Feb. 18, 1947. D. W. T. EVANS 2,416,048

SHIFTABLE WORK SUPPORT FOR MACHINES WHICH STRAIGHTEN TUBES OR BARS

Filed Aug. 16, 1943 6 Sheets-Sheet 1

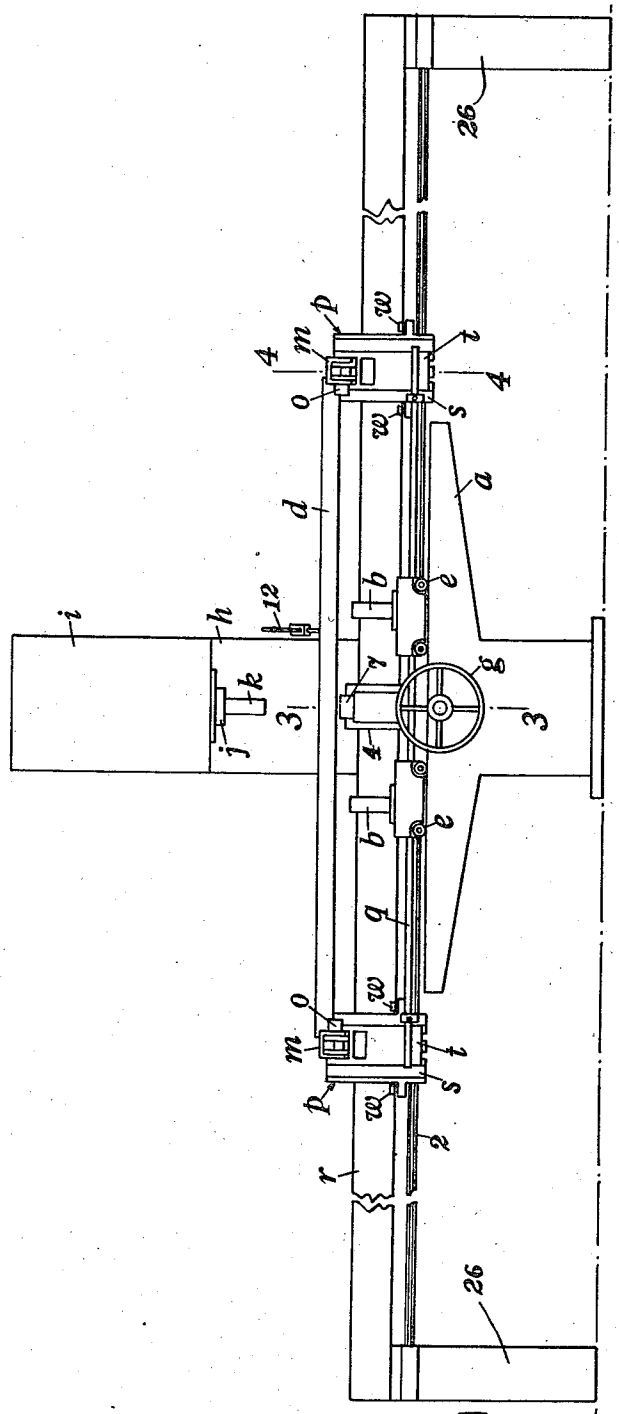


Fig.1

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Filed Aug. 16, 1943 6 Sheets-Sheet 2

