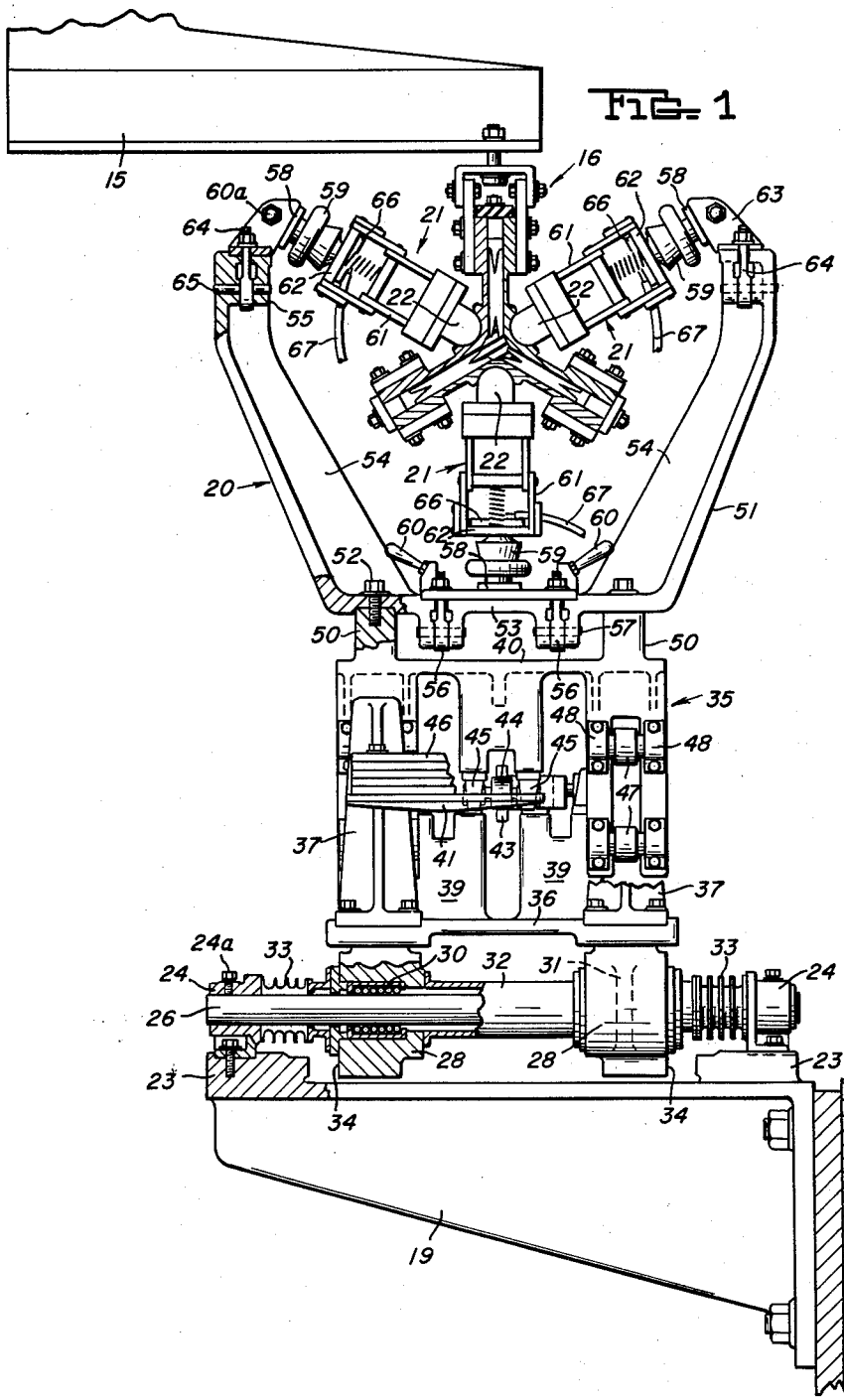
Sept. 1, 1964 H. G. FROSTICK ETAL 3,146,866

