Jan. 16, 1968 J. RITTER ET AL 3,363,474

STRAIGHT GUIDING DEVICE

Filed July 7, 1965 3 Sheets-Sheet 1

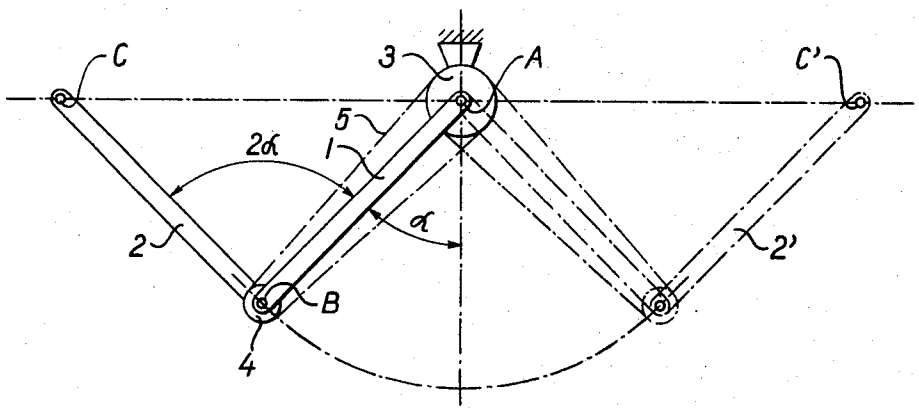

Fig. 1

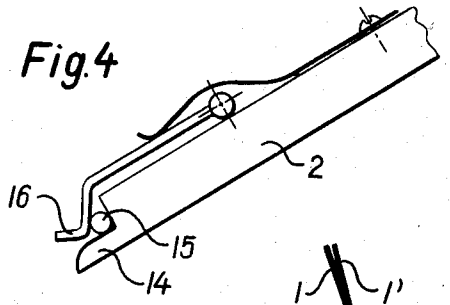

Fig. 4

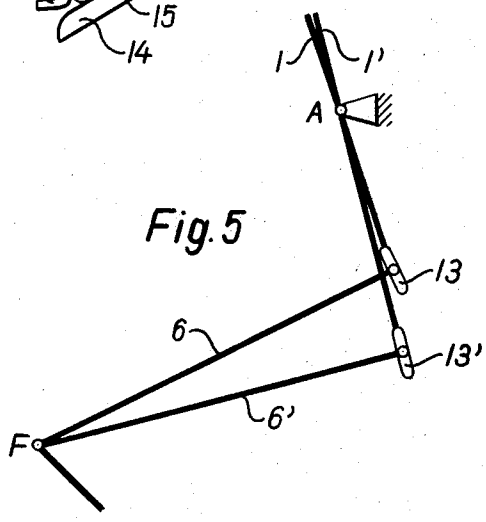

Fig. 5

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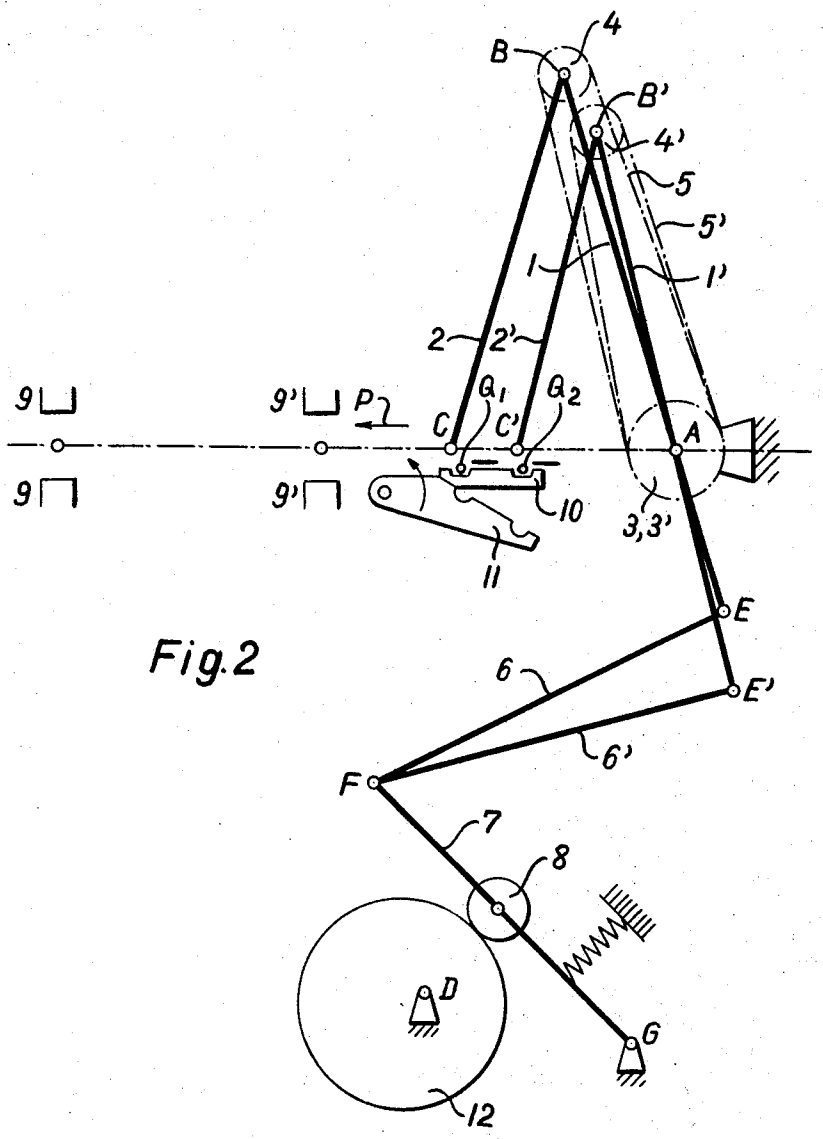

