

⑫ **EUROPEAN PATENT APPLICATION**

⑲ Application number: 86105503.6

⑤① Int. Cl.⁴: **E 05 F 15/04**
E 05 D 15/44

⑳ Date of filing: 21.04.86

⑳ Priority: 02.05.85 IT 1516585 U

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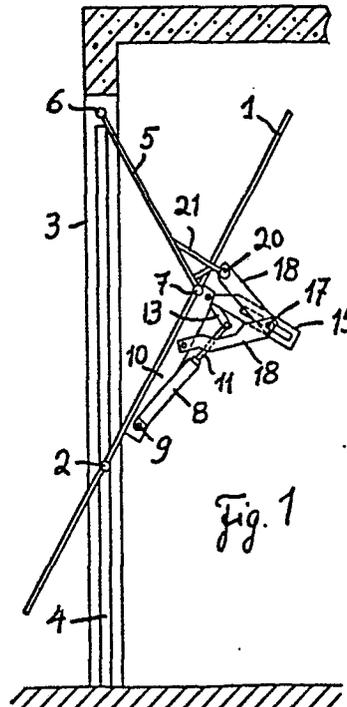
④③ Date of publication of application:
05.11.86 Bulletin 86/45

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⑥④ Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

⑤④ Driving device for a door with a wing being pivotable around an intermediate horizontal pivot.

⑤⑦ A driving device for a door with a wing (1) being pivotable around an intermediate horizontal pivot (2) which is so guided as to be vertically slidable along fixed lateral uprights (3), while a pivotable guiding arm (5) is provided on at least one side of the wing, and has one end (6) pivotally connected to the upper part of the respective fixed upright (3), and its opposite end (7) pivotally connected to the door wing (1), at a point that is eccentric to the horizontal pivot (2) around which the wing is pivotable, characterized in that it is placed between at least one of the lateral pivotable guiding arms (5) and the door wing (1), and comprises a hydraulic or pneumatic cylinder (8, 11) and a mechanism (13, 15, 17, 18) which is adapted for converting the rectilinear movement of the cylinder (8, 11) into a relative angular movement over about 180° of the lateral pivotable guiding arm (5) and the door wing (1).



1 Mario PASTORE, at Genoa, Italy

5 "Driving device for a door with a wing being pivotable around an intermediate horizontal pivot".

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The object of the invention is a driving device for a door with a wing being pivotable around an intermediate horizontal pivot which is so guided as to be vertically
15 slidable along fixed lateral uprights, for example, of a fixed doorframe, while a pivotable guiding arm is provided on at least one side of the wing, and has one end pivotably connected to the upper part of the respective fixed upright, and the opposite end pivotally connected to the door wing,
20 at a point which is eccentric to the pivot around which the wing is pivotable. The doors of this type are generally used for garages, carports, and the like, but they may be also applied for any other purpose. These doors are usually called overhead doors or pivotable gates.

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The device according to the invention is substantially characterized by the feature that it is placed between at least one of the lateral pivotable guiding arms and the door wing, and comprises a hydraulic or pneumatic cylinder
30 and a mechanism which is adapted for converting the rectilinear

1 movement of said cylinder into a relative angular movement
over about 180° of the lateral pivotable guiding arm and
the door wing.

5 Preferably, in one preferred embodiment of the
invention, the mechanism associated with each hydraulic or
pneumatic cylinder comprises a pivotable actuating arm which
is fulcrumed about the wing, and which, by means of the
cylinder can be angularly moved relatively to the said
10 wing, while along the said pivotable actuating arm there is
slidably guided the articulated joint between two V-arranged
levers, of which one is pivotally connected to the door
wing, and the other is pivotally connected to the respective
lateral pivotable guiding arm.

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The pivots for all the fulcra, the articulated
joints, and the pivotal connections as above disclosed,
are parallel to the pivot around which the door wing is
pivotable.

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Thus, by the driving device according to the
invention, the door is opened and closed by promoting
through the cylinder a relative angular movement of the
door wing and the lateral pivotable wing-guiding arm or
25 arms, between a relative opened position in which the door
wing is located in a substantially horizontal upper position
and the lateral pivotable guiding arm or arms are
substantially parallel to the wing and are situated on one
side of their pivotal connection to said wing, and a
30 relative closed position in which the door wing is located

1 in a substantially vertical position and the guiding arm
or arms are substantially parallel to the wing but are
situated, after a rotation of 180° relatively to the wing,
on the opposite side of their pivotal connection to said
5 wing. Therefore, according to the invention, the door is
opened and closed by angularly moving the lateral pivotable
wing-guiding arm or arms over about 180° relatively to the
wing, i.e., by applying the closing and opening force
between the said lateral pivotable guiding arm or arms
10 and the wing, by means of at least one hydraulic or
pneumatic cylinder, the rectilinear movement of which is
converted through any suitable mechanism into the said
relative angular movement of the door wing and the lateral
pivotable guiding arm or arms..