PANTOGRAPH CARRIAGE

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FIG. 1



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FIG. 2

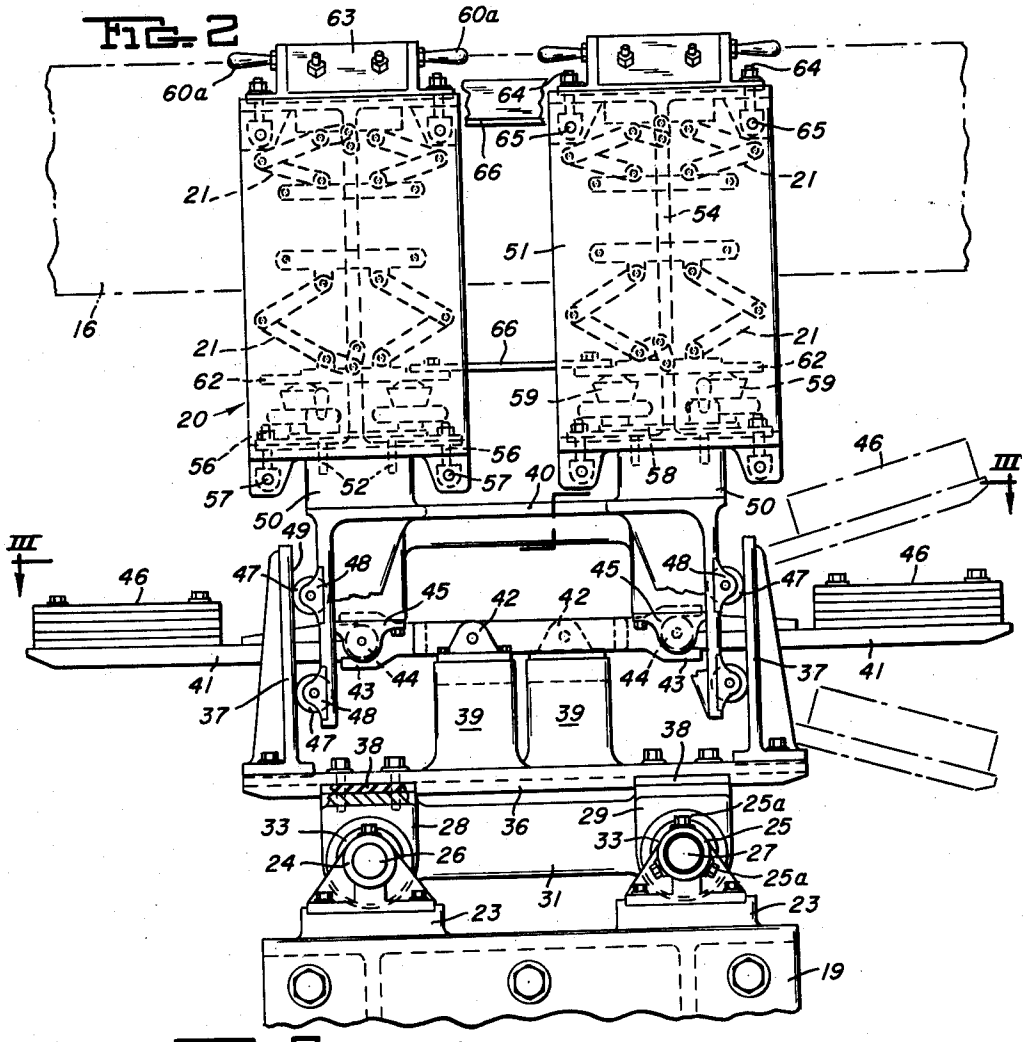
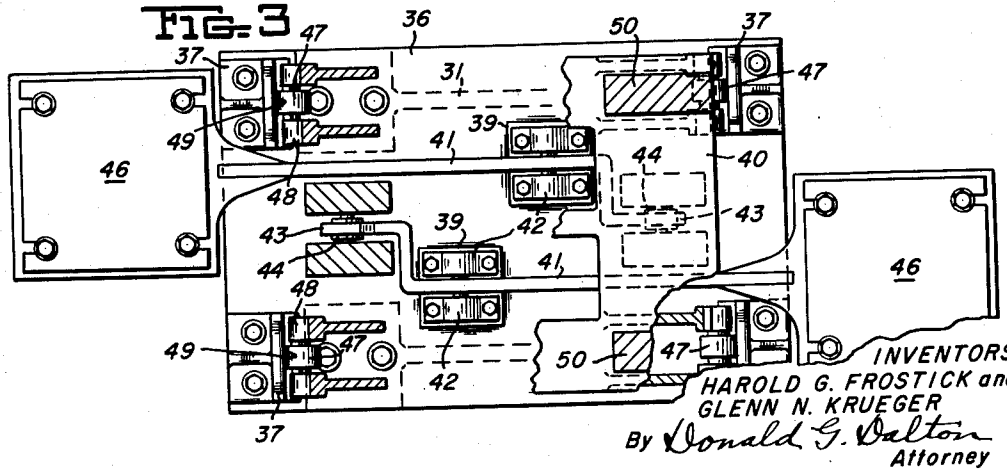