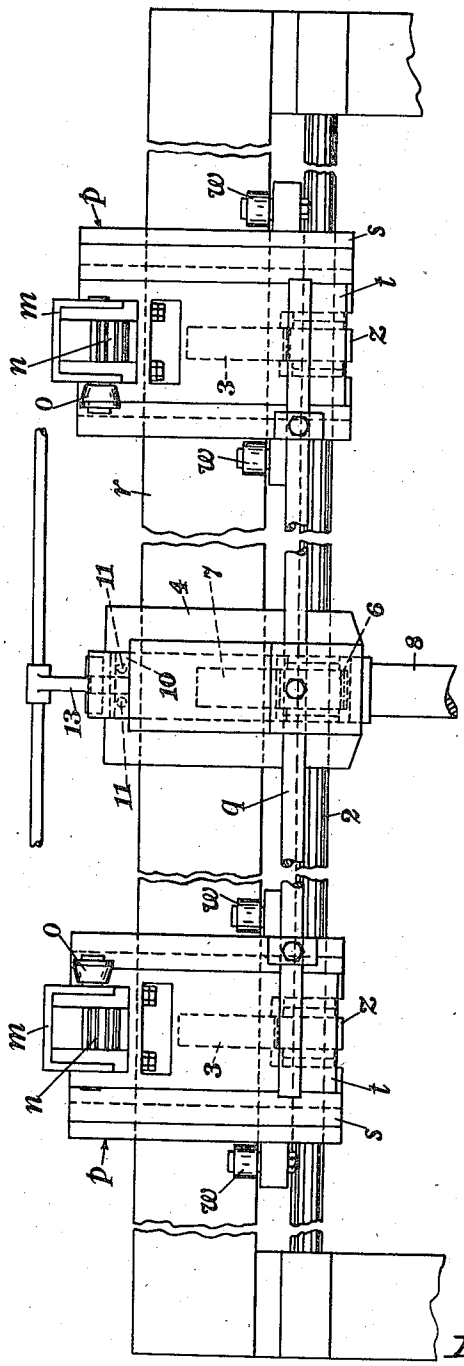


Fig.2

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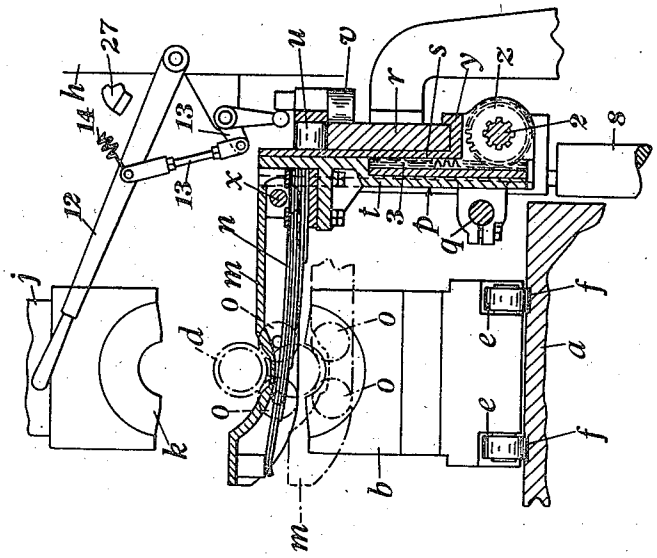


Fig.4

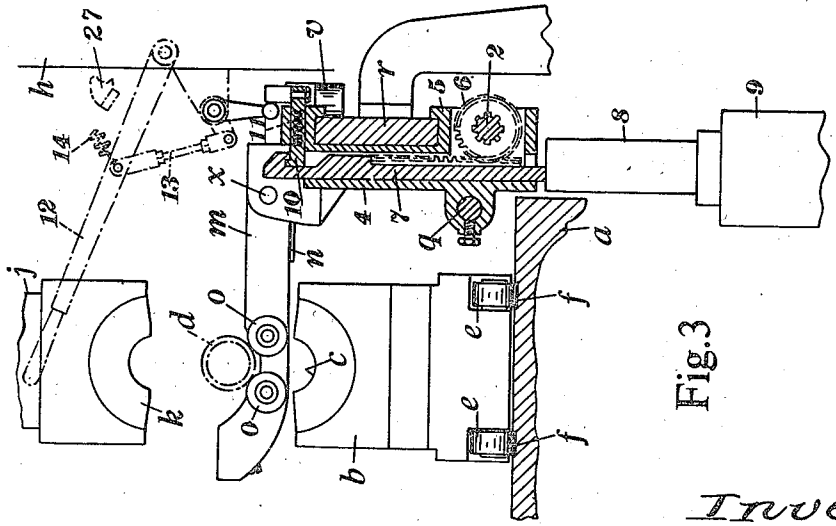


Fig.3

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Feb. 18, 1947. D. W. T. EVANS 2,416,048

