July 22, 1969 B. J. PRICE 3,456,756

MOBILE CANTILEVERED BRIDGE SCAFFOLD

Filed May 1, 1967 3 Sheets-Sheet 1

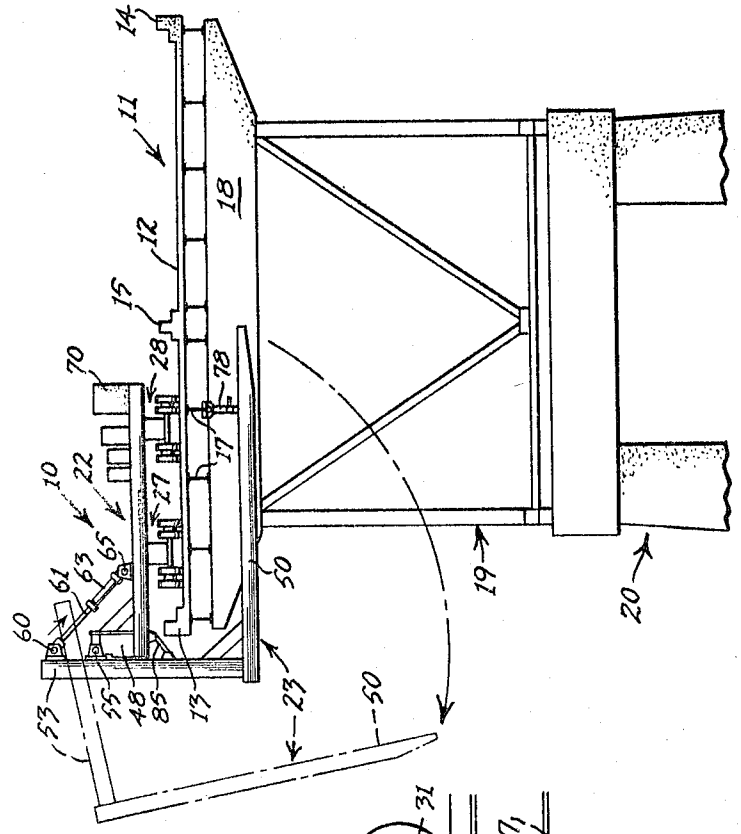


Fig. 1