FIG. 3



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PANTOGRAPH CARRIAGE

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This invention relates to carriage mounting pantograph assemblies having shoes for sliding contact with angle-bar conductors symmetrically arranged and so connected as to constitute a rigid collector rail.

Electrically powered vehicles ordinarily are supplied by one or more "third" rails engaged by sliding shoes mounted on the vehicle. In Frostick Patent No. 3,077,512, there is disclosed a collector rail made up of there 120°-angle bars secured together at their edges in Y relation, each bar having a groove of arcuate section on the interior of its vertex. It is the object of this invention to provide carriage mounting pantograph assemblies with shoes sliding in the grooves of the angle bars of such a rail. A further object is to provide a carriage with pantograph-mounting means movable transversely and vertically thereof. A still further object is to provide a counterbalanced pantograph-mounting means to relieve the collector rail of the weight of the pantograph assemblies and their shoes.

In a preferred embodiment, we employ a base or supporting bracket secured on the vehicle such as an overhead crane, for example. Parallel shafts are mounted thereon transversely to the direction of travel and a cage is slidable on the shafts. A frame or block floatingly carried on counterweighted levers for vertical movement in the cage supports a yoke or basket in which the pantograph assemblies are mounted.

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings:

FIGURE 1 is an end elevation of our carriage with parts in section and parts broken away;

FIGURE 2 is a side elevation of our carriage; and

FIGURE 3 is a horizontal section along the plane of line III—IIII of FIGURE 2.

Referring now in detail to the drawings, a traveling crane has a carriage-supporting bracket **19** secured thereto adjacent one end. The carriage indicated generally at **20** has pantograph assemblies **21** with shoes **22** making sliding engagement with the conductors of a rail **16** suspended from brackets **15**. Bracket **19** has four pads **23** on which pairs of dead-eye bearings **24** and **25** are secured. Slide shafts or guide bars **26** and **27** are fixed in these pairs of bearings. Shaft **26** has a snug fit in bearings **24** and is secured thereto by radial screws **24***a*. Bearings **25** are oversize and have radial adjusting screws **25***a* therein whereby shaft **27** may be adjusted to exact parallelism with shaft **26**. Pairs of hubs **28** and **29** are slidable on shafts **26** and **27** and for ease of movement have antifriction bearings **30** therein. The hubs of each pair are connected by a web **31**. Spacer sleeves **32** surround the shafts between the corresponding hubs of the two pairs and bellows sleeves **33** are placed over the ends of the shafts between each hub and bearing to exclude dust. Lateral movement of the hubs is limited by stop lugs **34** depending therefrom adapted to engage pads **23**.

Hubs **28** and **29** support a cage **35** comprising a bottom plate **36** and guide posts **37** upstanding thereon. Pads **38** of rubber-like material for absorbing impact and vibration are disposed between the hubs and plate **36**. Within the

cage are two bearing blocks **39** offset both longitudinally and transversely of plate **36**. A block or frame **40** is floatingly supported in the cage by a pair of levers **41**, one pivoted in bearings **42** on each block **39**. The short arms of the levers are offset and bifurcated as at **43** for cooperation with rollers **44** journaled in bearings **45** on the bottom of the block **40**. The long arms of the levers, extending outwardly beyond the block **40**, accommodate counterweights **46**, which are slotted for the purpose of adjustment. Levers **41** thus act as levers of the first class and weights **46** substantially balance the weight of block **40** and parts carried thereby, to be described hereafter. Rollers **47** journaled in bearings **48** at the ends of block **40** engage ways **49** on posts **37** to guide limited vertical movement of the block in the cage. The extent of such movement is indicated by the dotted-line positions of one of the counterweights in FIGURE 2.