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The driving device according to the invention has
the property that the said conversion of the rectilinear
movement of the cylinder into a relative angular movement
of the door wing and the lateral pivotable guiding arm or
20 arms is effected with a minimum space being occupied and
with a very simple construction, and yet a relatively
constant torque (and so a corresponding force on the wing)
is produced for all the travel between the opened and the
closed position, and viceversa.

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The particular features of the invention and the
advantages arising therefrom will clearly appear in the
detailed description made by referring to the annexed
drawings, in which:

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1 Figures 1 and 2 are side elevational views diagram-
matically showing a door provided with the driving device
according to the invention, in two different positions
during the door opening and closing movement, which are near
5 to the end positions;

 Figure 3 is a view in an enlarged scale showing
the driving device according to the invention in the
position corresponding to the position shown in Figure 2.
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 In the Figures, numeral 1 denotes a door wing which
is pivotable around an intermediate horizontal pivot 2
located, for example, substantially at a distance from the
bottom end of wing 1, which corresponds to one-third of the
15 height of said wing 1. This horizontal pivot 2 around which
the wing is pivotable, is so guided as to be vertically
slidable in guides 4 along fixed lateral uprights 3, that
may be the jambs of the fixed doorframe. On each side of
wing 1 a pivotable guiding arm 5 is provided between this
20 wing and the respective upright 3, and is pivotally connected
at 6 to the upper part of the respective upright 3, while
at 7 it is pivotally connected to the door wing 1, for
example at a point in which the distance from the top end
of the door wing substantially corresponds to one-third of
25 the height of said wing 1.

 The doors of this type are known, and are also
called overhead doors or pivotable gates. In closed position,
both the wing 1 and the two lateral pivotable guiding arms
30 5 are set in a substantially vertical position, and are

1 parallel to each other. The lateral pivotable guiding arms
5 are located in correspondence of the upper part of wing 1,
i.e., over the point 7 of their pivotal connection to the
said wing 1. In opened position, both the wing 1 and the
5 lateral pivotable guiding arms 5 are set in a substantially
horizontal, parallel position in the upper part of the door
opening. The lateral pivotable arms 5 are however situated
on the opposite side to the point 7 of their pivotal
connection to the door wing 1, i.e., they perform a rotation
10 over 180° relatively to the said wing, as they pass from
the closed to the opened position, and vice-versa.

According to the invention, for opening and closing
the pivotable doors of the above-disclosed type, a hydraulic
15 or pneumatic cylinder 8 is provided on at least one side of
the door wing 1, and is pivotally connected at 9 to a flange
10 which is integral with the said wing 1. The stem 11 of
said cylinder 8 is pivotally connected at 12 to a lever arm
13 which is fulcrumed at 14 about the flange 10 being
20 integral with the door wing 1. At the same point 14, also
a pivotable actuating arm 15 is fulcrumed about the flange
10 and is rotated together with the lever arm 13, the two
arms 13 and 15 being, for example, keyed onto the same
pivot pin 14. In the pivotable actuating arm 15 a
25 longitudinal slot 16 is provided, along which there is
slidably guided the articulated joint 17 between two levers
18 that are pivotally connected, the one at 19 to the flange
10 which is integral with the door wing 1, and the other
at 20 to an extension 21 of the respective lateral pivotable
30 guiding arm 5.

1 In the closed position of the door wing 1, the stem
11 of cylinder 8 is retracted, and the articulated joint
17 between the two levers 18 is situated in the guide slot
16 toward the free end of the pivotable actuating arm 15.
5 To open the door, the stem 11 of cylinder 8 is pushed
outwardly, thus causing the arm 13 and then also the
actuating arm 15 to pivot about their fulcrum 14, and thus
promoting through the scissors formed by the two levers 18,
a relative angular movement of the wing 1 and the respective
10 lateral pivotable guiding arm 5, so that this arm is
angularly moved over 180° from its position at the side of
the upper part of wing 1 to its position at the side of the
median part of said wing 1, i.e., on the opposite side to
the articulation 7. Owing to this relative angular movement
15 of the lateral pivotable guiding arm 5 and the door wing 1,
this wing is moved from its closed to its opened position,
while the articulated joint 17 between the two levers 18
is moved along the longitudinal slot 16 in the actuating
arm 15, away from the free end thereof. The door wing 1 is
20 similarly moved from its opened to its closed position,
when the stem 11 of cylinder 8 is retracted.