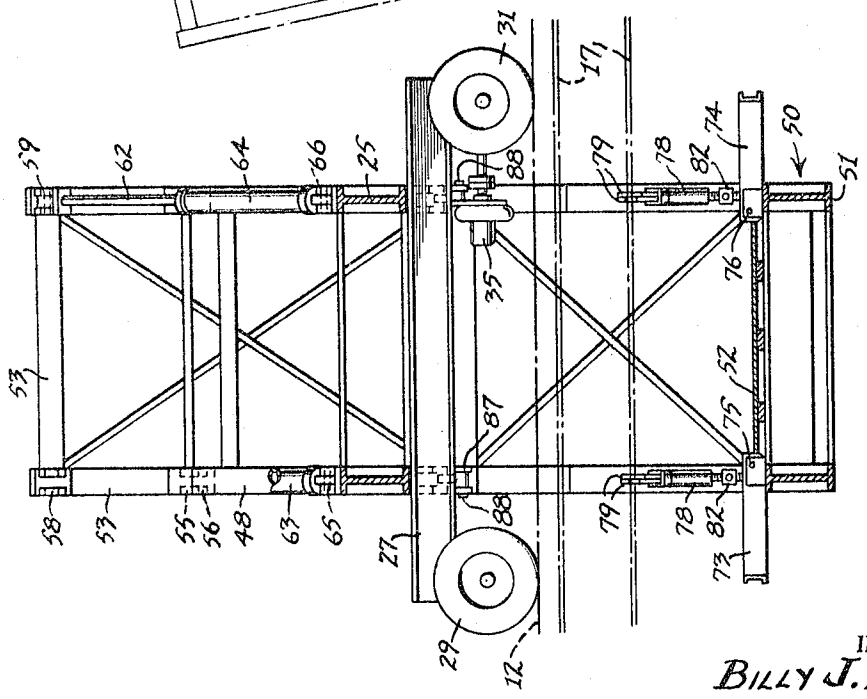


Fig. 4

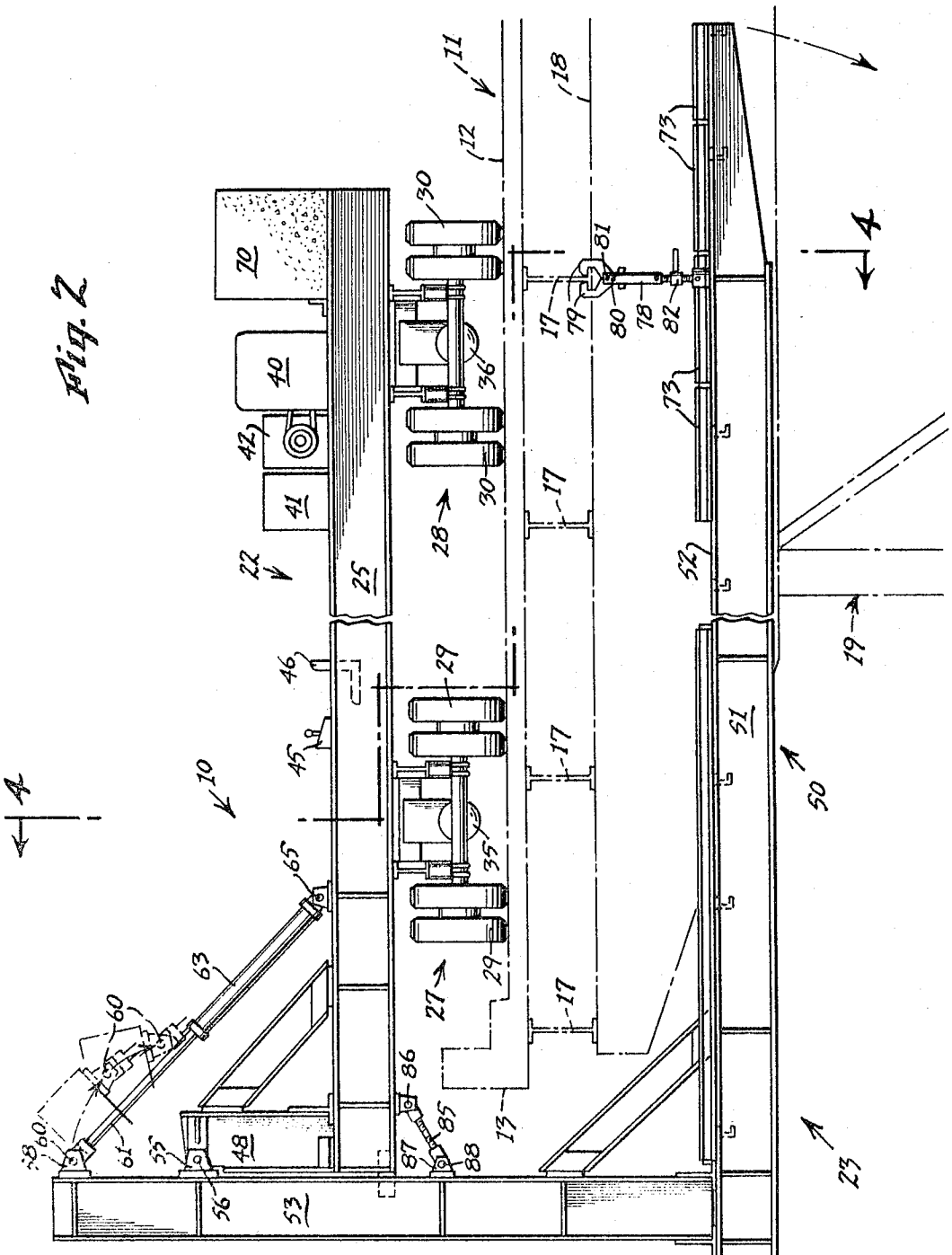
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Fig. 2