SHIFTABLE WORK SUPPORT FOR MACHINES WHICH STRAIGHTEN TUBES OR BARS

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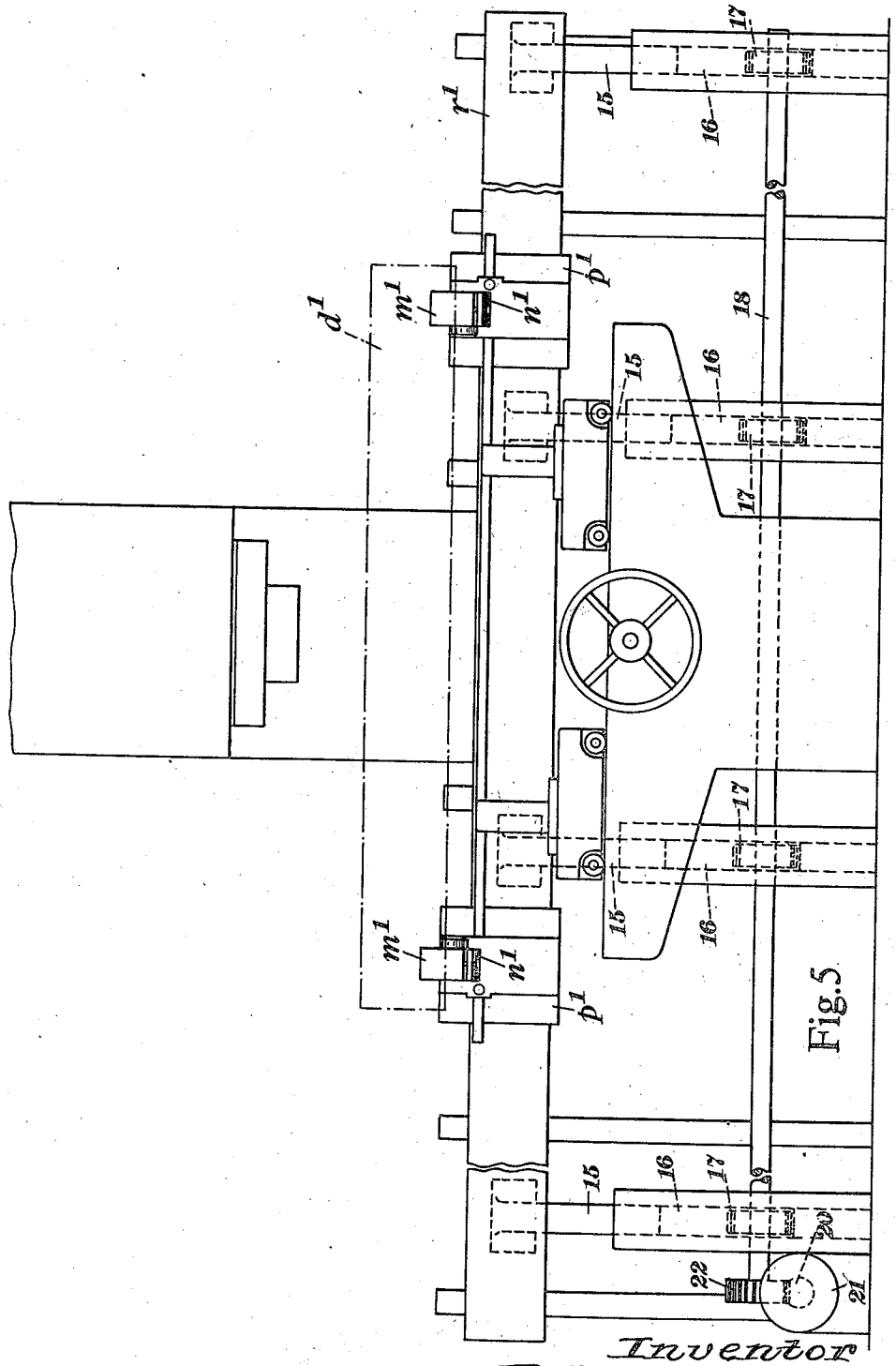


Fig. 5

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Feb. 18, 1947. D. W. T. EVANS 2,416,048

