Sept. 8, 1936. W. D. KELLER ET AL 2,053,292

FULCRUM FOR FORGING MANIPULATORS

Filed Feb. 3, 1934 3 Sheets-Sheet 1

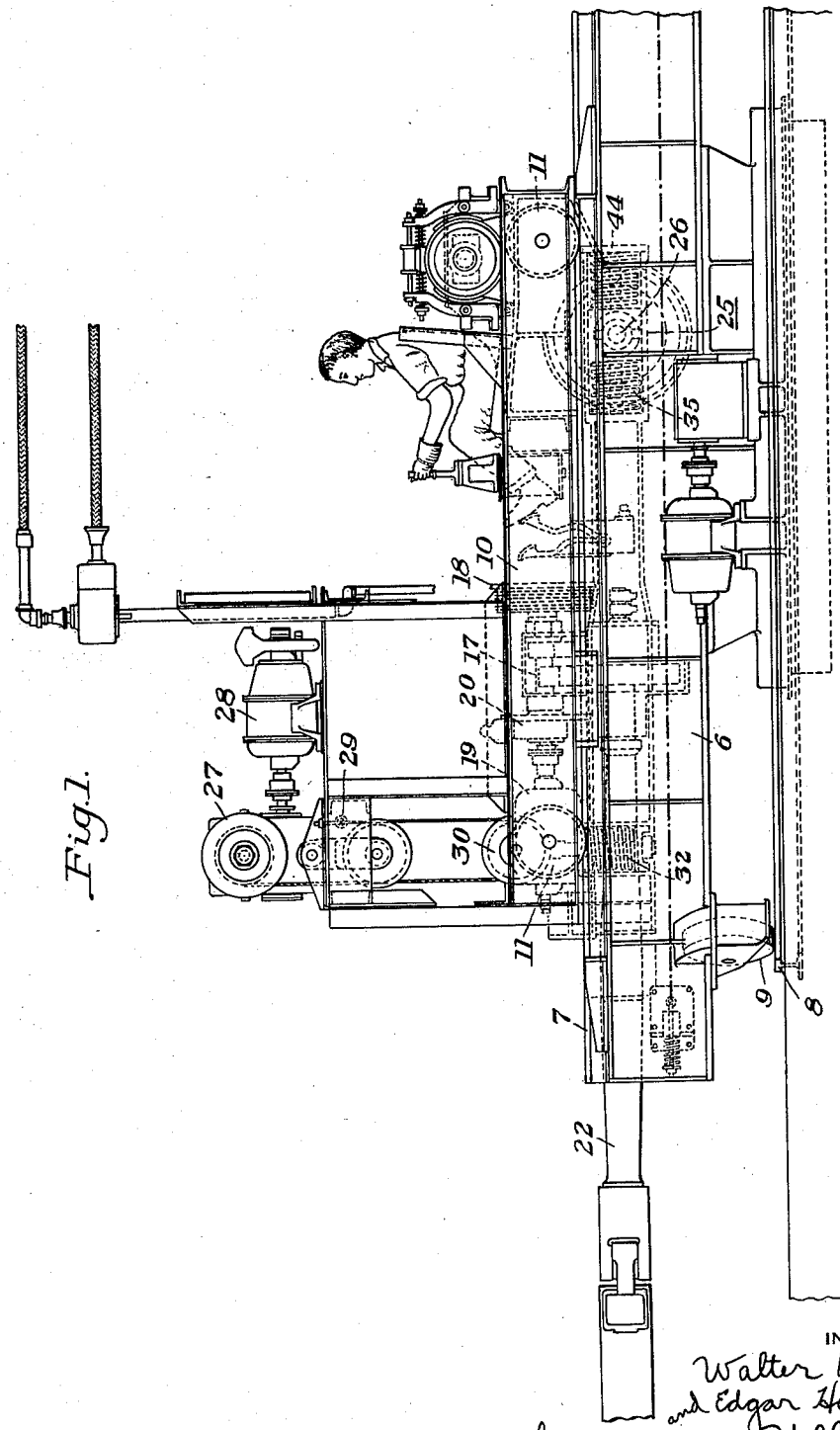


Fig. 1.

