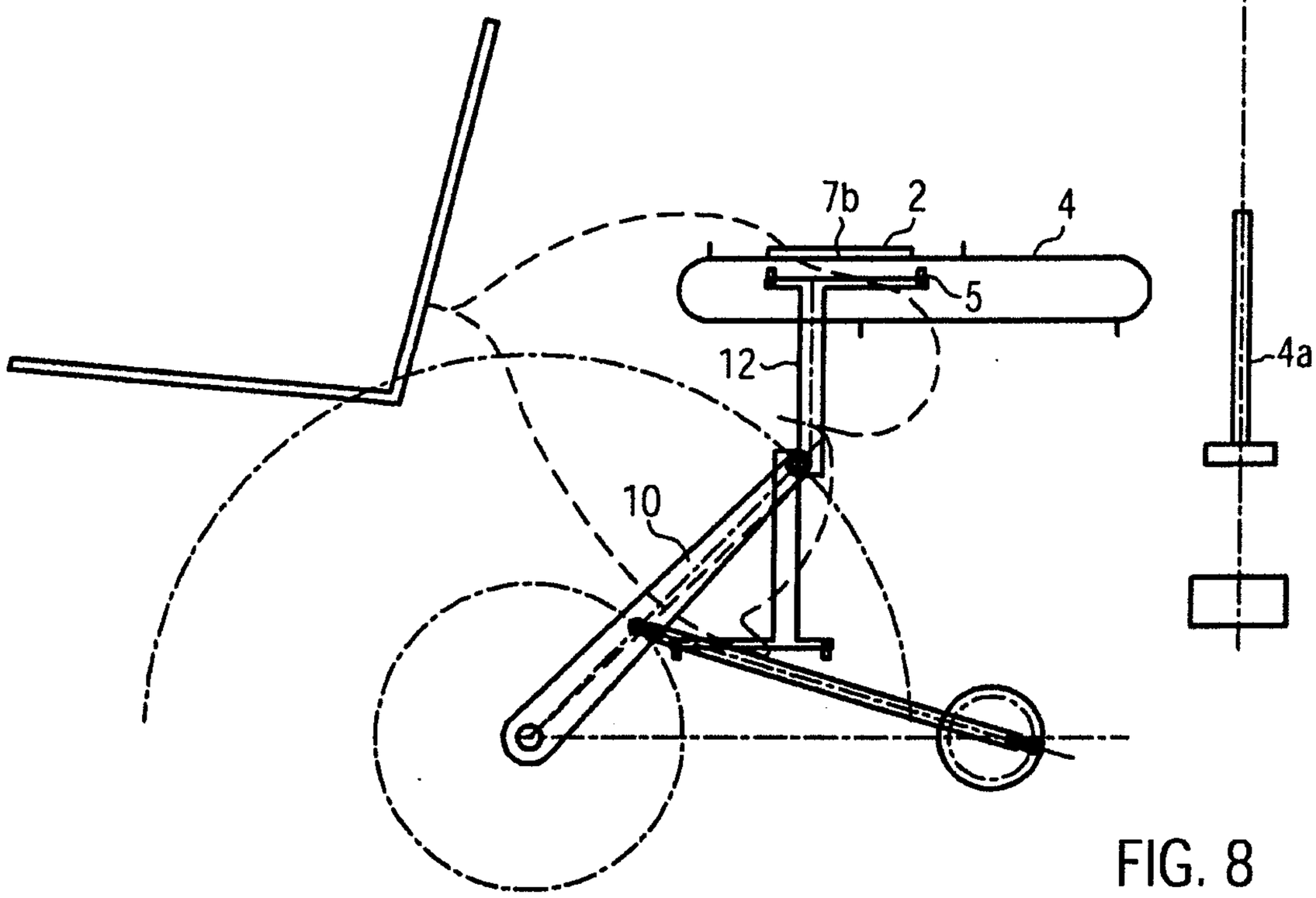


FIG. 8