Block **40** has a pad **50** at each corner. The pair of pads at each end of the block supports a yoke or basket **51** secured thereon by screws **52**. Each basket includes a bottom **53** and webs **54** extending upwardly from each side thereof, with an inturned flange **55** at the upper edge. A conventional pantograph assembly **21** is secured to bottom **53** by tiltable bolts **56** pivoted below the bottom on pins **57**. Each assembly comprises a plate **58** and insulators **59**. Lifting handles **60** extend in opposite directions from plate **58**, to facilitate removal and replacement of the assemblies. As shown in FIGURE 1, pantograph linkages **61** are mounted on bars **62** bridging insulators **59**. Linkages **61** support shoes **22**.

Webs **54** have pantograph brackets **63** secured thereto by tilting bolts **64** pivoted on pins **65** and pantograph assemblies **21** extend inwardly and downwardly therefrom. Brackets **63** have lifting handles **60***a* thereon. Corresponding pantographs in the two baskets are connected by jumper straps **66** secured to bars **62**. Flexible conductors **67** extend from straps **66** to the crane-motor power and control system (not shown). FIGURE 1 shows clearly the snug sliding fit of shoes **22** in the arcuate-section grooves of the conductors of rail **16**.

It will be evident that our invention provides a carriage for mounting pantograph assemblies for cooperation with a rigid, multi-conductor, collector rail, having numerous advantages. In the first place, the weight of the pantographs and their supports is substantially counterbalanced so that they impose practically no load on the rail. In the second place, the pantograph-supporting structure is free to move vertically and transversely relative to the crane structure, to compensate for minor deviations of the rail from an exact straight-line condition, as well as movement of the crane longitudinally thereof and irregularities in the level of the crane rails. Thus such deviations and irregularities do not cause application of stress to the collector rail.

Binding of block **40** in cage **35** is prevented by rollers **47** and easy sliding of hubs **28** and **29** on shafts **26** and **27** is assured by antifriction bearings **30**. The pantograph assemblies are always maintained at the proper angle relative to each other. They extend or contract as necessitated by the exact position of the collector rail at any point therealong and are spring-extended as shown to ensure constant contact of the shoes **22** with the grooves in the angle-bar conductors of the rail. The pantograph assemblies may be quickly detached for bodily removal and a replacement substituted in an equally short time, whenever necessary for maintenance. The parts of the carriage itself are such as to be practically maintenance-free.

Although we have disclosed herein the preferred embodiment of our invention, we intend to cover as well any change or modification therein which may be made with-

out departing from the spirit and scope of the invention.

We claim:

1. A pantograph carriage adapted to be mounted on a vehicle for travel along a rigid collector rail, comprising a yoke, a plurality of pantograph assemblies mounted on and extending inwardly of said yoke and means carried by said vehicle floatingly supporting said yoke, said means including a frame supporting said yoke, a tilting lever pivoted at one end to the frame and a counterweight on the other end of said lever.

2. A pantograph carriage adapted to be mounted on a vehicle for travel along a rigid collector rail, comprising a yoke, a plurality of pantograph assemblies mounted on and extending inwardly of said yoke and means carried by said vehicle floatingly supporting said yoke, said means including a frame supporting said yoke, a cage and means guiding vertical movement of said frame in said cage.

3. A pantograph carriage adapted to be mounted on a vehicle for travel along a rigid collector rail, comprising a yoke, a plurality of pantograph assemblies mounted on and extending inwardly of said yoke and means carried by said vehicle supporting said yoke for sliding movement transversely of the direction of travel of said vehicle, said means including a pair of spaced parallel guide bars and yoke-supporting members slidable thereon.

4. Apparatus as defined in claim 2, characterized by

said guiding means including cooperating rollers and ways on said frame and cage.

5. A pantograph carriage adapted to be mounted on a vehicle for travel along a rigid collector rail, comprising a yoke, a plurality of pantograph assemblies mounted on and extending inwardly of said yoke, a cage carried by said vehicle and a frame within said cage and movable vertically therein, said yoke being mounted on said frame.

6. A pantograph carriage adapted to be mounted on a vehicle for travel along a rigid collector rail, comprising a yoke, a plurality of pantograph assemblies mounted on and extending inwardly of said yoke, spaced parallel guide bars mounted on said vehicle, a cage slidable horizontally on said bars, and a frame within said cage movable vertically therein, said yoke being mounted on said frame.

7. Apparatus as defined in claim 6, characterized by means at least partially counterbalancing the weight of said frame, yoke and pantographs.

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