SHIFTABLE WORK SUPPORT FOR MACHINES WHICH STRAIGHTEN TUBES OR BARS

Filed Aug. 16, 1943 6 Sheets-Sheet 5

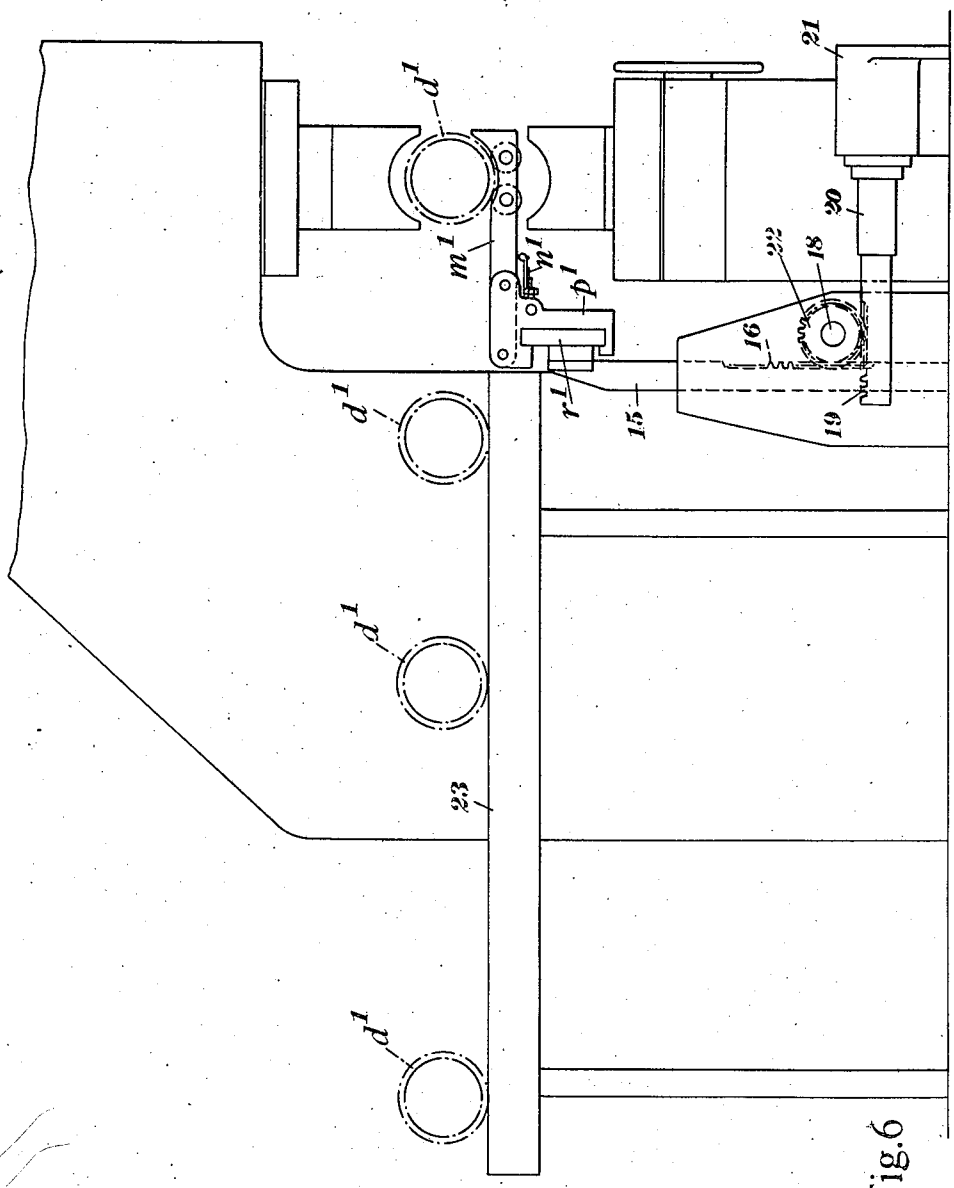


Fig. 6

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Feb. 18, 1947. D. W. T. EVANS 2,416,048

SHIFTABLE WORK SUPPORT FOR MACHINES WHICH STRAIGHTEN TUBES OR BARS

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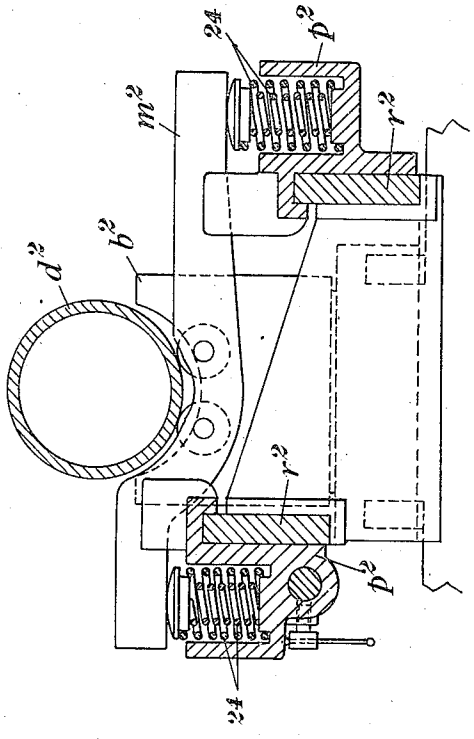


