May 18, 1954 J. V. DAVIS 2,678,714

WORK CARRIER ARM

Filed March 24, 1951 2 Sheets-Sheet 1

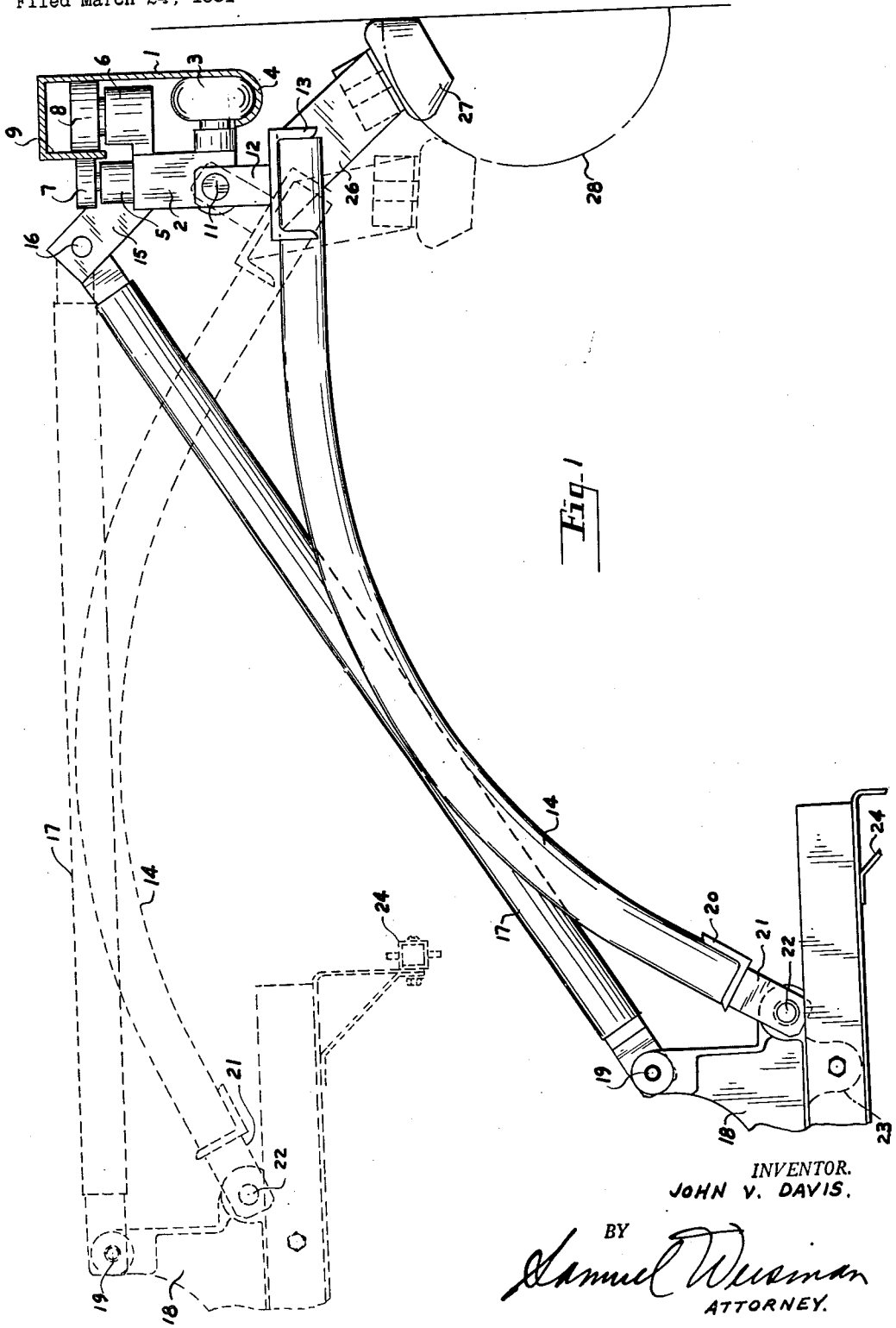


Fig. 1

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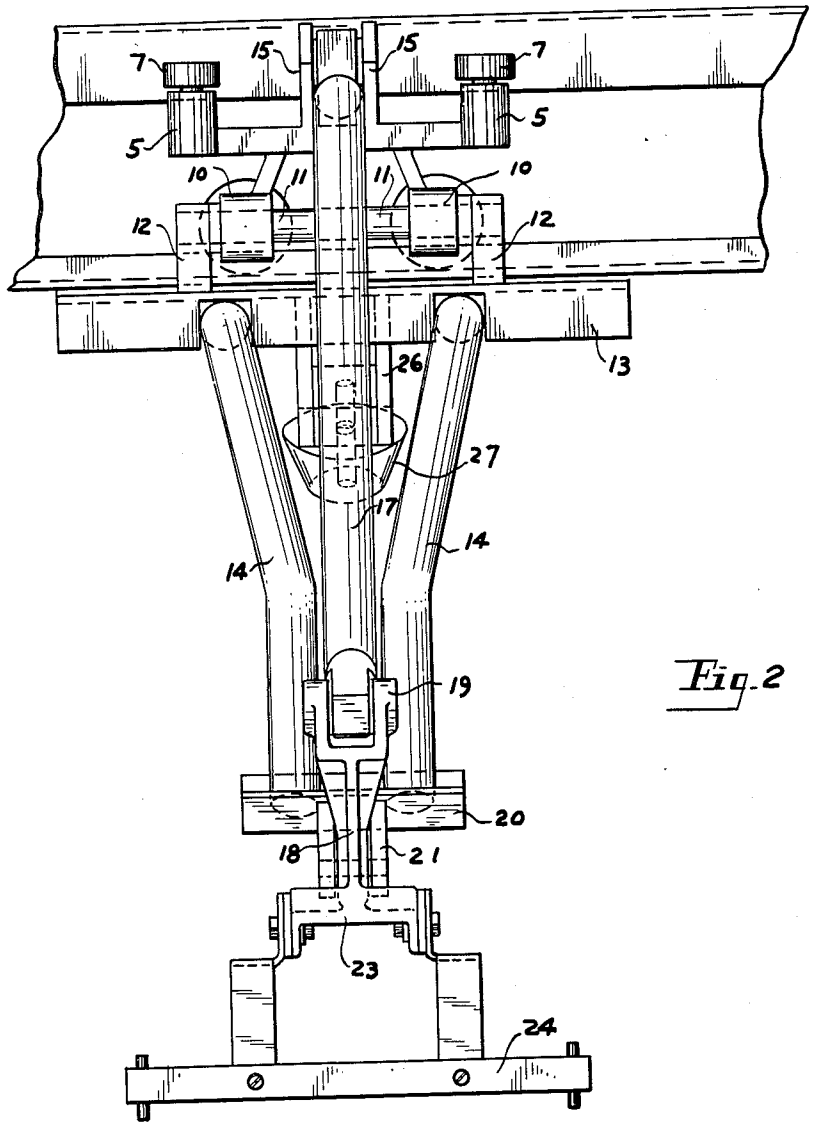


Fig. 2

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WORK CARRIER ARM

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8 Claims. (Cl. 198—19)

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The present invention pertains to a novel carrier arm for plating and similar machines, wherein the work is to be raised and lowered in its course along the machine. The carrier is in the nature of a parallelogram linkage attached to a rolling carriage at one end and having the work suspended from the other end. A roller or guide secured to the linkage at the carriage engages at intervals a fixed cam which raises and lowers the other end of the linkage with the work suspended therefrom. In plating machines this mechanism lifts the work out of one bath and into the next.

Because of the relatively great length of the linkage from its work supporting end to the carriage, prior devices of this general character have been known to develop looseness and lateral play under the high stresses that occur in the operation of the device, especially at the pivotal mountings in the carriage.

The principal object of the invention is to overcome this difficulty and is accomplished generally by a laterally balanced construction. More particularly, one of the longer sides of the parallelogram consists of a pair of spaced arms instead of the usual single arm, and the opposite arm passes between the spaced arms in the shifting of the linkage. Also, the attachments or bearings of the two arms to their common pivotal axis on the carriage are disposed at opposite sides of the single arm. The spaced pivotal mountings on a common axis are equivalent to an elongated bearing, and this in turn reduces unsteadiness and lateral play almost completely. Further, because of the symmetry of the pivotal mountings, the stresses are well balanced.