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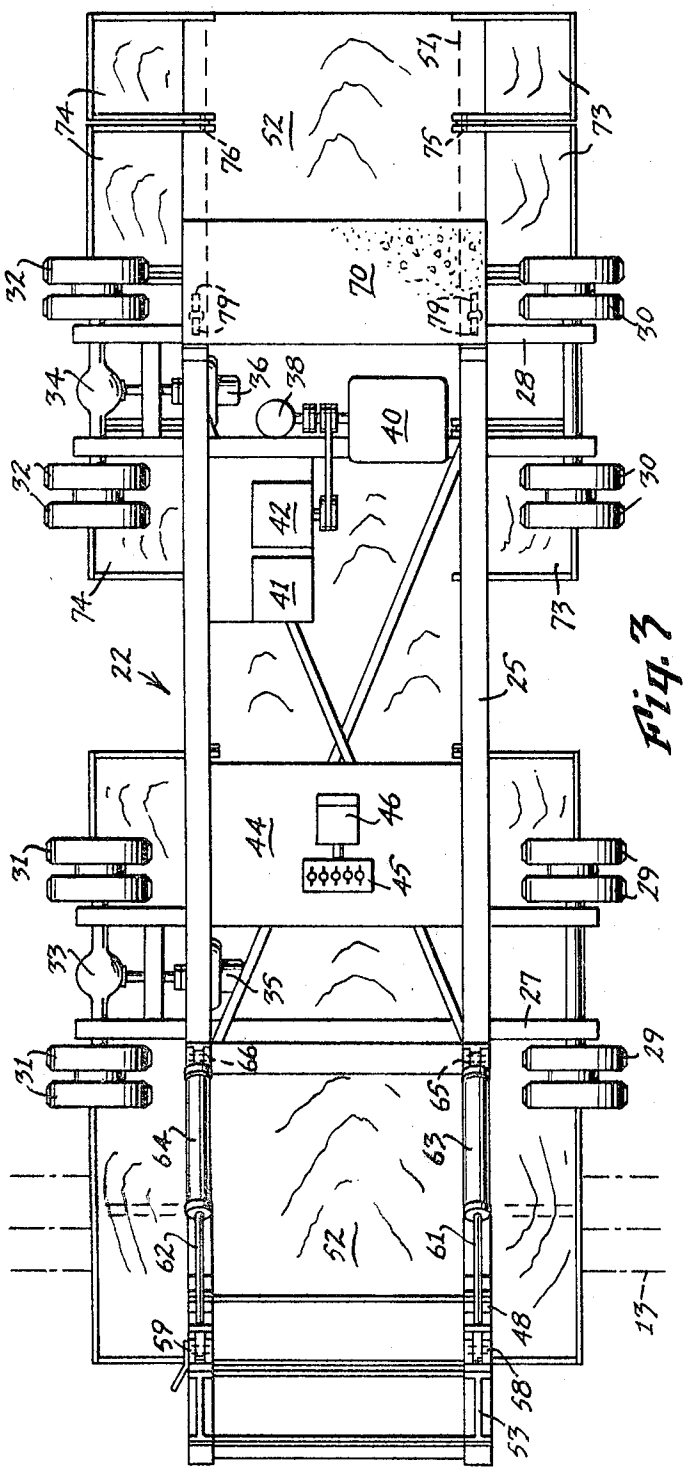


Fig. 3

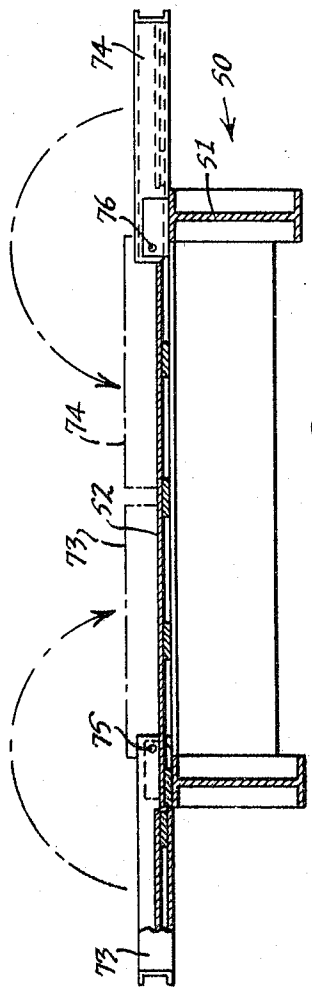


Fig. 5

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United States Patent Office 3,456,756 Patented July 22, 1969

3,456,756

MOBILE CANTILEVERED BRIDGE SCAFFOLD

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Filed May 1, 1967, Ser. No. 635,188
Int. Cl. E04g 5/00, 1/18
U.S. Cl. 182—63 4 Claims

ABSTRACT OF THE DISCLOSURE

A mobile chassis adapted to move along the edge of a bridge deck, a cantilevered platform member pivotally mounted to the chassis, and double-acting means mounted upon the chassis and connected to the platform member for positively swinging the platform member beneath and away from the bridge deck.