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CLAIMS

1. A driving device for a door with a wing (1) being pivotable around an intermediate horizontal pivot (2) 5 which is so guided as to be vertically slidable along fixed lateral uprights (3), while a pivotable guiding arm (5) is provided on at least one side of the wing, and has one end (6) pivotally connected to the upper part of the respective fixed upright (3) and its opposite end (7) pivotally 10 connected to the door wing (1), at a point that is eccentric to the horizontal pivot (2) around which the wing is pivotable, characterized in that it is placed between at least one of the lateral pivotable guiding arms (5) and the door wing (1), and comprises a hydraulic or pneumatic 15 cylinder (8, 11) and a mechanism (13, 15, 17, 18) which is adapted for converting the rectilinear movement of the cylinder (8, 11) into a relative angular movement over about 180° of the lateral pivotable guiding arm (5) and the door wing (1).

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2. The device according to Claim 1, characterized in that the mechanism which is associated with the hydraulic or pneumatic cylinder (8, 11) comprises a pivotable actuating arm (15) which is fulcrumed about the wing (1), 25 and can be angularly moved relatively to this wing by means of said cylinder (8, 11), while along the said pivotable actuating arm (15) there is slidably guided the articulated joint (17) between to V-arranged levers (18), of which one is pivotally connected to the door wing (1), and the other 30 is pivotally connected to the respective lateral pivotable

1 guiding arm (5).

3. The device according to Claim 1 and 2, characterized in that the hydraulic or pneumatic cylinder (8, 11) 5 has one end pivotally connected at a fixed point (9) to the door wing (1), and has the opposite end pivotally connected at a point (12) on an intermediate lever (13) which is pivotably fulcrumed about a point (14) on the door wing (1), and is integral with one of the two v+arranged, articulatingly 10 connected levers (18).

4. The device according to the preceding Claims, characterized in that the fulcrum 9 about which one end of the hydraulic or pneumatic cylinder (8, 11) is pivotally 15 connected, the fulcrum (14) of the intermediate lever (13), and the fulcrum (19) of one of the two V-arranged levers (18), are provided eccentrically to the plane of the wing (1), on a flange (10) which is integral with the said wing (1).

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5. A driving device for a so-called overhead door or pivotable gate, having a wing which is pivotable around an intermediate horizontal pivot, and being particularly adapted for garages, carports, and the like, substantially 25 as shown, as described, and for the aforementioned purposes.

