

[54] FLEXIBLE MAGNET YOKE FOR A CRANE

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[51] Int. Cl. B66c 19/00
[58] Field of Search 212/10, 11, 42, 124, 212/127, 129; 214/1 BS; 294/65.5

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[57] ABSTRACT

A crane having a pair of trolleys supported on its bridge and a mast dependent from each trolley has a support pivotally mounted on the mast for movement about a horizontal axis. A suspension bar is pivotally mounted on each end of the support for movement about an axis parallel to the support axis. A magnet is suspended from each of the suspension bars by means of a resilient support at each end of the bar. Thus, when an elongated object is picked up by the four magnets good contact is made by all four magnets.

2 Claims, 5 Drawing Figures

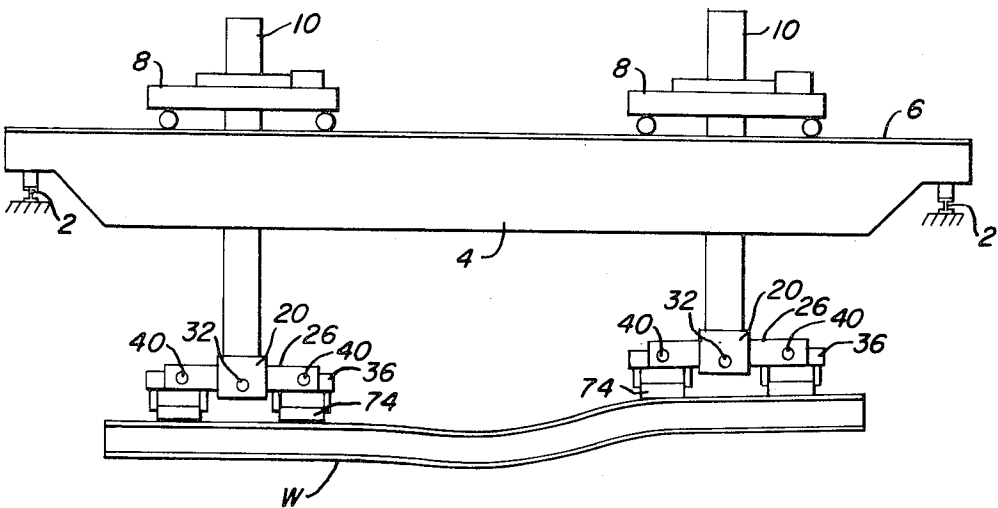


FIG. 1

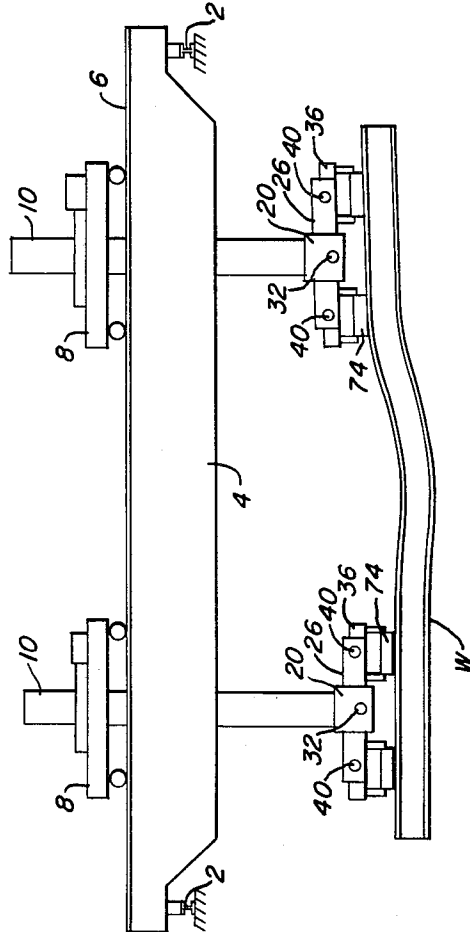
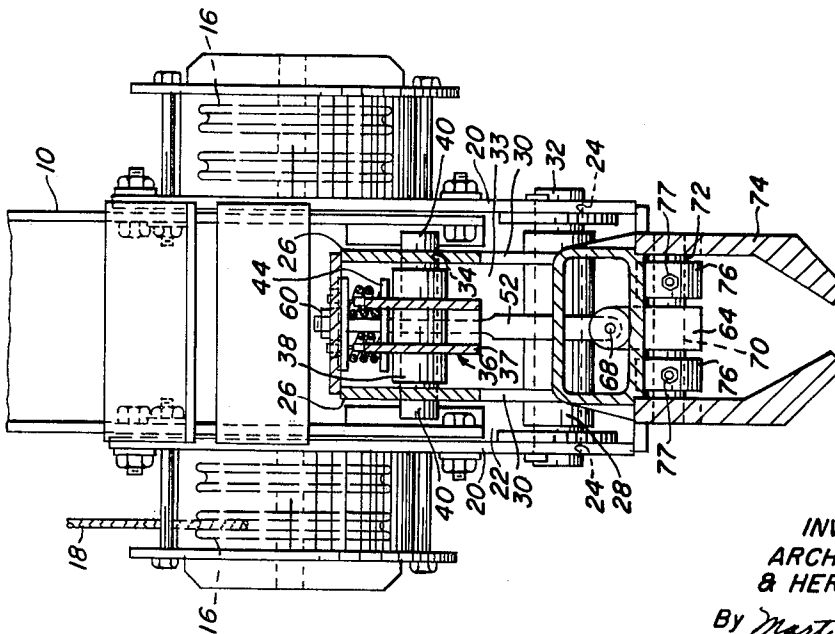
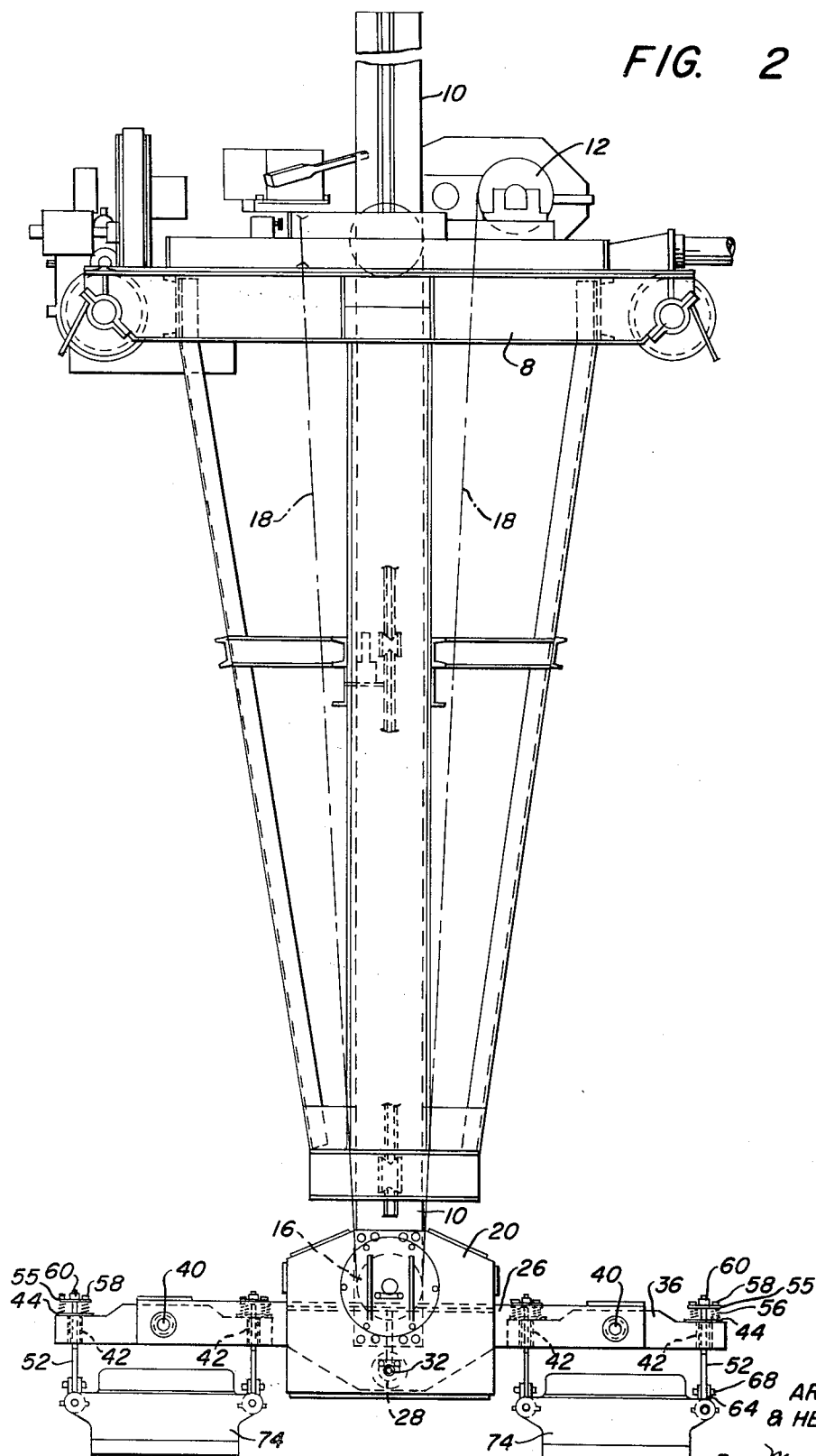