Fig.2

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STRAIGHT GUIDING DEVICE

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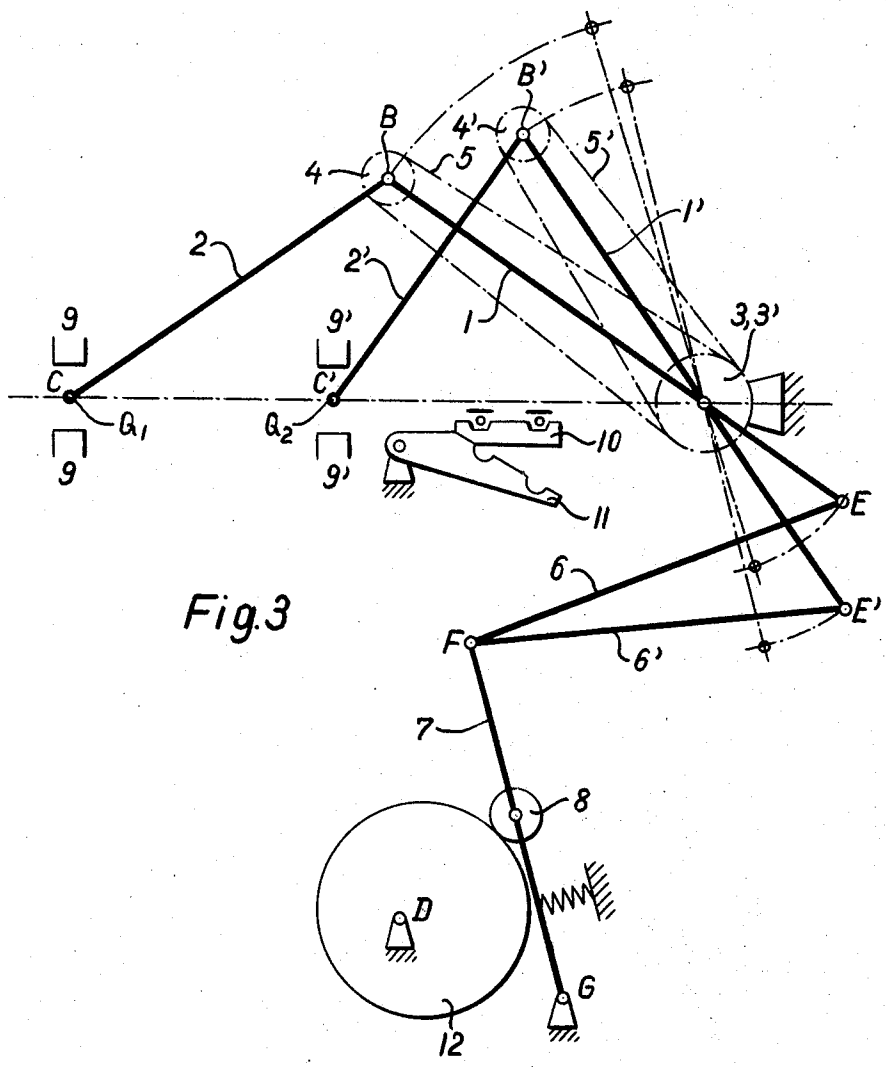