INVENTOR
Walter D. Keller
and Edgar Homer Kendall
by Byrnes Stebbins & Blenko
their attorneys

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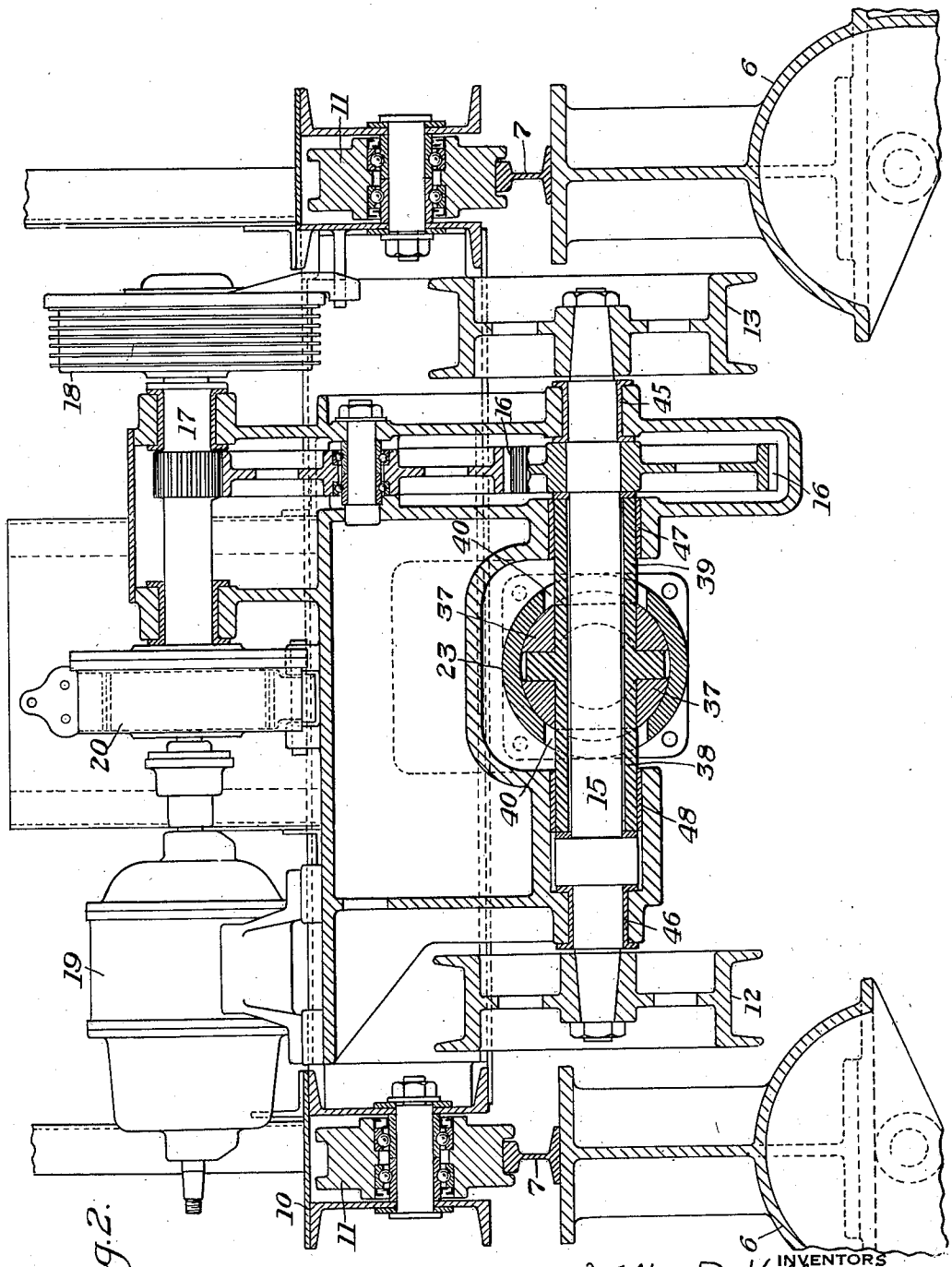


Fig. 2.