BACKGROUND OF THE INVENTION

This invention relates to a bridge scaffold, and more particularly to a mobile bridge scaffold pivotally supporting a cantilevered platform.

In bridge construction, and particularly the construction of reinforced concrete bridges, a certain amount of manual labor has to be performed beneath the bridge deck after it is constructed. For a concrete bridge deck, the forms must be stripped from beneath the deck after the concrete has set. Moreover, a certain amount of finishing work must be performed beneath the bridge deck, such as finishing the concrete or painting the steel supporting members, such as the truss work.

In order to accomplish this manual labor beneath the bridge deck, various types of scaffolds have been designed and constructed to provide a platform beneath the bridge deck upon which workers may carry out these finishing operations. Some platforms have been of a temporary, stationary type, which require about as much time in assembling and positioning, and dis-assembling, as the actual work performed by the men on the scaffold. Other types of bridge scaffolds have been mounted on mobile chassis for movement longitudinally of the bridge as the work beneath the bridge deck progresses, such as disclosed in the Kaufman Patent 2,669,490 and the Sims Patent 3,035,659. These patents also disclose mobile scaffolds incorporating cantilevered platforms which are moved into operative position beneath the bridge deck and to an inoperative position away from the bridge deck, by various types of cable and winch means with the assistance of gravity.

SUMMARY OF THE INVENTION

This invention contemplates not only a bridge scaffold incorporating a mobile chassis and a pivotally mounted, cantilevered platform, but also fluid-powered means for positively swinging the platform in both directions between its operative and inoperative positions.

The invention also contemplates a mobile cantilevered bridge scaffold incorporating a particular construction of the framework and hinge means for pivotally swinging the platform relative to the chassis and the bridge deck with a minimum of effort and maximum efficiency.

Another object of this invention is to provide in a cantilevered bridge scaffold a pivotal connection between the movable platform member and the supporting chassis in which the pivotal axis is located substantially above the chassis to provide a large radius and a small arc through which the platform swings, and to improve the leverage of the means for swinging the platform member between its operative and inoperative positions.

A further object of this invention is to provide a mobile cantilevered bridge scaffold in which the mobile chassis will occupy a minimum of space transversely of a bridge deck, and in which the chassis may simultaneously support a cantilevered platform extending the full width of the deck.

Another object of this invention is to provide in a mobile cantilevered bridge scaffold a platform incorporatiing foldable platform extensions so that the platform with the extensions folded may be moved into operative position between relative narrow bridge supporting members and the platform extensions may be unfolded in operative position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an end elevation of the bridge scaffold made in accordance with this invention in operative and inoperative positions upon a bridge;

FIG. 2 is an enlarged end elevation of the scaffold in operative position, with the bridge disclosed in phantom;

FIG. 3 is a top plan view of the scaffold disclosed in FIG. 2;

FIG. 4 is a section taken along the line 4—4 of FIG. 2; and

FIG. 5 is an enlarged outboard side elevation of the platform disclosed in FIG. 4 partially in section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in more detail, the scaffold **10** made in accordance with this invention is disclosed in FIGS. 1, 2 and 4 upon a bridge **11** including a concrete deck **12**, the lateral edges of which form curbs **13** and **14**, and including a center dividing strip **15**. The deck **12** is supported by longitudinal I-beam stringers **17**. The longitudinal stringers **17** are supported at spaced longitudinal intervals by cross-beams **18** mounted on trusswork **19**, carried by concrete piers **20**.

The scaffold **10** includes a mobile chassis **22** upon which is pivotally mounted a cantilevered platform member **23**.

The chassis **22** is disclosed as a rectangular frame **25** upon which is mounted the various operating equipment, and also for supporting the operator of the scaffold. The chassis **22** is supported for movement longitudinally of the bridge and adjacent one side thereof, for example the curb **13**, by running gear, such as **27** and **28**, incorporating front wheels **29** and **30** and rear wheels **31** and **32**, respectively. The rear wheels **31** and **32** may be driven by any convenient means, such as differentials **33** and **34** by hydraulic motors **35** and **36**, respectively. The hydraulic motors **35** and **36** are supplied with hydraulic fluid under pressure from hydraulic pump **38** driven by gasoline engine **40** through fluid lines, not shown. The hydraulic pump **38** is connected to the hydraulic reservoir **41**, by fluid lines, not shown, in order to complete the hydraulic circuit. The chassis **22** may also mount other equipment for other purposes, such as an air compressor **42**, also driven by the gasoline engine **40**.