The invention is fully disclosed by way of example in the following description and in the accompanying drawings in which:

Figure 1 is a side elevation of the device in lowered position, with the raised position shown in dotted lines, and

Figure 2 is an end view from the carrying end.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

In Figure 1 is shown a rail 1 extending along and parallel to a series of plating tanks, above and laterally of the tanks, as known in the art. A carriage 2 travels along the rail by means of

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a pair of rollers 3 on horizontal axes and received at the bottom or trough 4 of the rail. The upper portion of the carriage is formed with vertical bearings 5 and 6 carrying rollers 7 and 8 which engage opposite sides of a vertical flange 9 extending downward from the top of the rail.

The carriage 2 is further formed with a pair of horizontally aligned bearings 10 in which is journalled a pivot rod 11. Blocks 12 are suspended from the ends of the rod 11, to which they may be welded, and support a bar on channel iron 13 lying parallel to the rail 1 and being somewhat longer than the carriage 2.

A pair of similar and upwardly arched arms 14 have one end firmly secured to spaced points on the bar 13 and extend somewhat convergingly therefrom and downward in the lower position of the carrier. A pair of ears 15 extend rigidly from an upper portion of the carriage and carry a pivot pin 16 on which is mounted one end of a third arm 17 which also extends downward, passing between the arms 14 and adapted to move in this space as will presently be described.