Fig. 7

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Patented Feb. 18, 1947

2,416,048

UNITED STATES PATENT OFFICE

2,416,048

SHIFTABLE WORK SUPPORT FOR MACHINES WHICH STRAIGHTEN TUBES OR BARS

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Application August 16, 1943, Serial No. 498,832
In Great Britain September 11, 1942

5 Claims. (Cl. 153—52)

1

This invention relates to machines for effecting pressing, hammering or other operations on a metal tube, or bar, the machine being of the kind in which the work piece is supported horizontally on a pair of spaced anvils, and in which pressure is applied by a movable part of the machine to the upper side of the work piece at a position between the anvils. Such a machine is used more particularly in straightening operations, but it may be employed for other purposes.

The task of lifting the work pieces into and out of the machine is usually performed manually, and when dealing with large and heavy work pieces, the task imposes a severe strain on the workers. The object of the present invention is to provide means whereby this task can be performed mainly by mechanical means.

The invention comprises the combination with a machine of the kind aforesaid, of a horizontally movable carrier, and means for raising the carrier at least in part to enable it to clear the anvils during the horizontal movements.

In the accompanying sheets of explanatory drawings:

Figure 1 is a front elevation of a machine used in the straightening of large and heavy work pieces (in the form of metal tubes or bars of circular or other cross section), and embodying the invention.

Figure 2 is a view similar to but drawn to a larger scale than Figure 1 with some of the parts omitted.

Figures 3 and 4 are sections taken respectively on the lines 3—3 and 4—4 of Figure 1 and drawn to the same scale as Figure 2.

Figures 5 and 6 are respectively a front view and a side view illustrating a modified form of the invention.

Figure 7 is a sectional side view illustrating a further modification.

The machine shown in Figures 1 to 4 of the drawings comprises a horizontal bed *a* on which are mounted a pair of spaced anvils *b*, each having a V or half round recess *c* in its upper side to support the work piece as *d*. The anvils *b* are supported on the bed *a* by wheels or rollers *e* which engage longitudinal guideways *f* in the upper surface of the bed, and which facilitate adjustment of the anvils to vary the distance between them, this adjustment being effected by a hand wheel *g* through the agency of any convenient mechanism (not shown). On the main part *h* of the machine extending above the bed *a* is formed or secured a vertical hydraulic cylinder *i* having a ram or plunger *j*, the lower end of the

2

latter carrying a tool *k* by which straightening pressure can be applied to the upper side of the work piece *d* at a position centrally between the anvils *b*. Also the machine is provided with a pair of horizontal arms *m* which are supported by springs *n* and which (through the medium of rollers *o*) support the work piece *d* near its ends. The purpose of the arms *m* is to support the work piece *d* clear of the anvils *b* and allow the work piece to be easily rotated by the attendant to enable him to detect the lack of straightness and the position at which the straightening pressure is to be applied. The purpose of the springs *n* is to enable the arms *m* to yield and allow the work piece *d* to be pressed on to the anvils *b* by the pressure exerted by the plunger *j*.