INVENTORS
Walter D. Keller
and Edgar Homer Kendall
by Byrnes, Stebbins & Blenko
their attorneys

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Filed Feb. 3, 1934 3 Sheets-Sheet 3

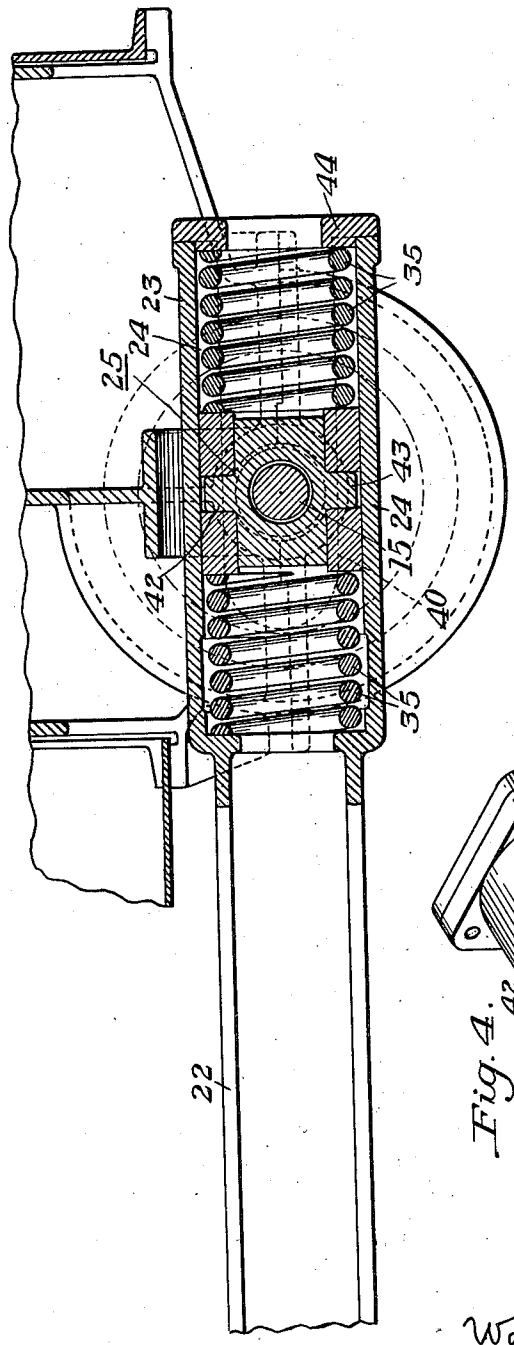


Fig. 3.

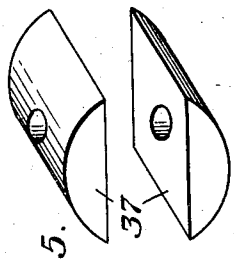


Fig. 5.

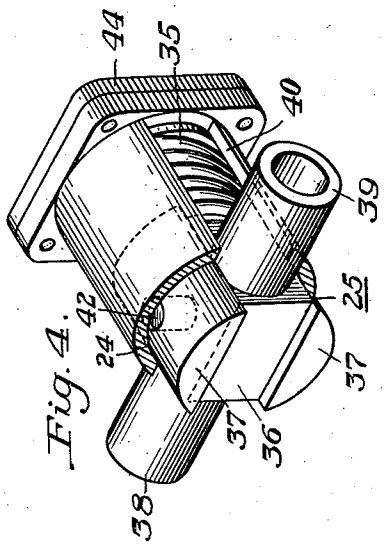


Fig. 4.

INVENTOR

Walter D. Keller
and Edgar Homer Kendall

by Byrnes, Stebbins & Blenko
their attorneys

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UNITED STATES PATENT OFFICE

2,053,292

FULCRUM FOR FORGING MANIPULATORS

Walter D. Keller and Edgar Homer Kendall, Alliance, Ohio, assignors to The Alliance Machine Company, Alliance, Ohio, a corporation of Ohio

Application February 3, 1934, Serial No. 709,672

2 Claims. (Cl. 287—92)

This invention relates to forging manipulators, and more particularly to the fulcrum member whereby the peel is mounted for swinging movement. In the mounting for the fulcrum member we incorporate parts to permit not only the necessary vertical swinging of the peel, but also slight turning movement of the peel about its axis, along with a cushioning of the fulcrum member which relieves the mechanism of a large part of the destructive jolts incident to the handling of a forging.