A heavy bracket 18 is suspended from a pivot pin 19 in the lower end of the arm 17. The lower ends of the arms 14 are joined by a cross piece 20 from which extends a pair of rigid ears 21 straddling the member 18 and pivotally attached thereto by a pin 22. The lower end of the member 18 is formed with a cross head 23 from which is suspended a conventional rack hanger 24 in the usual manner. It will be understood that the work pieces are carried by the rack for immersion in the plating baths, while the described mechanism is raised from time to time to lift the work pieces over the partitions that separate the baths.

For the latter purpose the bar 13 carries a pair of rigid fingers 26 between which is rotatably mounted a cam follower 27. At the points where the mechanism is to be raised, there are mounted cams 28 extending generally toward the free ends of the arms and engageable by the follower 27.

The line between the pivots 11 and 16 is equal and parallel to the line between the pivots 19 and 22. Since the first line does not change its position the second line remains parallel thereto as the arms 14 and 17 are displaced by the action of a cam 28. Consequently the hanger 24 main-

tains a parallel position while being raised and lowered.

Because of the cantilever construction of the device, there is considerable stress in the structure supporting the pivot pins 11 and 16, especially when the arms 14 and 17 are raised by the cam 28 as shown in Figure 1. Prior devices of this general character develop considerable lateral play and unsteadiness from this cause. This difficulty is overcome in the present invention by the provision of two horizontally adjacent rods in one set joined together at both ends by rigid means to form a stable and rigid structure. As previously stated, the single rod is receivable between a pair of rods for the relative shifting in the raising and lowering of the device as may be seen by a comparison of the positions shown in Figure 1. Greater strength in the pivotal mounting is also gained by the provision of the two bearings 10 of the carriage 2 disposed at opposite sides of the central arm 17. This double bearing arrangement over a substantial length of the pivot pin 11 reduces the liklihood of unsteadiness and lateral play in the assembly.

The three-point attachment of the arms to the carriage provides a triangular distribution of the load, which is obviously better balanced and less destructive than the two-point distribution where only two arms are used as in the prior art. The distribution is further enhanced by widening the base of the triangle support, through the divergence of the arms 14 toward the carriage.

Another feature of the invention is the upward arching of the arms 14, with the arm 17 so positioned that it lies substantially outside the arch. The upward arching of the arms 14 provides additional clearance for parts associated with the fixed structure or that may desirably be built on the structure. With straight arms, as in the prior art, precaution must be taken to design the fixed structure so that no associated parts are in the path of the arms. The arm 17, lying outside the arch, does not reduce the added clearance. A similar relation may be incorporated in a two-arm carrier wherein one arm is arched and the other lies outside the arch.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What I claim is:

1. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying between the vertical planes of the first two arms and being spaced vertically from the first pivotal axis, thereby forming a triangle, a rigid structure to which the free ends of all of said arms are pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram.

2. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying between the vertical planes of the first two arms and being spaced vertically from the first pivotal axis, thereby forming a triangle, a rigid structure

to which the free ends of all of said arms are pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram, the pair of arms diverging from the single arm toward said support and having a minimum spacing in which the single arm is received.

3. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying substantially midway between the vertical planes of the first two arms and being spaced vertically from the first pivotal axis, thereby forming a triangle, a rigid structure to which the free ends of all of said arms are pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram.

4. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying substantially midway between the vertical planes of the first two arms and being spaced vertically from the first pivotal axis, thereby forming a triangle, a rigid structure to which the free ends of all of said arms are pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram, the pair of arms diverging from the single arm toward said support and having a minimum spacing in which the single arm is received.

5. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying between the vertical planes of the first two arms and being spaced upwardly from the first pivotal axis, thereby forming a triangle, a rigid structure to which the free ends of all of said arms are pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram.

6. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying between the vertical planes of the first two arms and being spaced upwardly from the first pivotal axis, thereby forming a triangle, a rigid structure to which the free ends of all of said arms are pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram, the pair of arms diverging from the single arm toward said support and having a minimum spacing in which the single arm is received.

7. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying between the vertical planes of the first two arms and being spaced vertically from the first pivotal axis, thereby forming a triangle, a rigid structure to which the free ends of all of said arms are

pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram, said single arm being arched upward and receivable between said pair of arms.

8. A work carrier comprising a support, a pair of arms attached thereto on a common horizontal pivotal axis and extending laterally from said support, another arm attached to said support on a spaced and parallel pivotal axis, the pivot point of the last named arm lying between the vertical planes of the first two arms and being spaced vertically from the first pivotal axis, thereby forming a triangle, a rigid structure to which the free ends of all of said arms are

pivotally attached, the pivotal axes of both ends of all of said arms passing through the vertices of a parallelogram, said single arm being arched upward and receivable between said pair of arms.

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