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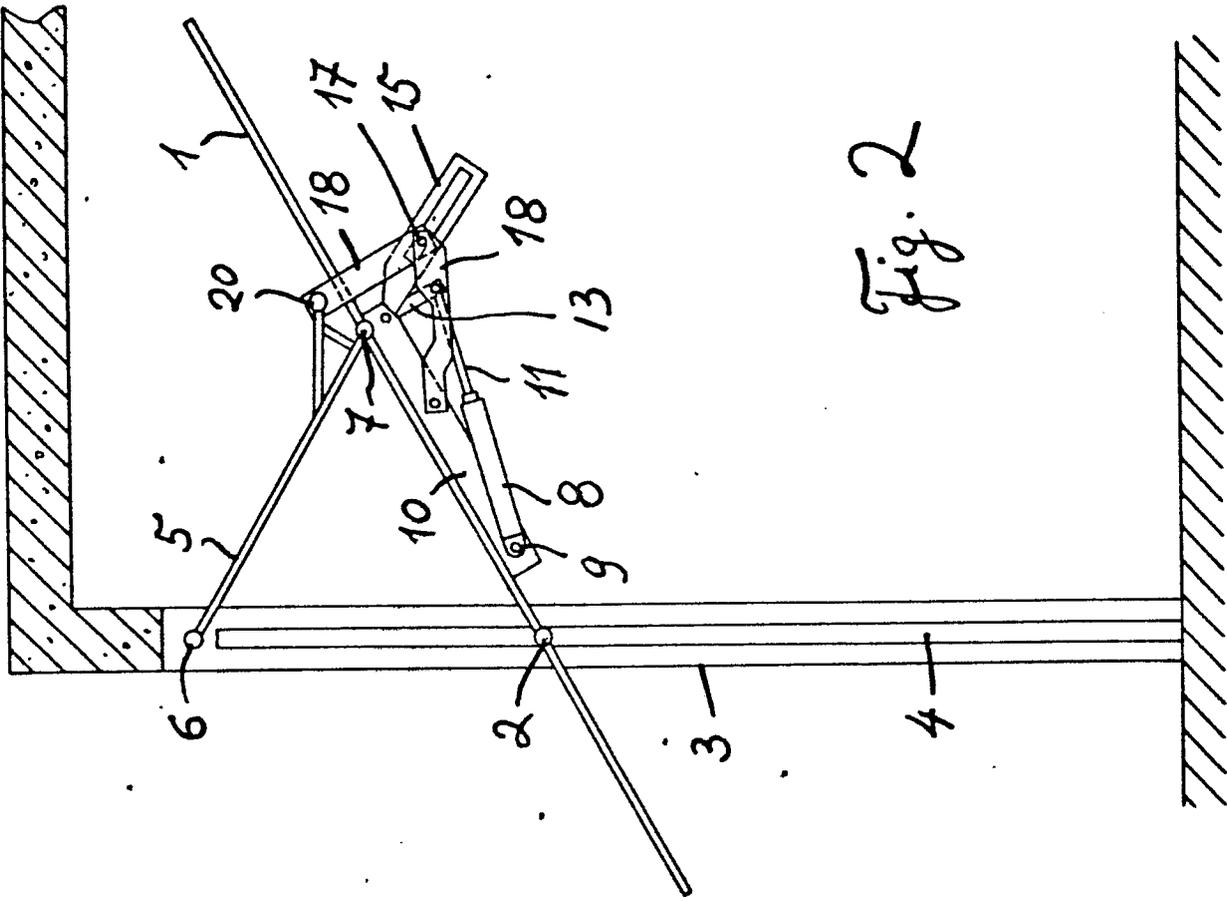