In prior constructions, the fulcrum member of a forging manipulator has been subjected to strains which resulted in excessive wear. In spite of great care in attempting to accurately align different parts of the manipulator and to allow for the movements of the parts in operation, there is at times a tendency for deflection of the peel out of alignment, and this deflection has thrown the brunt of the strain upon the bearings of the pivotal mounting of the peel. With mechanism constructed in accordance with our invention, the various operations of the peel may be carried out; and the motions are more completely compensated than has been possible with any previous design. At the same time, our improved construction makes it possible to cushion the fulcrum member so that the thrust arising during forging and any accidental jolts are cushioned.

In the drawings which show an illustrative embodiment of our invention,

Fig. 1 is a view in side elevation of a forging manipulator which includes a peel carried by a trolley whose wheels engage rails on a traveling or rotating bridge, the peel being raised and lowered by suitable hoisting mechanism mounted on the trolley;

Fig. 2 is a vertical transverse view principally in section through the axis of the fulcrum member;

Fig. 3 is a detail view in longitudinal vertical section through the housing for the fulcrum member at the rear end of the peel;

Fig. 4 is a perspective view of the fulcrum member, the housing being partially broken away;

Fig. 5 is a perspective view of the opposed shoes which form a part of the fulcrum member.

The bridge which carries the rails for the trolley may be of any suitable construction, as the present invention relates more particularly to the mounting of the peel on the trolley. As shown in Figs. 1 and 2, rails 7 are supported on a pair of girders 6, these girders constituting the movable upper structure of a turn table. A circular track 8 is provided for the wheels 9 of the turn table, and suitable mechanism is provided for revolving the turn table about its axis.

A trolley 10 is provided with wheels 11 which roll along the rails 7 as the trolley is moved forwardly and backwardly along the girders of the turn table. Reels 12 and 13 fixed to a transverse shaft 15 are driven through intermediate gearing 16 from a jack shaft 17. A brake 18 may be applied to hold the reels 12 and 13 stationary; and the shaft 17 may be driven from a motor 19 through a transmission 20. Preferably, the transmission 20 and brake 18 are so controlled as to permit the operator to bring the reels 12 and 13 to a stop precisely at the point desired.

The peel 22 is provided at its rear end with a housing 23 having cylindrical portions 24 engageable by a fulcrum member indicated in general by the numeral 25. The peel is swung vertically about the axis 26 of this fulcrum member by means of hoisting mechanism 27 driven by the motor 28. The hoisting mechanism 27 raises or lowers the peel through two systems of rope reeving, each rope being deadended at an eye bolt 29. The peel 22 passes through and is held within a vertically slidable cross-head (not shown), and the lower sheaves 30 of the hoisting mechanism are connected to this cross-head through springs 32. This resilient connection between the hoisting mechanism 27 and the peel absorbs the vertical shocks from the press or hammer.

Should the springs 32 on the two sides of the cross-head react differently during operation of the manipulator, or should the ropes deadended at the eye bolts 29 be out of balance due to careless assembly, the peel will be caused to rotate about its longitudinal axis. Our improved fulcrum member is constructed to compensate so as to prevent a twist which will impose a strain on any part of the mounting for the peel. Moreover, due to the rough nature of the work handled, it is necessary to have adequate clearance between the cross-head and the guides within which the cross-head slides up and down. Due to such clearance, the peel is permitted to skew slightly to the right or left. Our improved construction takes care of such slight variations from right angle position on the part of the peel.

As illustrated more particularly in Figs. 2 and 3, the fulcrum member 25 is slidable lengthwise of the housing 23 in engagement with the bearing

surfaces 24. The fulcrum member 25 is cushioned in the housing 23 by cushioning means which, in the embodiment illustrated, takes the form of opposed coil springs 35. When the forgings are worked under the press or hammer, the reduction of the workpiece on the dies causes an elongation of the workpiece. This movement is resisted or absorbed by the cushioning means, the two springs 35 controlling the longitudinal position of the fulcrum member 25 in the housing 23, thus cushioning the shock of any longitudinal jolts imparted to the peel.

In the embodiment illustrated, the fulcrum member is made up of shoes 37 and a trunnion block 36 pivotally mounted therein. The shoes 37 engage the cylindrical bearing surfaces 24 which permit not only the longitudinal sliding movement occurring when either of the springs is compressed, but also a slight turning movement of the peel about its longitudinal axis relative to the fulcrum member 25. The trunnion block 36 has opposed trunnions 38 and 39 which project through elongated openings 40 in the housing 23. These openings 40 are long enough to allow for complete compression of the springs 35. The width of the openings does not accurately fit the trunnions 38 and 39; but on the contrary, sufficient clearance is allowed for the slight turning of the peel about its longitudinal axis which has been above referred to in connection with the spring mounting 32 connecting the peel to the hoisting mechanism 27. The bearing surfaces 24 being cylindrical, the housing 23 rotates readily on the shoes 37.