The chassis **22** also supports an operator station **44**, which may take the form of a cab, mounting a control panel **45** and an operator seat **46**.

As particularly disclosed in FIGS. 1 and 2, the outboard end of the chassis **22** projects laterally beyond the outboard running gear **27** sufficiently to extend beyond the curb **13** of the bridge deck **12**.

Fixed to and projecting upwardly from the chassis frame **25** adjacent the outboard end of the chassis **22** is a side frame **48** of the same width as the frame **25**.

The platform member **23** includes an elongated platform **50** having a rectangular frame **51** and a platform deck **52**. The platform **50** is sufficiently long to extend beneath the bridge deck **12** transversely any desired distance.

Fixed to and projecting upwardly, preferably at right angles to the platform **50** adjacent its outboard end is a support frame **53**, also disclosed as rectangular and of substantially the same width as the platform **50**. The support frame **53** is long enough to extend vertically from the platform **50** in operative position above the bridge deck **12**, the chassis **22** and the top end of the side frame **48**. The top end of the side frame **48** is pivotally connected to the support frame **53** below its top end by one or more journal members **55** having a common pivotal axis, parallel to the direction of travel of chassis **22**. In the scaffold **10** two journal members are employed on each side of the frames **48** and **53**, although only one journal member **55** including a pivot pin **56** can be seen in the drawings.

The distance between the journal member **55** and the platform **50** is sufficient for the platform **50** to extend transversely beneath the deck **12** in operative position and allow sufficient head room for workers to stand on the platform deck **52** and conveniently work beneath the bridge deck **12**.

Spaced vertically above the journal member **55** and mounted on the upper end of the support frame **53**, and on opposite sides thereof, are a pair of clevises **58** and **59** receiving and pivotally connected by pivot pins **60** to the free ends of piston rods **61** and **62**. The pivot pins **60** have a common pivotal axis parallel to the pivotal axis of the journal pins **56**. The piston rods **61** and **62** are reciprocably received within their corresponding hydraulic cylinders **63** and **64**, the lower ends of which are pivotally connected by pivot pins **65** and **66** to the chassis frame **25**. The hydraulic cylinders **63** and **64** are double-acting and are supplied with hydraulic fluid under pressure by fluid lines, not shown, from the hydraulic pump **38**.

It will be noted that the hydraulic cylinders **63** and **64** and the corresponding piston rods **61** and **62** are disposed in normal operative position at approximately a 45° angle to the chassis frame **25** to obtain optimum leverage. The arc of travel of the pivot pin **60** between its operative and inoperative positions is disclosed in dashed lines in FIG. 2. Since the maximum turning force transmitted axially through the piston rod **61** must act tangentially to the illustrated arc generated by the pivot pin **60**, then it is apparent that the positioning of the cylinder **63**, piston rod **61** and pivot pin **60** is more efficient than a cylinder mounted upon and parallel to the chassis frame **25**. In order to obtain the optimum angular position of the cylinder **63** and piston rod **61**, the pivot pin **60** is located above the journal pin **56** and the journal pin **56** is mounted above the chassis frame **25**. In this manner, the maximum components of forces exerted axially through the piston rod **61** will turn or pivot the platform support frame **53** and a minimum of the force components will be lost or wasted in acting parallel to the longitudinal axis of the support frame **53**, during the entire stroke of the piston rod **61**.

The journal member **55** is mounted on top of a vertically extending side frame **48** in order to elevate the pivotal axis of the platform member **23** as much as possible to provide a maximum radius and a minimum pivotal arc through which the platform member **23** travels between its operative and inoperative positions.

Although FIG. 1 discloses the inoperative position of the platform member **23** in phantom at a pivotal angle slightly less than 90° from the operative position of the platform member, nevertheless the inoperative position could be at a much smaller angle with the free end of the platform **50** still clearing the trusswork **19**.

Mounted on the inboard end of the carrier frame **25** is a counterweight **70**, disclosed as a massive block of concrete, in order to assure that the center of gravity of the entire scaffold **10** extends between the running gears **27** and **28**, regardless of the pivotal position of the platform member **23**. It is also within the scope of this invention to provide a platform **50** long enough to substantially span the entire width of the bridge deck **12** without extending the corresponding dimension of the carrier frame **25**, by providing sufficient mass within the counterweight **70**. In this manner, the platform member **50** will extend far enough for the workmen to complete their finishing operation upon the entire width of the bridge for each station of the scaffold **10** along the bridge. Since the corresponding transverse dimension of the chassis **22** does not have to be extended, there will be sufficient clearance on top of the bridge deck **12** for at least one lane of moving traffic as disclosed in FIG. 1.