Fig.3

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United States Patent Office 3,363,474 Patented Jan. 16, 1968

3,363,474

STRAIGHT GUIDING DEVICE

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Filed July 7, 1965, Ser. No. 470,291
Claims priority, application Austria, July 8, 1964, A 5,886/64
3 Claims. (Cl. 74—52)

ABSTRACT OF THE DISCLOSURE

A straight guiding device has a first arm pivoted between its ends, a second arm pivoted to one end of the first arm, and cam operated drive means connected to the other end. Guide means are provided between the first and second arms so that when the drive means tilt the first arm, the second arm will be tilted oppositely sufficiently so that its free end will describe a straight line.

The invention relates to straight guiding devices, and relates more particularly to straight guiding devices of the type wherein a main lever is tiltably movable about a fixed point and carries on its free end an auxiliary lever with which it is so connected that the tilting movement of the main lever will cause an angularly opposite tilting movement of the auxiliary lever. The free end of the auxiliary lever will describe a rectilinear movement.

Straight guiding devices heretofore used were of two kinds, namely one wherein the drive connection between two levers was carried out by means of a parallelogram and gearing, and the other by means of a parallelogram and connecting rods. The former had the disadvantage that the backlash of the gears which worsened with wear did not readily admit of adjustment, so that with increased use the predetermined angular displacement between the levers differed increasingly from its theoretical value. The latter construction, while not so much subject to wear, was complex and expensive, and did not admit of adjustment.

It is accordingly among the principal objects of the invention to provide a straight guiding device which avoids all of the aforesaid drawbacks of the prior art.

It is a further object of the invention to provide for a straight guiding device which dispenses with any parallelogram linkage, and is easily adjustable and subject to but little wear.

Further objects and advantages of the invention will be set forth in part in the following specification and in part will be obvious therefrom without being specifically referred to, the same being realized and attained as pointed out in the claims hereof.

With the above and other objects of the invention in view, the invention consists in the novel construction, arrangement and combination of various devices, elements and parts, as set forth in the claims hereof, one embodiment of the same being illustrated in the accompanying drawings and described in the specification.

The instant invention is particularly suitable for the straight guiding of transverse wires to feed them along the longitudinal wires into an automatic welding machine, to be spot welded with the longitudinal wires by the welding machine into a welded mesh.

Reference is had to our co-pending application Ser. No. 343,333, filed Feb. 7, 1964, for "Wire Mesh Double Spot Welding," now Patent No. 3,286,072, dated Nov. 15, 1966.

The instant invention offers the advantage of simplicity for adjusting the distance needed for the welding machine between the transverse wires.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings, in which:

FIG. 1 in a schematic view of a pair of interconnected levers, in accordance with the principle of the invention;

FIG. 2 is a schematic elevational view of a straight guiding device for use in connection with a wire mesh welding machine, in accordance with an embodiment of the invention, showing the device before the transverse wires are being fed into the machine;

FIG. 3 is a schematic view, similar to FIG. 2, but showing the device after the transverse wires have been positioned in the welding machine;

FIG. 4 is a fragmentary elevational view of a wire gripper, in accordance with a facet of the invention; and

FIG. 5 is a fragmentary schematic view, similar to FIGS. 2 and 3, but showing a constructional detail of the adjustable connection between the connecting rods and the tiltable levers.

In carrying the invention into effect in one of the embodiments which has been selected for illustration in the accompanying drawings and for description in this specification, and referring now particularly to FIG. 1, there is provided a main lever or first tiltable arm **1** and an auxiliary lever or second tiltable arm **2**. When the first arm **1** is tilted from the vertical center line throughout the angle alpha, the second arm **2** will be tilted in the opposite direction throughout twice that angle. The free end C of the second arm **2**, during that movement, describes a straight path along the straight line C—C'.

The construction of this device is as follows: The first arm **1** is pivoted to a fixed pivot point A and is tiltable about the same, through otherwise immovable.