In applying my invention to the machine shown in Figures 1 to 4, I pivotally attach one end of each arm *m* to a slide *p*, and I mount on the slide the spring *n* by which the arm is supported, this spring being of laminated or helical form. The two slides are interconnected (at any desired distance apart) by a horizontal bar *q* to which the slides are adjustably secured. The slides *p* and arms *m* are situated at the opposite sides of the two anvils *b*, and are carried on a fixed horizontal track bar *r* which extends sufficiently beyond one or each side of the machine to enable the slides to be moved to a loading and unloading position. The track bar *r* is carried by any convenient supports as 26. Each slide *p* consists of two main parts *s*, *t*. The part *s* of each slide *p* is provided with and supported on the track bar *r* by rollers *u*, *v*, and *w*. The other part *t* of each slide *p* is mounted on the corresponding part *s* and is slidable relatively to the latter part in a vertical direction. The slide parts *t* carry the springs *n* and the arms *m*, the latter being pivoted at *x* to the said parts, and being arranged to rest on the springs. The lower portions of the slide parts *s* are shaped to form housings *y* which at their upper sides embrace the lower edge of the track bar *r*, and which accommodate pinions *z* slidable on but rotatable with a horizontal rotatable shaft 2 passing through the housings, the pinions being in engagement with racks 3 on the vertically slidable parts *t*. Rotation of the shaft 2 causes the slide parts *t* to be raised or lowered as desired, the amount of vertical movement provided being sufficient to enable the arms *m* to be lifted to a position clear of the tops of the anvils *b* as shown in full lines in the drawings. Rotation of the shaft 2 may be effected by any convenient means. For example I mount on the track bar *r* at a position between the two slides *p* a third slide 4 which

embraces the track bar and is adjustably secured to the connecting bar *q*. At its lower end the slide 4 is shaped to form a housing 5 which accommodates another pinion 6 rotatable with but slidable on the shaft 2. This pinion 6 is engaged by a vertically slidable rack 7 carried by the slide 4, the rack being operable by any convenient means such as the plunger 8 of a hydraulic cylinder 9. Movement of the rack 7 rotates the shaft 2, and the latter transmits its motion to the vertically slidable parts *t* of the other slides *p*.

Slidably supported by and extending transversely through the upper end of the slide 4 is a spring loaded catch member 10 adapted by engagement with the upper end of the rack 7 to retain the latter in a raised position in which the arms *m* are clear of the anvils *b*, the engagement being such that the catch member cannot be retracted until the rack is given a small additional upward movement. Such additional movement is imparted to the rack 7 by the plunger 8 when it is required to lower the arms *m*, and serves to disengage the rack from the catch member 10 which can then be retracted against the action of its loading spring 11 by a hand lever 12, the latter being adapted to act on the catch member through the agency of link and lever mechanism 13. Retraction of the catch member 10 permits the rack 7 to move downwardly without obstruction by the catch member. While the catch member 10 is held in its retracted position the plunger 8 is moved downwardly, thus enabling corresponding movement of the slide parts *t* and the rack 7 to take place under the action of gravity at a rate controlled by the plunger. This movement continues until the work piece *d* is slightly above the anvils *b* as shown in broken lines in Figure 4. After the rack 7 has moved downwardly to an extent sufficient to clear the catch member 10, the hand lever 12 is released and returned to its initial position (in which it abuts against a stop 27) by a spring 14. This enables the catch member 10 to re-assume its operative position under the action of the loading spring 11, so that when the rack 7 is again raised it is automatically re-engaged by the catch member, the upper end of the rack being adapted to ride over the adjacent end of the catch member during its upward movement.

Assuming the carrier (consisting of the slides *p* and arms *m*) to be in the loading position at one end of the track bar *r*, a work piece *d* is rolled on to the arms from a deck situated at the level of the arms. The carrier is then moved by hand (or by power if desired) to the working position and the arms *m* are lowered to a position in which the work piece *d* is slightly above the anvils *b*. The straightening operation is now carried out in the usual manner, the movement of the work piece *d* on to the anvils *b* by the plunger *j* of the machine being permitted by the yielding of the springs *n* which support the arms. After this operation has been completed the arms *m* are returned to their upper position in which they can clear the anvils *b* during movement of the slides *p* along the track bar *r* and the carrier is then slid along the track bar to the discharge position, which may be at the same side of the machine as the loading position, or at the opposite side.

The invention is not, however, limited to the example above described, as the details of construction may be varied to suit different requirements. Thus, the raising and lowering of the arms may be effected by imparting vertical movements to the track bar, an example of this modification being shown in Figures 5 and 6, in which parts similar or analogous to those above described are indicated by the same reference characters suffixed by 1. As shown in Figures 5 and 6 each of the slides p^1 on which an arm m^1 and spring n^1 are mounted consists only of a member which is slidable on the track bar r^1, and the track bar is carried by a plurality of vertically slidable supports 15. For actuating these supports any convenient mechanism is employed. Thus each support 15 may be provided with a rack 16 which engages a pinion 17 on a shaft 18, the latter being rotatable by any convenient means such as another rack 19 which is operable by the plunger 20 of a hydraulic cylinder 21, and which engages another pinion 22 on the shaft. In the example shown in Figures 5 and 6, 23 indicates the deck from which the work pieces d^1 are rolled on to the arms m^1 when the slides p^1 occupy appropriate positions.