As best disclosed in FIGS. 3, 4 and 5, platform extensions **73** and **74**, preferably rectangular, are pivotally connected along their inner edges by hinge pins **75** and **76** to the opposite side edges of the platform **50**. In their normal operative positions disclosed in solid lines in FIGS. 4 and 5, the extensions are folded outwardly substantially coplanar to each other and the platform **50** to provide an expanded platform surface beneath the bridge deck **12**. When not in use, the platform extensions **73** and **74** are folded upwardly and inwardly to their inoperative positions as disclosed in phantom in FIG. 5. The purpose of these platform extensions **73** and **74** is to permit the platform **50** to move between closely spaced truss members in the trusswork **19** with the extensions **73** and **74** folded in inoperative position. Then, when the platform **50** is in operative position, the extensions are unfolded to provide maximum platform surface, beneath the deck **12**.

In order to assist in supporting the platform **50** beneath the bridge deck **12** in operative position, a suspension member **78** may be mounted on each side of the platform frame **51**. Suspension member **78** is provided with a pair of opposed clamp jaws **79** pivotally connected by pin **80** and adapted to engage the bottom flange of one of the I-beams **17** in operative position, and to be locked in that position by a locking pin **81**. The clamp jaws **79** may then be tightened against the bottom flange of the I-beam **17** by a ratchet member **82**. The suspension member **78** may be of particular benefit for especially long platforms **50**.

As an additional safety feature, a locking rod **85** may be permanently pivotally connected to the bottom of the carrier frame **25** by pivot pin **86**. When the platform member **23** is in operative position, then the free end of the locking rod **85** may be fitted within the clevis **87** fixed to the support frame **53** and locked in place by a locking pin **88**. When it is desired to move the platform member **23** away from its operative position, the locking pin **88** is of course first removed.

It is therefore apparent that a mobile cantilevered bridge scaffold of simple and economical construction has been developed which can be positively and quickly pivoted between its operative and inoperative positions with a minimum hydraulic stroke, a maximum radius and gradual arc of travel for the platform member through a relatively small pivotal angle, and with an optimum application of a turning force by the hydraulic drive means upon the platform member.

It will be apparent to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A mobile bridge scaffold comprising:

(a) a chassis having an outboard edge and an inboard edge,

(b) running gear mounted on said chassis to support said chassis for travel along the upper surface of and adjacent and parallel to one edge of a bridge deck so that said outboard edge projects laterally outboard of said deck edge,

(c) a side frame fixed to and projecting above said chassis adjacent said outboard edge,

(d) an elongated platform having an outboard end and a free inboard end,

(e) an elongated support frame fixed to said outboard end and extending above said platform in operative position,

(f) journal means connecting said support frame to said side frame for pivotal movement of said platform in a substantially vertical plane between an operative position in which said platform is spaced far enough below said chassis that said platform will extend transversely beneath the bridge deck and have sufficient head room to permit workmen to stand on said platform, and an inoperative position in which the platform is laterally outboard of the bridge supporting structure to permit free movement of the chassis along said deck,

(g) an elongated rod pivotally connected to said support frame above said journal means in operative position, and

(h) double-acting drive means mounted on said chassis for reciprocably and longitudinally moving said rod to positively swing said platform in either direction between said inoperative and operative positions.

2. The invention according to claim 1 in which said double-acting drive means comprises a fluid cylinder,

means pivotally connecting said cylinder to said chassis below said journal means, said rod comprising a piston rod reciprocably received in said cylinder.

3. The invention according to claim 1 in which the inboard end of said platform projects, in operative position, inboard substantially farther than the inboard end of said chassis, and further comprising a counter-weight mounted on said chassis adjacent said inboard edge to maintain the center of gravity of said scaffold within said running gear for any position of said platform.

4. The invention according to claim 1 further comprising suspension means pivotally connected to said platform adjacent said inboard end for connection to a structural portion of said bridge beneath the deck to assist in supporting the free end of said platform in operative position.

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U.S. Cl. X.R.

182—141