The second arm **2** is pivoted with one end at B to the free end portion of the first arm **1**. Guide means are provided connecting the arms **1** and **2** in such a manner that when the arm **1** is tilted about the pivot point A throughout a primary angle, the arm **2** will oppositely be tilted about the pivot point B for a secondary angle between the arms **1** and **2** which is twice the primary angle. The guide means comprise a driving element, such as a wheel **3** that is immovably concentrically mounted to the pivot point A. The wheel **3** may either have a smooth surface, or may be a gear, or sprocket wheel, or rope or belt pulley; a driven element, such as a wheel **4** which is secured to the second arm **2** and is rotatable therewith about the pivot point B as a fulcrum and the surface of which will match that of the wheel **3**, and thus will be either smooth, or be a gear or a sprocket wheel or pulley; and, lastly, a preferably adjustable interconnecting means, such as an endless member **5**, for instance a chain or one or more ropes, or a belt, or the like, interconnecting the wheels **3** and **4**.

The diameter of the wheel **3** is twice that of the wheel **4**, so that the diameters are at a ratio of 2:1. By this arrangement, when the first arm **1** is tilted throughout a primary angle alpha, the second arm **2** will be tilted relative to the first arm **1** throughout a secondary angle of twice the size of the angle alpha. As previously stated, the free end C of the second arm **2** is thereby guided rectilinearly along the straight line C–C'. The paths of the arms **1** and **2** may suitably be so arranged relative to the wheels **3** and **4** that the arm **2** may pass without obstruction past the pivot point A into the position **2'**.

In FIGS. 2 and 3 there is shown an exemplification of applying the instant straight guiding device, in accordance with the invention, to the simultaneous feeding of two transverse wires Q_1 and Q_2 into a welding machine. Prior to feeding, the wires Q_1 and Q_2 are positioned at rest in a dispenser **10**. The direction of the longitudinal wires (not shown) along which the transverse wires Q_1

and Q_2 are to be fed into the machine, is indicated by an arrow P. The transverse wires Q_1 and Q_2 are to be positioned between the electrode pairs **9** and **9'** of the wire mesh spot welding machine.

In FIG. 2 the straight guiding device is illustrated at rest immediately before the pick-up of the transverse wires Q_1 and Q_2; while in FIG. 3 the device is shown in position when the transverse wires Q_1 and Q_2 have been positioned in the machine between the respective electrodes.

The straight guiding device of FIGS. 2 and 3 comprises two straight guiding mechanisms. One of these guiding mechanisms comprises the first arm **1**, the second arm **2**, the wheels **3** and **4** with the interconnecting means **5**, an extension of the first arm **1** to a point E, and a connecting rod **6**; the free end point C of the second arm **2** moves linearly along the line C–C'. The other guiding mechanism comprises the first arm **1'**, the second arm **2'** with its free end C', wheels **3'** and **4'** and interconnecting means **5'** therebetween, the extension of the arm **1'** to the point E' and a connecting rod **6'**. The free end C' of the second arm **2'** moves linearly along the straight line C–C'.

The connecting rods **6** and **6'** are connected together at a pivot point F, and each is tiltable about the pivot point F as a fulcrum.

Driving means are provided, such as a cam and cam follower means, for instance a rotatable cam **12** and a cam follower roll **8**. The cam follower roll **8** is revolvably mounted on a spring pressed drive lever **7** that is pivoted to a fixed point G and to the pivot point F.

Each of the first arms **1**, **7'** carries its second arm **2**, **2'** near its upper end portion at B, B'; and terminates its lower end portion at E, E', respectively. Each wheel **3**, **3'** is thus mounted on its respective first arm **1**, **1'** between the end portions thereof, its center A (FIG. 2) serving, as previously described, as the journalling point for the arm **1**, **1'**.

Each of the second arms **2**, **2'** has near its free ends C, C' a gripper for releasably gripping one of the transverse wires Q_1, Q_2, respectively. Each gripper comprises a lip **14** and a shoulder **15** against which there may be positioned a transverse wire; a clamp **16** is pivoted to the second arm **2**, **2'** and is resiliently held in position wherein it presses the transverse wire against the lip **14** and the shoulder **15** (as shown in FIG. 4).

Upon actuation of the device of FIGS. 2 and 3, a movable lifting mechanism **11** will raise the transverse wires Q_1 and Q_2 off the dispenser **10** into the respective grippers which, as previously described, are positioned near the free ends C and C', respectively of the second arms **2**, **2'**. Thereupon the cam and cam follower means **12**, **8** will move the lever **7**, which will cause the connecting rods **6**, **6'** to tilt, owing to the pivot connections at E, E', the first arms **1** and **1'**. Thereby the free ends C, C' of the second arms **2**, **2'** which carry in their grippers the wires Q_1, Q_2 will be shifted in the direction P along the straight line C–C', until the free ends C, C' have positioned the wires Q_1, Q_2 between the electrode pairs **9**, **9'**, respectively (FIG. 3).

During the retraction movement of the second arms **2**, **2'** into the initial position (FIG. 2) the grippers will relinquish the wires Q_1, Q_2 which have been welded onto the longitudinal wires by the welding machine; the release is accomplished by the yielding turning movement of the spring pressed clamps **16**.

While the driving means have been shown as cam and cam follower means **12**, **8**, other conventional suitable means may be used instead without departing from the spirit and scope of the invention, except as limited in the claims hereof.

When the distance between the transverse wires in the wire mesh is to be changed, the wires Q_1, Q_2 will need to be spaced apart in the end position for a different distance. In order to adjust the guiding device to the new end distance between the electrode pairs **9**, **9'**, it will be necessary to change the distances A–E and, respectively, A–E'. This requires a change of the connection between the connecting rods **6**, **6'** to the first arms **1**, **1'**, respectively; one may need to change at the same time the lengths F–E and F–E' of the connecting rods **6**, **6'**; so that the free ends C, C' will return into the position shown in FIG. 2 for receiving the transverse wires Q_1 and Q_2 to be fed into the welding machine.

In accordance with a preferred embodiment, this adjustment is carried out by means of arcuate guide slots **13**, **13'** formed at the points E, E' of the first arm **1**, **1'**, respectively. The slots **13**, **13'** are arcuate about the fulcrum F. Each connecting rod **6**, **6'** carries a block that is guided in the respective slot **13**, **13'** and is adjustably positionable therein.

It is, however, also possible to use other adjusting means instead, for instance turn buckles or the like, for changing the lengths of the connecting rods **6**, **6'**, or selectively adjustable joints at the points E, E', as well as exchangeable cams **12**, without departing from the invention except as limited in the claims.

One or several of the straight guiding devices of FIGS. 2 and 3 may be used for each welding machine.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what we claim as new and desire to be secured by Letters Patent, is as follows:

1. In a straight guiding device, the combination of two guiding mechanisms each comprising a first arm having a free end portion and another end portion and being between said end portions tiltably journalled about a fixed pivot point, a second arm rotatably connected with one end to said free end portion of said first arm, and guide means operable for connecting said one end of said second arm to said first arm in such a manner that when said first arm is tilted about said fixed pivot point the second arm will be tilted oppositely relative to said first arm, whereby the free end of said second arm will describe a rectilinear motion, said guide means comprising a driving element mounted immovabley concentrically about said fixed pivot point, a driven element secured to said second arm and rotatable therewith, interconnecting means extending between and connecting said elements, said elements being so dimensioned that the tilting of said first arm about said pivot point throughout a primary angle will cause rotation of said second arm relative to said first arm throughout a secondary angle equalling twice said primary angle, and drive means operable for simultaneously tilting the first arms of both mechanisms comprising cam and cam follower means, and a connecting rod in driven connection from said cam follower means and in driving connection with said other end portion of both said first arms, operable to oscillate said first arms.

2. In a straight guiding device, the combination of a first arm tiltably journalled about a fixed pivot point and having a free end portion, a second arm rotatably connected with one end to said free end portion of said first arm, and guide means operable for connecting said one end of said second arm to said first arm in such a manner that when said first arm is tilted above said fixed pivot point the second arm will be tilted oppositely relative to said first arm, whereby the free end of said second arm will describe a rectilinear motion, said guide means comprising a first wheel mounted immovably concentrically about said fixed pivot point, a second wheel secured to said second arm and rotatable therewith, interconnecting means extending between and connecting said wheels, said wheels being so dimensioned that the tilting of said first arm about said pivot point throughout an angle of a predetermined magnitude will cause rotation of said second arm relative to said first arm throughout an angle of twice said predetermined magnitude, said first arm being jour-

nalled to said pivot point at a portion between its end portions, and drive means operable for driving the other end portion of said first arm, said drive means comprising cam and cam follower means, and a connecting rod in driven connection from said cam follower means and in driving connection with said other end portion of said first arm, operable to oscillate said first arm.

3. In a straight guiding device, as claimed in claim 2, said connecting rod being pivoted at a fulcrum with relation to said cam follower means and having a free end section movable about said fulcrum along a peripheral arc, connecting means disposed between said other end portion of said first arm and said end section of said connecting rod comprising an arcuate guiding slot defined in said other end portion of said first arm, and a block

connected to said end section of said connecting rod guided and adjustably positionable in said slot, for the stepless changing of the amplitudes of said second end portion of said first arm during the oscillation movement of said first arm.

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