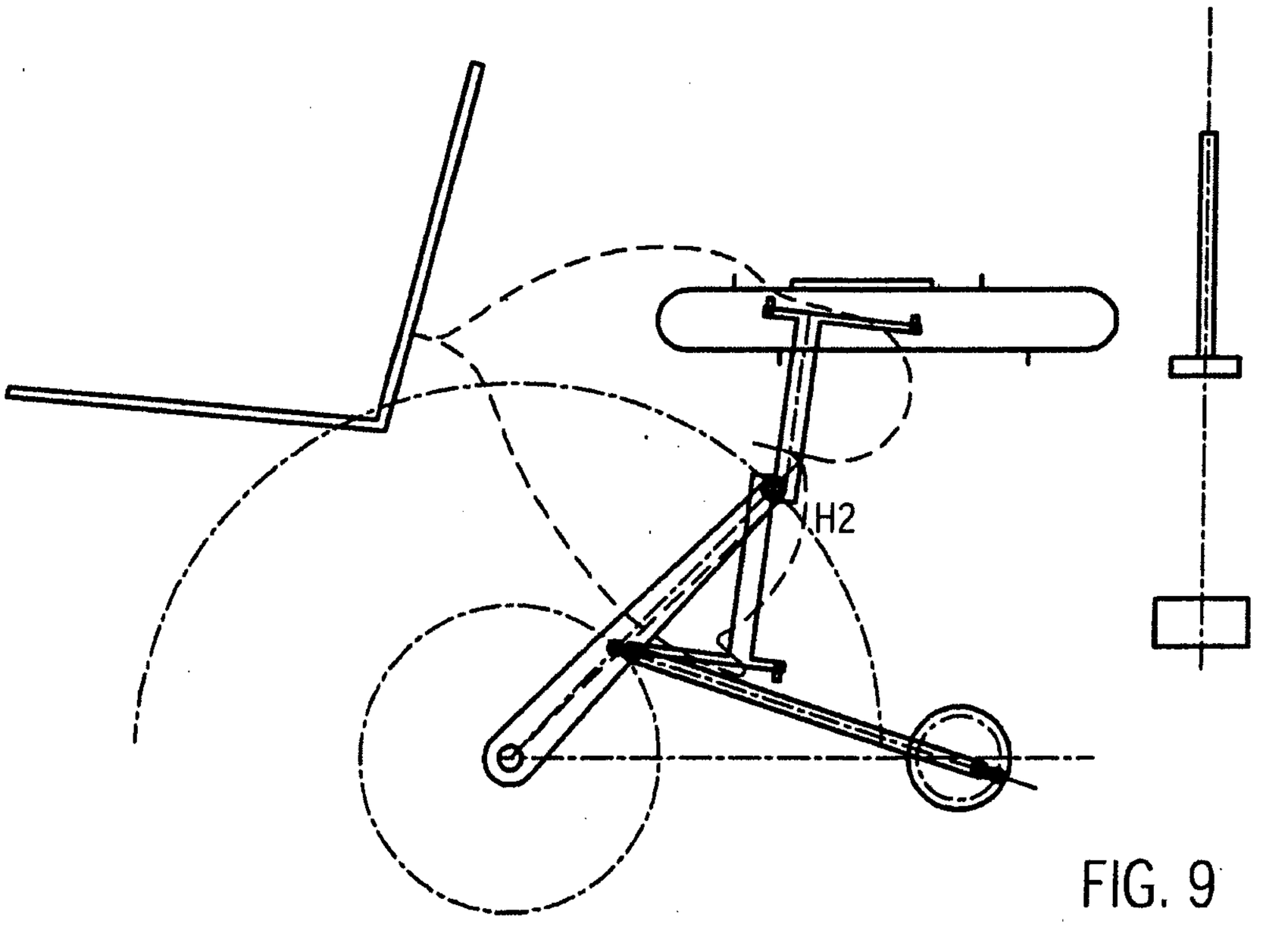


FIG. 9

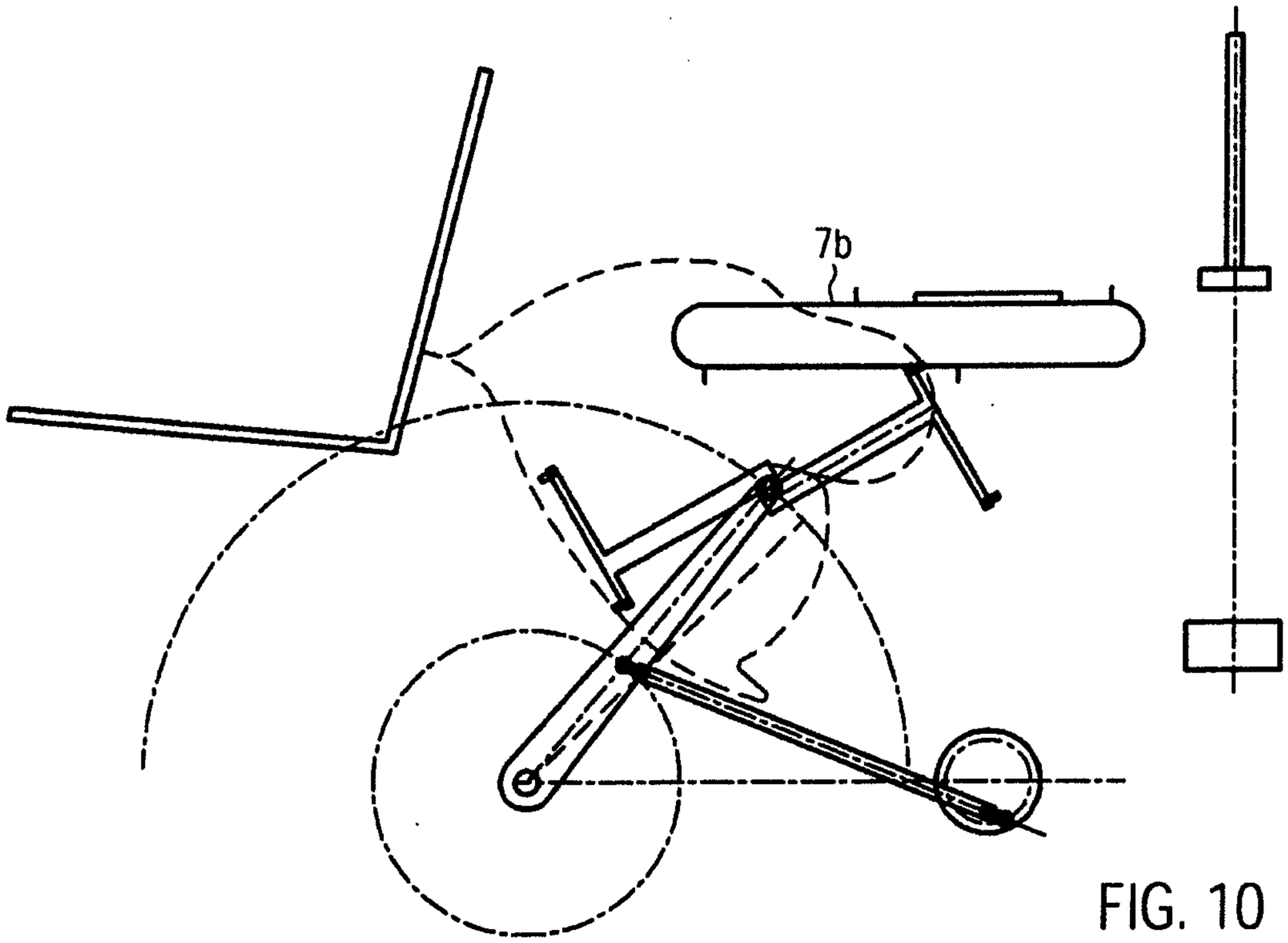