FIG. 5



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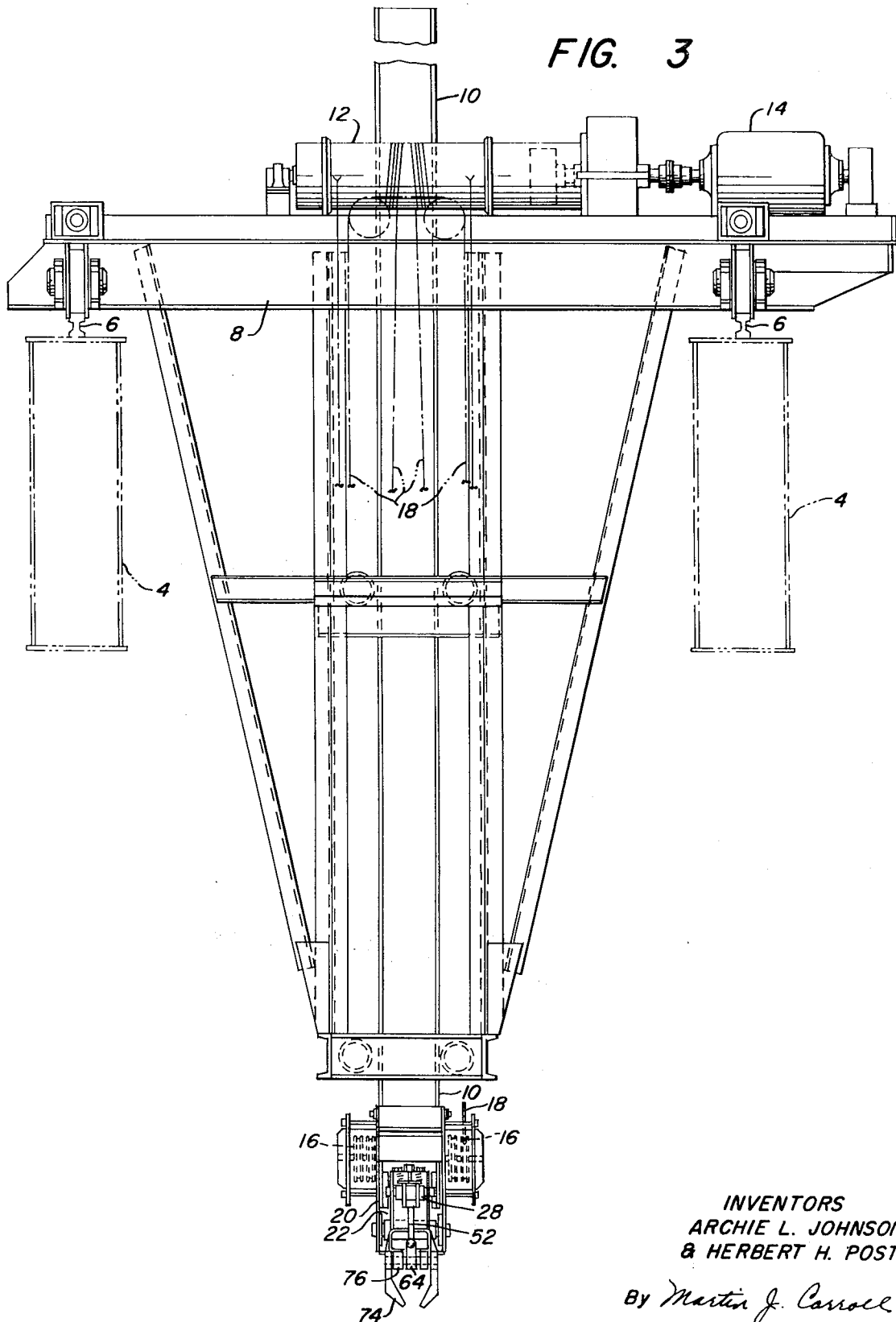
FIG. 2