The pivotal mounting of the trunnion block 36 in the shoes 37 permits the peel to skew slightly to the right or left, as has been above referred to in connection with the clearance for the crosshead. Such turning of the peel 22 and housing 23 causes the shoes 37 which bear against the cylindrical surfaces 24 to turn also; but the block 36 pivots freely and, therefore, there is no strain imparted to the trunnions 38 and 39. The pivotal mounting of the block 36 between the shoes 37 may be accomplished in various ways. We prefer to extend trunnions, such as shown at 42 and 43, vertically into openings in the shoes 37, these trunnions, together with the lateral trunnions 38 and 39, affording a fulcrum partaking of the nature of a universal joint.

Inasmuch as the shoes 37, while sliding lengthwise in the housing 23 are intended to remain in alignment with the axis thereof, while the block 36 can pivot about the axis of the trunnions 42 and 43, the springs 35 bear against these shoes 37 and not against the trunnion block 36. An end closure 44 for the housing 23 may be secured in position by bolts or screws so as to hold the springs 35 in engagement with the fulcrum member after the parts have been assembled.

The trunnions 38 and 39 are hollow, the opening through the same being continued through the block 36 as is a clear from Fig. 2. The shaft 15 extends through this opening and is journaled at 45 and 46 in the frame of the trolley 10. The trunnions 38 and 39 are journaled at 47 and 48 in the same frame. With such a construction, the reels 12 and 13 which move the trolley along the rails 7 are rotatable about the same axis 26 as the axis of the fulcrum member 25. When the peel 22 is raised or lowered, it swings about this axis 26.

It will be apparent from the above description that the improved construction disclosed herein compensates more completely for motions of the peel, such as twists and thrusts which may be imparted thereto in operation, than is true of prior constructions. If the operation of the hoisting mechanism 27 or of the springs 32 is such as to twist the peel 22, the housing 23 turns on the shoes 37, the openings 40 providing sufficient clearance to take care of such a twist without imparting the strain to the trunnions 38 and 39. If the peel is deflected slightly to the right or left, the housing 23 and shoes 37 turn on the trunnions 42 and 43 without transmitting strain to the trunnions 38 and 39. The peel is free to swing about the trunnions 38 and 39 without causing binding of the same in the bearings 47 and 48, even though the peel be at the time deflected to the right or left or even twisted about its longitudinal axis. In all positions of the peel and even though twisted or deflected, the springs 35 act as cushioning means to take up any longitudinal jolts or thrusts imparted through the peel 22 to the housing 23. Excessive wear on the trunnions 38 and 39 is thus avoided.

While we have illustrated and described the specific embodiment of our invention which we at present prefer, it will be understood that the invention may be otherwise embodied and practiced within the scope of the following claims.

We claim:

1. In a forging manipulator, in combination, a peel provided with a fulcrum housing having cylindrical bearing portions permitting the fulcrum member to slide longitudinally therein and also to turn about the axis thereof, a fulcrum member comprising opposed shoes engaging the cylindrical bearing portions of the housing and a trunnion block pivotally mounted on trunnions between said shoes to receive through said shoes from said housing reaction to vertical strains at the outer end of the peel, said trunnion block having trunnions received in openings in said housing, resilient means acting against said shoes to cushion said fulcrum member in said housing, and means for rotatably supporting said last mentioned trunnions.

2. In a forging manipulator, in combination, a peel provided with a fulcrum housing having bearing portions permitting the fulcrum member to slide longitudinally therein, a fulcrum member comprising opposed shoes engaging said bearing portions and a trunnion block having opposed trunnions pivotally mounted in said shoes and a second pair of trunnions substantially at right angles to the first mentioned pair, opposed springs at the ends of said fulcrum member and acting against said shoes to cushion the member in said housing, and means for rotatably supporting said second mentioned pair of trunnions.

WALTER D. KELLER.
EDGAR HOMER KENDALL.