FIG. 10

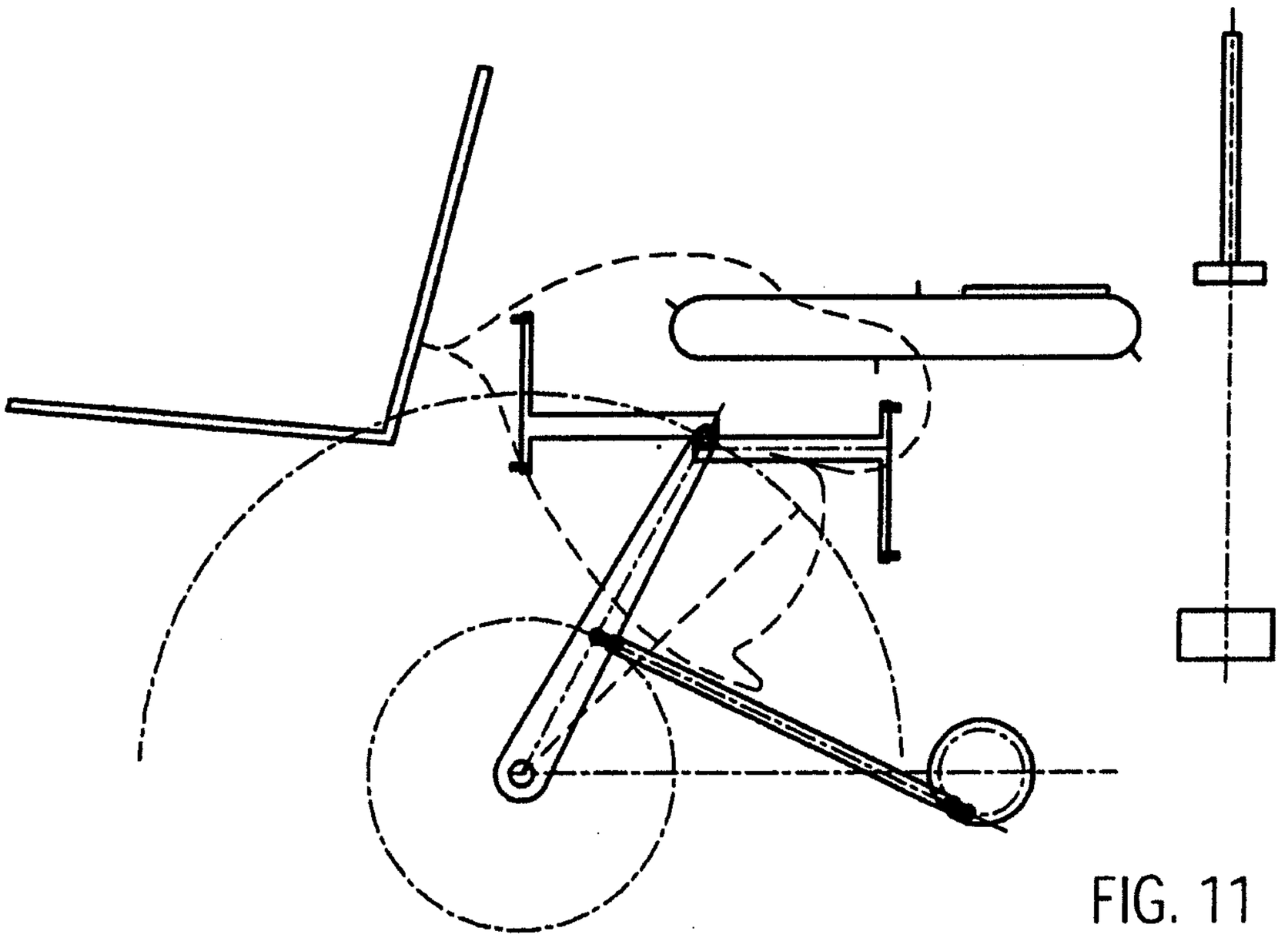