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FLEXIBLE MAGNET YOKE FOR A CRANE

This invention relates to a crane having two flexible magnet yokes and more particularly to such a crane for handling structural beams. In the cranes used prior to our invention the crane had two trolleys, each with a mast supporting two magnets. The supports for the magnets were of rigid construction so that the bottoms of the magnets were always horizontal and the magnets supported by any one mast were always in the same horizontal plane. When the beams were perfectly square with its top in a single horizontal plane no problem resulted since there was full contact with the magnets. However, it is very common for the beams to be out of square for various reasons. For example, the beam may have some twist in it or it may deflect due to its own weight. When this occurred the magnets could not be in full contact with the beam. This resulted in air gaps between the magnets and the beam which reduced the lifting power of the magnets drastically. This loss of lifting power sometimes resulted in dropping of the beam, thus damaging the beam and other materials or equipment. In addition, this presented a serious hazard to the workmen.

It is therefore an object of our invention to provide a crane having its magnets supported in such a manner that the load is supported over most of the bottom surface of the magnet.

This and other objects will be more apparent after referring to the following specification and attached drawings, in which:

FIG. 1 is a schematic elevation showing how the device of our invention is used in lifting a beam;

FIG. 2 is an elevation of a crane with the lifting yoke of our invention incorporated therein;

FIG. 3 is a side view of FIG. 2;

FIG. 4 is a sectional view showing a portion of the lower end of FIG. 2; and

FIG. 5 is a view taken on the line V—V of FIG. 4.

Referring more particularly to the drawings, reference numeral 2 indicates tracks on which a crane bridge 4 moves. Rails 6 are mounted on top of the bridge 4 for supporting two trolleys 8. The trolleys 8 are identical so that only one will be described in detail. A mast 10 is mounted on trolley 8 for vertical movement with respect thereto. For this purpose a drum 12 is mounted on the trolley and is rotated by means of a motor 14. Sheaves 16 are supported on each side of the bottom of mast 10 and a cable 18 surrounds the drum and sheaves. Thus, operation of the motor causes the mast to raise or lower. The parts so far described are conventional and form no part of the present invention.

A magnet support or bracket 20 is secured to the bottom of mast 10. The support 20 has an opening 22 therethrough with aligned holes 24 through the walls of the opening. A magnet suspension support 26 is received in opening 22 and has a bushing 28 extending between side walls 30 of the support 26. The bushing 28 is arranged between and in axial alignment with the holes 24 and a pivot pin 32 passes therethrough with the suspension support 26 being free to pivot around the pin 32. The magnet suspension support 26 has an opening 33 therethrough with aligned holes 34 in the walls of the opening at each end of the magnet suspension support 26. A magnet suspension bar 36 is received in each end of opening 33 and includes a bushing 38 extending between side walls 37 of the bar 36. The bushing 38 is arranged in alignment with holes 34