Fig. 2

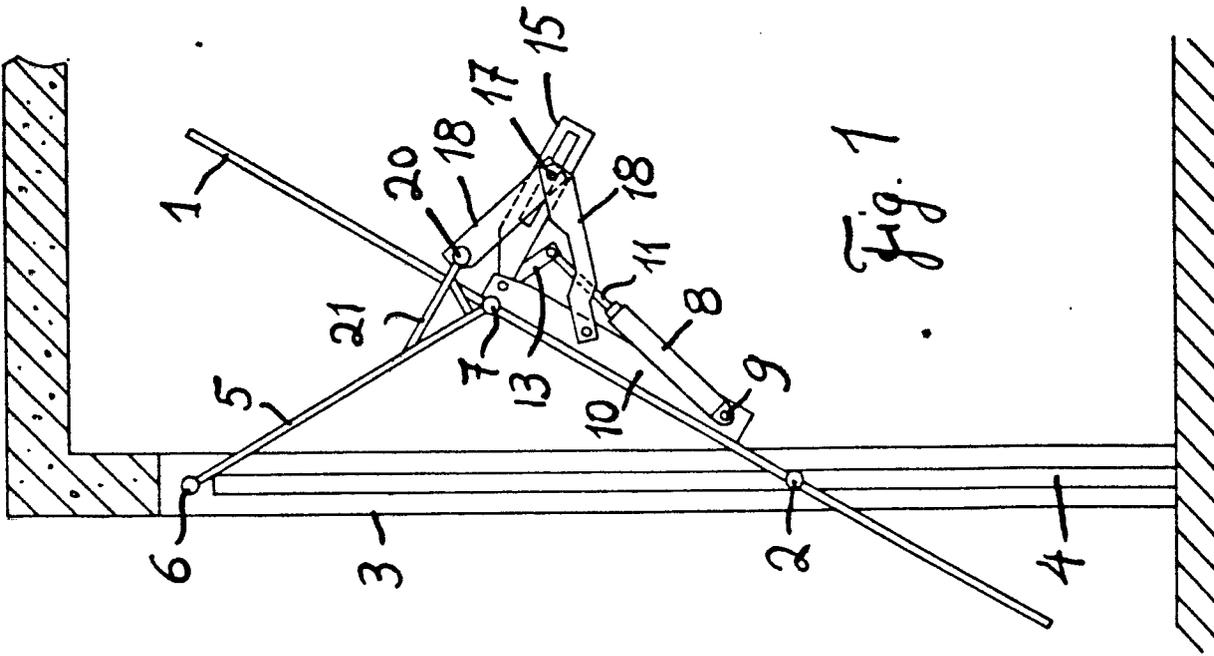


Fig. 1

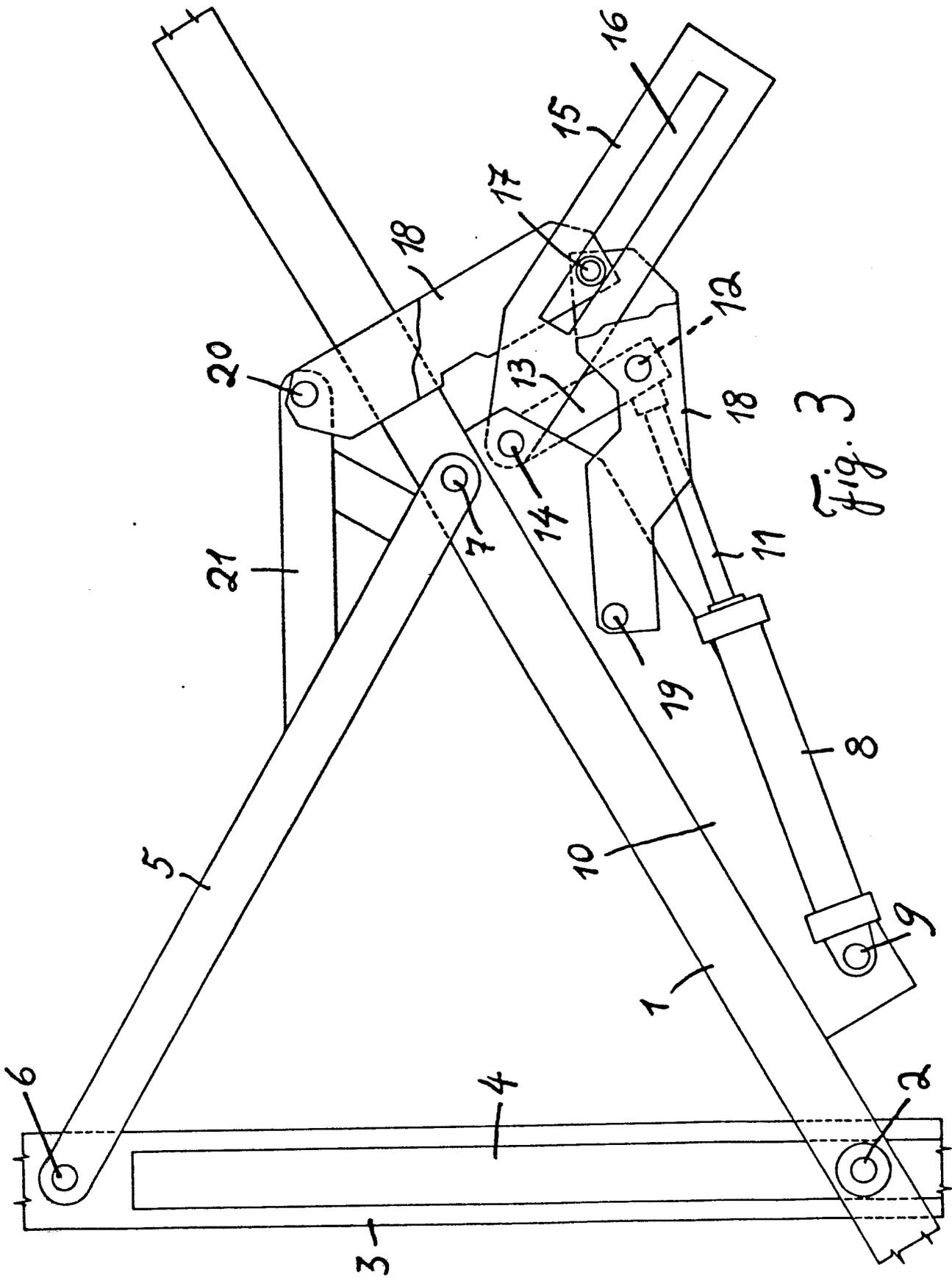


Fig. 3