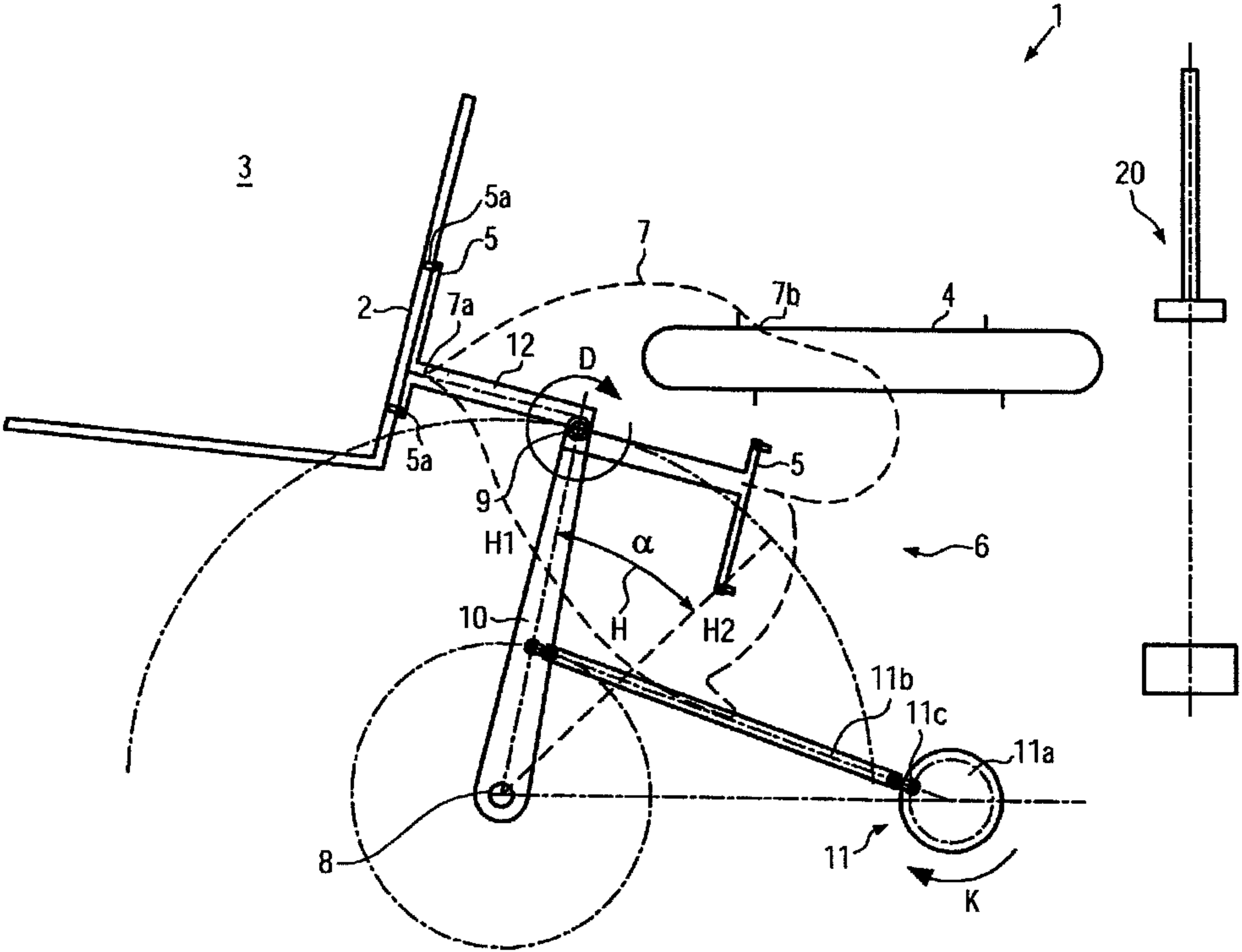


FIG. 11


1
3
20
5a
5
7
2
7a
7b
4
12
D
5a
5
9
H1
α
6
10
H
H2
11b
11c
11a
8
11
K