A further modification is illustrated by Figure 7 in which parts similar or analogous to those above described are indicated by the same reference characters suffixed by 2. In this example I employ a pair of track bars r^2 arranged parallel with each other and situated respectively in front of and behind the anvils b^2. The slides p^2 are slidably supported on these bars r^2, and the arms m^2 instead of being pivotally attached to the slides may be supported at both ends on helical springs 24 carried by the slides. Vertical movements of the arms m^2 may be obtained by constructing the slides with vertically movable parts or by arranging for vertical movements to be imparted to the track bars, as in either of the previously described examples.

By this invention I am able greatly to reduce the physical effort usually involved in the handling of heavy tubes or bars in straightening operations and other operations of an analogous kind.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A machine of the kind specified having in combination a pair of spaced anvils for supporting the work piece in a working position, a pair of horizontally movable slides situated at opposite sides of the anvils and adapted to move the work piece into and out of a position above the anvils, each slide being composed of a pair of main parts one of which is capable of vertical movement relatively to the other, at least one fixed horizontal track bar supporting the slides, springs carried by the vertically movable parts of the slides, arms supported by the springs and adapted to support the work piece near its ends, the arms being movable by the vertically movable parts of the slides to enable the arms to clear the anvils during the horizontal movements of the slides, racks on the vertically movable parts of the slides, pinions engaging the racks, a rotatable shaft carrying the pinions, the latter being rotatable with but slidable relatively to the shaft, a third horizontally movable slide supported by the track bar, another pinion slidable on but rotatable with the shaft, a third vertically movable rack carried by the third slide and engaging the latter pinion, means for imparting vertical movement to the third rack, and a spring loaded catch member for retaining the third rack in a raised position.

2. A machine of the kind specified having in

combination a pair of spaced anvils for supporting the work piece in a working position, a pair of horizontally movable slides situated at opposite sides of the anvils and adapted to move the work piece into and out of a position above the anvils, springs carried by the slides, arms supported by the springs and adapted to support the work piece near its ends, and means adapted to be brought into action under the control of the operator for raising the slides at least in part to enable them to clear the anvils during the horizontal movements of the slides.

3. A machine of the kind specified having in combination a pair of spaced anvils for supporting the work piece in a working position, a pair of horizontally movable slides situated at opposite sides of the anvils and adapted to move the work piece into and out of a position above the anvils, each slide being composed of a pair of main parts one of which is capable of vertical movement relatively to the other, at least one fixed horizontal track bar supporting the slides, springs carried by the vertically movable parts of the slides, arms supported by the springs and adapted to support the work piece near its ends; and means adapted to be brought into action under the control of the operator for raising the vertically movable parts of the slides to enable the arms to clear the anvils during the horizontal movements of the slides.

4. A machine of the kind specified having in combination a pair of spaced anvils for supporting the work piece in a working position, a pair of horizontally movable slides situated at opposite sides of the anvils and adapted to move the work piece into and out of a position above the anvils, each slide being composed of a pair of main parts one of which is capable of vertical movement relatively to the other, at least one fixed horizontal track bar supporting the slides, springs carried by the vertically movable parts of the slides, arms supported by the springs and adapted to support the work piece near its ends, the arms being movable in a vertical direction by the vertically movable parts of the slide to enable the arms to clear the anvils during the horizontal movements of the slides, racks on the vertically movable parts of the slides, pinions engaging the racks, a rotatable shaft carrying the pinions, the latter being rotatable with but slidable relatively to the shaft, and means adapted to be brought into action under the control of the operator for imparting movement to the shaft.

5. A machine of the kind specified having in combination a pair of spaced anvils for supporting the work piece in a working position, a pair of horizontal slides situated at opposite sides of the anvils and adapted to move the work piece into and out of a position above the anvils, springs carried by the slides, arms supported by the springs and adapted to support the work piece near its ends, at least one vertically movable horizontal track bar on which the slides are supported, and means adapted to be brought into action under the control of the operator for raising the track bar to enable the arms to clear the anvils during the horizontal movements of the slides.

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