and a pivot pin 40 passes through the bushing 38 and holes 34 with the suspension bar 36 being free to pivot around the axis of pin 40. A vertical sleeve 42 is secured to each end of the bar 36 between side walls 37 and a plate 44 is welded to the suspension bar 36 above the top of each sleeve 42 with a hole 45 being provided therethrough in alignment with the sleeve 42. Four pins 46, each having a shoulder 48 and a threaded upper portion 50, are welded to each plate 44 in spaced apart relationship. A hanger bolt 52 passes through the sleeve 42 and hole 45 and through hole 54 in a plate 55 resting on springs 56. Spring 56 surrounds each pin 46 with its ends bearing against plates 44 and 55. Nuts 58 are threaded on the top of pins 46 above the plate 54 and a nut 60 is threaded on bolt 52 above the plate 55. The lower end of the bolt 52, which has a hole 62 therethrough, is received between the sides of yoke 64 which have aligned holes 66 therein for receiving a pivot pin 68. The yoke 64 has a hole 70 therethrough at right angles to the holes 66. A pin 72 is slidably received in holes 66. A magnet 74 is secured to the ends of pins 72. A separator 76 is fastened to the pin 72 on each side of yoke 64. Bolt 52, yoke 64, pins 68 and 72, and separators 76 are made from non-magnetic material so that the magnetic flux is not dissipated above the bottom of the magnet. This insures that the maximum lifting power of the magnet is being used to lift and hold the workpiece. The length of pin 72 is slightly less than the width of magnet 74 and separators 76 are locked in place by means of bolts 77 thereby locking pin 72 in place and insuring that the maximum dimension of the magnet is the width of the magnet. It will be seen that the magnet 74 can pivot freely about the pins 68, that the magnet bars 36 can pivot freely about the pins 40, and that the magnet suspension support 26 can pivot freely about the pin 32. The springs 56 supporting hanger increases 52 increases the flexibility of the magnet support and reduces shock loads on the magnet.

In operation, the masts 10 are lowered until the magnets 74 rest on the workpiece W which is to be lifted, the magnets 74 are energized and the masts 10 are raised to bring the workpiece to the required elevation. Because of the pivoted connections the bottoms of the four magnets 74 will contact the top of the workpiece W over practically their entire surface whether the workpiece is on a slope in a direction parallel or at right angle to its length. As shown in FIG. 1, this contact remains even when the workpiece flexes during the lifting operation. Thus, maximum lifting power of the magnets is utilized.

While one embodiment of our invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

We claim:

1. A crane comprising a mast, an elongated support, a bracket secured to the lower end of said mast, said bracket having generally parallel vertical sides forming an opening for receiving said elongated support, a first generally horizontal pivot pin supported by said parallel vertical sides on which said support is mounted for pivotal movement, a pair of suspension bars, spaced vertical walls in said support for receiving each of said suspension bars, a second generally horizontal pivot pin supporting each of said suspension bars for pivotal movement and supported by said spaced vertical walls, a generally vertical sleeve at each end of each suspen-

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sion bar, a hanger bolt extending through each sleeve with a space between the hanger bolt and the sleeve, a plate surrounding each hanger bolt above the top of said suspension bar, springs bearing against the bottom of said plate biasing said hanger bolt upwardly, a magnet associated with each suspension bar, a clevis attached to each end of the associated magnet, and a pivot pin connecting the bottom end of each hanger bolt to the associated magnet, the axis of said pivot pin being normal to the vertical plane through the axis of

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the suspension bar.
2. A crane according to claim 1 including a crane bridge, a pair of trolleys supported on said bridge for movement therealong, means supporting said mast on one of said trolleys for vertical movement, a second mast having an associated structure similar to said first mast, and means supporting said second mast on the other of said trolleys for vertical movement.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,773,185 Dated November 20, 1973

Inventor(s) Archie L. Johnson, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 37, after "hanger" insert -- bolts 52 --
and delete "52 incrases".

Signed and sealed this 30th day of April 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents