May 26, 1964 H. T. ADKINS ETAL 3,134,116

PORTABLE PROJECTION BRIDGE

Filed July 5, 1960

5 Sheets-Sheet 1

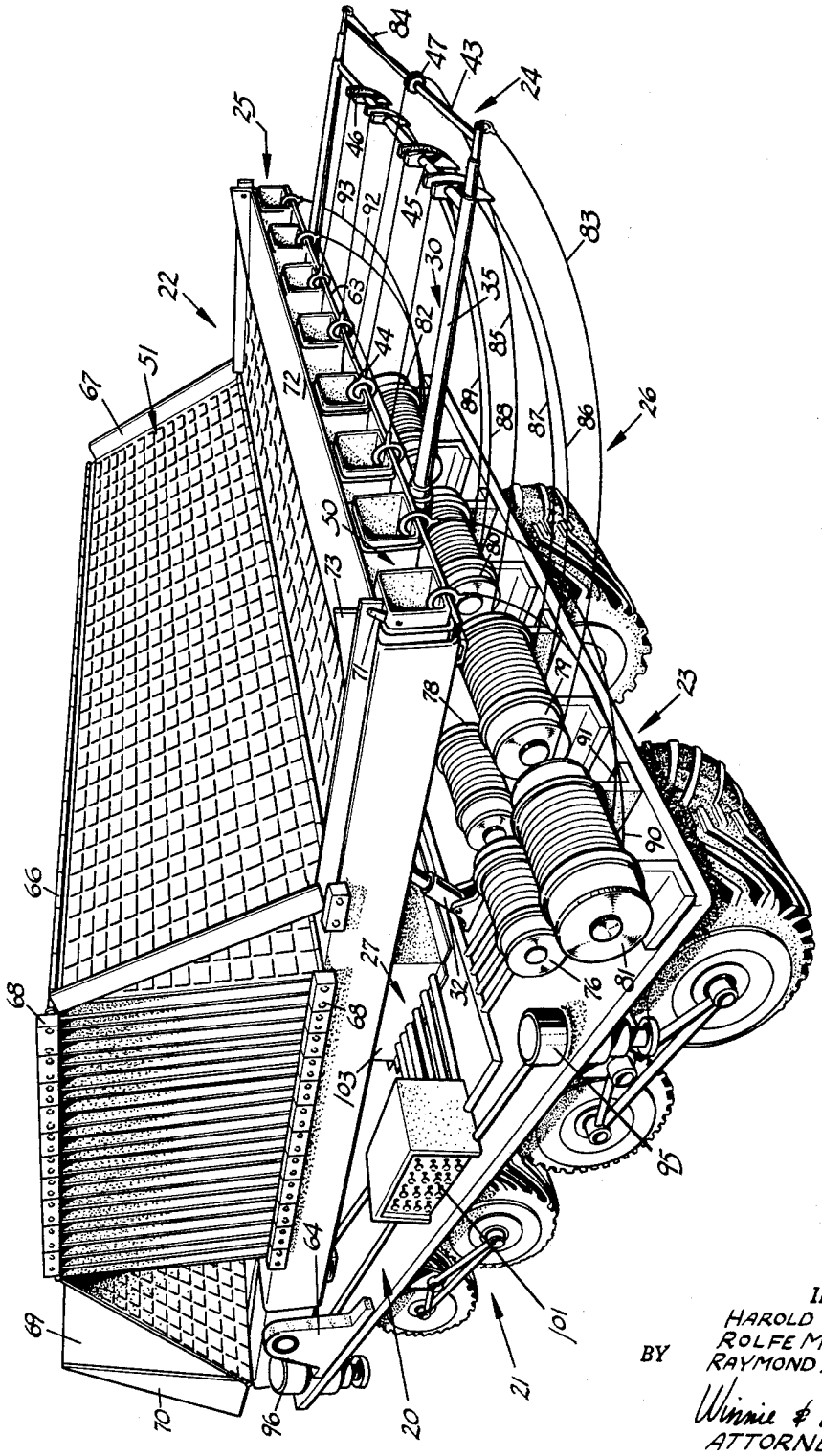


FIG. 1

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PORTABLE PROJECTION BRIDGE

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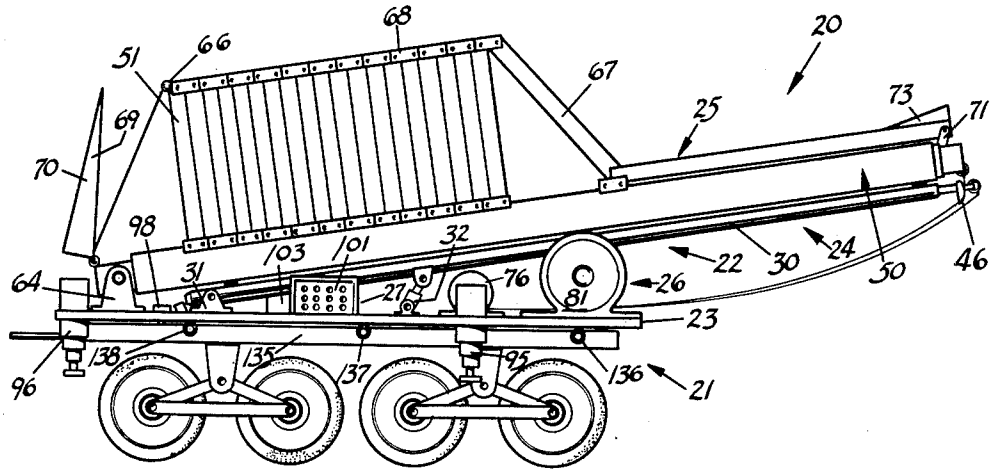


FIG. 2

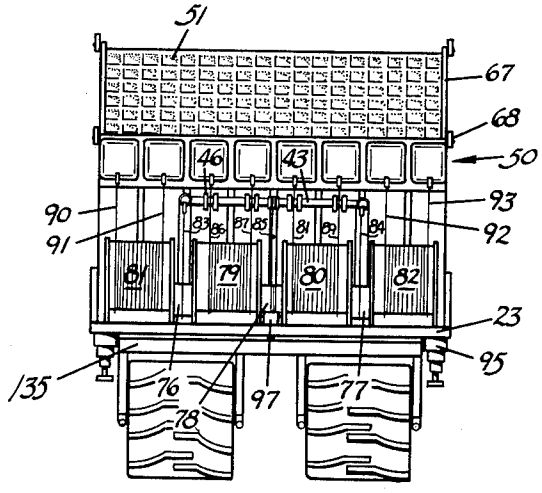


FIG. 3

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PORTABLE PROJECTION BRIDGE

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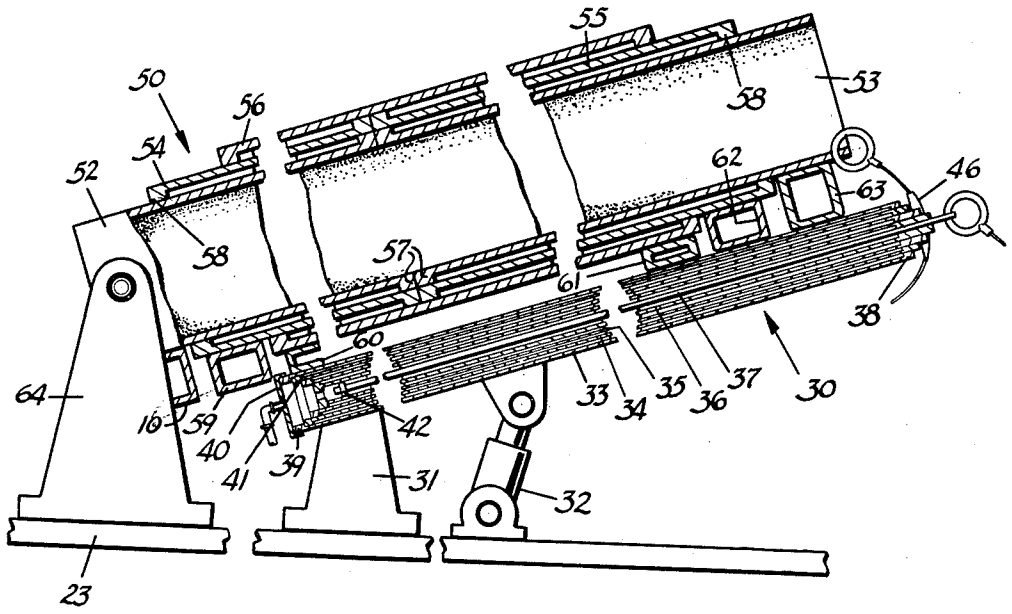


FIG. 4

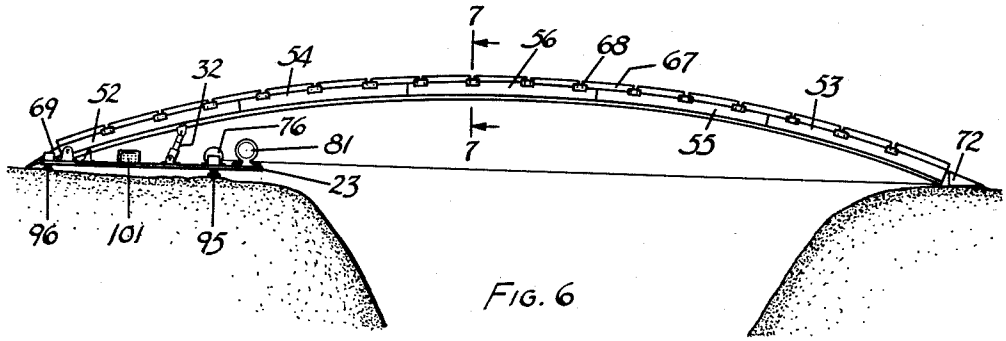


FIG. 6

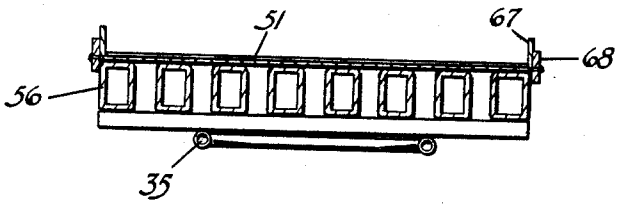


FIG. 7

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PORTABLE PROJECTION BRIDGE

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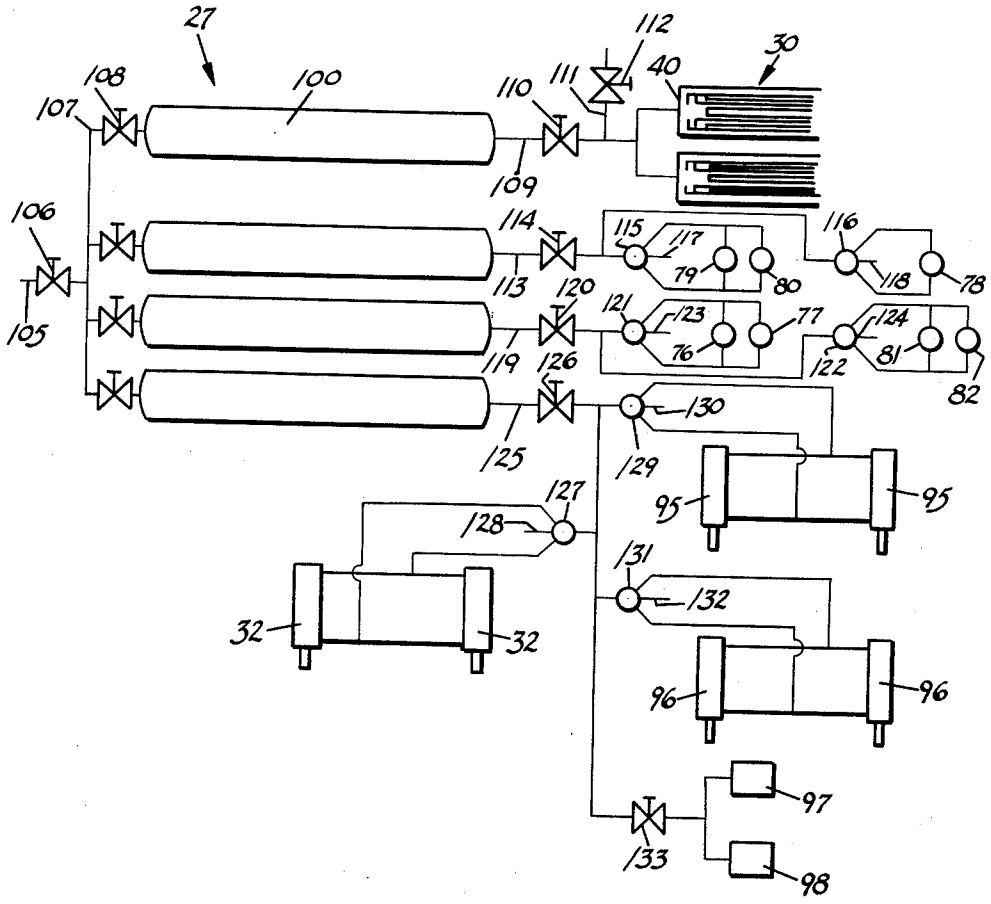


FIG. 5

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PORTABLE PROJECTION BRIDGE

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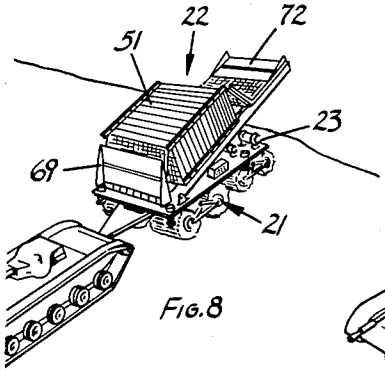


FIG. 8

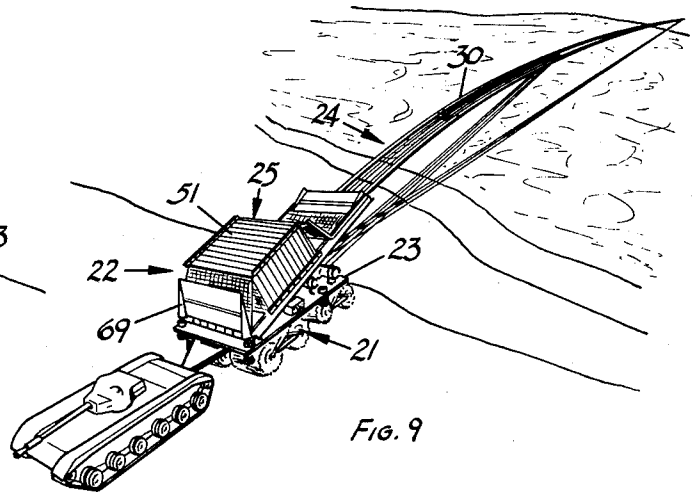


FIG. 9

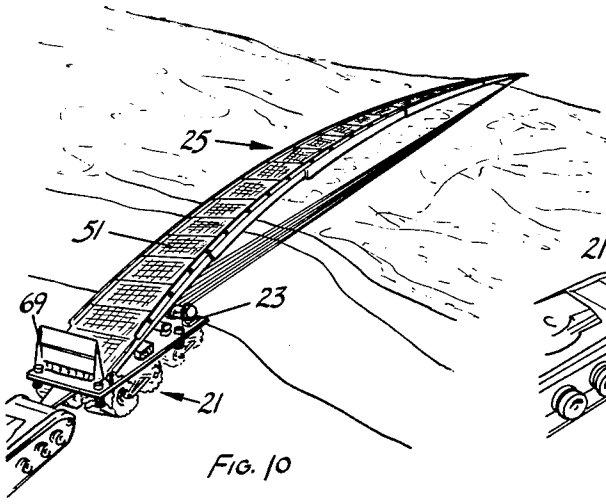


FIG. 10

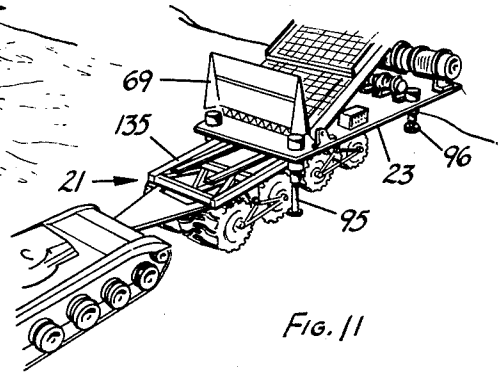


FIG. 11

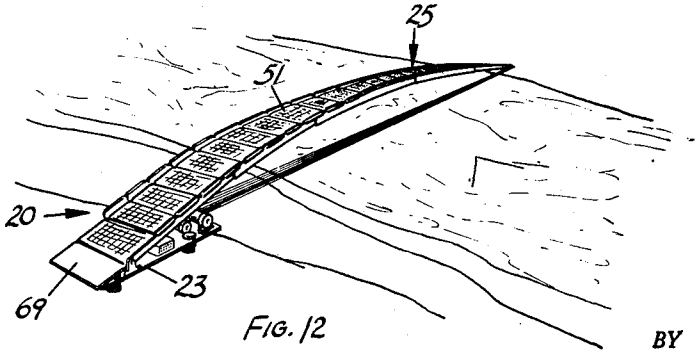


FIG. 12

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United States Patent Office 3,134,116 Patented May 26, 1964

3,134,116

PORTABLE PROJECTION BRIDGE

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Filed July 5, 1960, Ser. No. 40,803
3 Claims. (Cl. 14—1)

This invention relates to the mechanical arts. More particularly, it relates to bridges and especially to portable bridges.

From time to time the need arises for a temporary bridge which can be rapidly placed into position for spanning a bridgeless ravine, an unspanned deep river or some similar gap in the surface road system.

Such a need frequently arises during military operations. In this regard modern warfare demands that an army have speed and mobility. Front line equipment is now "rolling stock" and vehicles are more and more a necessary part of an attacking military force. But, such a force is slowed down by substantial gaps in the surface road system. The erection of a bridge, even with sufficient material and manpower available, can be a difficult and hazardous task and seriously time-consuming.

In construction projects, such as in the construction of roads, electrical highlines and the like, a temporary bridge may be necessary in order to place men and materials on the other side of a ravine, canyon and the like in order to carry out the construction of a more permanent bridge structure.

Hence, there is a need for a portable bridge which can be projected into place for use and, when the necessity for the same ceases, can be retracted into a compact structural unit for transportation to another site.

A general object of this invention is to provide such a bridge.

A specific object of this invention is to provide a portable projection bridge which is structurally complete at all times and which need not be assembled or knocked down under normal use conditions.

Still another specific object of this invention is to provide such a bridge which can be placed into use in rapid order with a minimum of personnel. Indeed, in its more specific aspects, this invention has as its object a portable projection bridge which can be rapidly moved into place by an armored vehicle and be projected into position without the necessity of having to expose personnel.

These and other objects which may appear as this specification proceeds are achieved by this invention.

This invention in its broader and narrower aspects is predicated on a number of concepts.

One concept involved in this invention is that of telescopable, span forming, beam means which can be extended from a telescoped position into a bridge span.

Another structural concept employed is that of road bed sections hingedly connected together in series with the end sections thereof hingedly connected to the end members of the telescopable, span forming, beam means. Hence, upon extension of the telescopable, span forming beam means from a telescoped position, the road bed sections are pulled along therewith out of a nested position to form a road bed supported by said span forming beam means.

Another concept involved in this invention is that of means for extending said telescopable, span forming beam means into fully extended position and for retracting the same into telescoped position. In a specific embodiment of this invention, there is involved a precursor bridge structure in which is employed auxiliary span means in the form of telescopable tubes which are extendable by

application of pressure air to the ends thereof. In this specific embodiment the auxiliary span means are provided with cable bearing surfaces and the bridge structure is provided with cable means bearing on said surfaces intermediate the ends of the cable means. One end of said cable means is attached to the forward ends of the telescopable, span forming beam means while the other end of said cable means is attached to relatively stationary winch means.

Still another concept involved in this invention is that of a platform means on which are mounted the winch means and the stationary end members of the telescopable, span forming beam means. In a specific aspect involved there is employed the concept of trailer means for receiving said platform means and means for disengaging the platform means from the trailer means when the bridge structure is to be placed into use.

These and other concepts as may appear as this specification proceeds are present in the specific embodiment of this invention disclosed in the drawings and described hereinafter.

In the drawings:

FIG. 1 is a perspective view of a preferred embodiment of a portable projection bridge of this invention with the precursor bridge assembly in partially extended condition;

FIG. 2 is a side view of the bridge of FIG. 1 but with all parts thereof in nested, retracted condition;

FIG. 3 is a front end view of the portable projection bridge of FIG. 1;

FIG. 4 is a cross sectional view taken through the telescopable, main span forming beam means and through the telescopable tubing which form the auxiliary span means;

FIG. 5 is a diagrammatic flow sheet of the pressure air system of the bridge structure of FIG. 1;

FIG. 6 is a side view of the portable bridge structure of FIG. 1 in fully extended position and with the trailer removed therefrom;

FIG. 7 is a cross sectional view of the bridge structure of FIG. 6, which view is taken as indicated by the sectioning plane 7—7 of FIG. 6;

FIG. 8 illustrates the portable bridge of FIG. 1 in nested condition being placed into position by an armored vehicle;

FIG. 9 illustrates the portable projection bridge in which the precursor bridge structure or auxiliary span means has been extended;

FIG. 10 is an illustration of the portable projection bridge of FIG. 1 with the main bridge structure in fully extended condition;

FIG. 11 is an illustration of the portable bridge structure of FIG. 10 in condition and position for removal of the trailer therefrom; and

FIG. 12 is an illustration of the portable projection bridge in fully extended condition with the trailer removed therefrom and the platform means lowered to the ground so that the bridge structure is in readiness for use.

Structure

In greater detail, FIGS. 1–3 of the drawings disclose a portable projection bridge **20** in combination with a trailer **21**. In general, the portable projection bridge **20** comprises a bridging structure **22** mounted on a platform **23**.

The bridging structure **23** comprises a precursor bridge assembly **24**, a main bridge assembly **25** and in combination with these assemblies a cable and winch system **26** and a pressure air system **27**.

The precursor bridge assembly **24** comprises a pair of auxiliary span tube sets **30**. The auxiliary span tube sets **30** are generally horizontally and longitudinally disposed in spaced, parallel relationship. The back end

of each auxiliary span tube set **30** is pivotally mounted on a mounting bracket **31** secured to the platform **23**. Such mounting provides a horizontal, transverse axis of rotation for each auxiliary span tube set **30**. Forwardly of the bracket **31** each auxiliary span tube set **30** is supported on the upper end of an elevation position setting air jack **32**, the lower end of which is pivotally mounted to the platform **23**.

Each auxiliary span tube set **30** comprises a plurality of lightweight tubes arranged in concentric, telescopable relationship. In the embodiment shown in FIG. 4 the auxiliary span tube set **30** comprises an outer encasement tube **33**, a first intermediate tube **34**, a second intermediate tube **35**, a third intermediate tube **36** and an inner tube **37**. More or less intermediate tubes may be provided depending upon the length desired of the precursor bridge assembly **24** when fully projected. The front end regions of the outer encasement tube **33** and the intermediate tubes **34**, **35** and **36** comprise inwardly extending, annular flanges **38** which not only function as stops upon extension of the auxiliary tube span set but also as bearings for the tubes during extension and retraction. The back end region of the outer encasement tube **33** comprises an inwardly extending, annular flange **39** and an end closure, pressure air head **40**. The back end regions of the intermediate tubes comprise outwardly extending annular flanges **41** which function as bearings for the intermediate tubes, stops for the tubes when fully extended and retracted and as pressure seals. The back end region of the inner tube **37** is closed and comprises an annular, outwardly extending flange **42** which functions as a stop for the tube **37** when in fully extended and retracted positions, as a bearing for the inner tube **37** and as a pressure seal.

Between the auxiliary span tube sets **30** and joined to the front ends of the inner tubes **37** is a front cross bar **43**. This is best shown in FIG. 1. Between the auxiliary span tube set **30** and joined to the front ends of the first and second intermediate tubes **34** and **35** are cross bars **44** and **45** respectively. These cross bars provide lateral stability to the precursor bridge assembly **24**. Mounted on the cross bar **45** between the second intermediate tubes **35** are downwardly and upwardly extending guide means **46** which have vertically disposed cable guide surfaces. Mounted centrally on the front cross bar **43** is a pulley **47**.

The main bridge assembly **25** comprises a plurality of main span beam sets **50**, and a plurality of road bed sections **51**. The main span beam sets **50** are longitudinally and horizontally disposed side by side above the auxiliary span tube sets **30**. Each span beam set **50**, as best shown in FIG. 4, comprises a plurality of telescopable lightweight tubes generally rectangular in cross-section. In the embodiment shown each beam set **50** comprises five of these tubes: a back inner tube **52** and a front inner tube **53** arranged end to end when in telescoped position, a back intermediate tube **54** and a front intermediate tube **55** disposed end to end when in telescoped position and surrounding in sliding relationship the back and front inner tubes **52** and **53**, and an outer tube **56** which surrounds in sliding relationship the back and front intermediate tubes **54** and **55**. The adjacent ends of the back and front inner tubes **52** and **53** and the back and front intermediate tubes **54** and **55** comprise outwardly extending flanges **57**. The back end of the back intermediate tube **54**, the front end of the front intermediate tube **55** and the front and back ends of the outer tube **56** have inwardly extending flanges **58**. These flanges **57** and **58** function not only as bearings for the tubes relative to one another but also as stops limiting the extent of maximum projection of the tubes in each set. The back end of the back inner tube **52** in each main span beam set **50** is pivotally mounted on a mounting bracket **64** secured to the platform **23**. The mounting bracket **64** provides for each main span beam

set **50** a horizontal, transverse axis of rotation. Forwardly of this axis the back inner tube **52**, intermediate tubes **54** and outer tubes **56** in each set **50** are joined in the region of their back ends by generally horizontal, transverse cross bars **10**, **59** and **60** while the front inner tube **53**, the front intermediate tube **55** and the outer tube **56** in each set **50** are joined in the region of their front ends by generally horizontal cross bars **61**, **62** and **63**. In each case the cross bar is disposed on the underside of the main span beam sets **50**. When the main span beams are in telescoped position, the bottom side of each bar rests on top of the other tubes **33** of the auxiliary span tube sets **30**. The cross bars function to give lateral stability to the main span beam sets **50** when in fully projected or extended position. Although not shown automatic latch means may be provided which automatically lock the mean span beam tubes in position upon being fully extended and which are manually unlocked when it is desired to retract the main span beams.

The road bed sections **51**, as best shown in FIGS. 1–3, comprise transversely disposed panels of expanded metal grating. The panels are longitudinally and hingedly connected together in series as by piano hinges **66**. The sections **51** rest on top of the main span beam sets **50**. Laterally the panels comprise side plates **67**, which function as guard rails, and downwardly extending side retainer members **68**, which establish and maintain the road bed sections **51** in alignment with the main span beam sets **50**. The back road bed section **51** at the back end of the main bridge assembly **25** is pivotally secured to the back inner tubes **52** of the outer main span tube sets **50**. In addition, it is hingedly secured to a ramp panel **69** having triangular, ground contacting side rails **70**. The front road bed section **51** at the front end of the main bridge assembly **25** is secured as by a connecting link **71** to the front inner tubes **53** of the outer main span beam sets **50**. In addition it is hingedly connected to a front ramp panel **72** having triangular, ground contacting side rails **73**. With the span beam sets **50** in telescoped position the majority of the road bed panels **51** are vertically disposed in stacked or nested condition as shown in FIG. 1. When the main span beam sets **50** are in fully extended or projected position all of the road bed panels **51** are strung out end to end in generally horizontal, load bearing position as in FIGS. 6, 10 and 12.

The cable and winch system **26** comprises a pair of auxiliary span tube set retraction winches **76** and **77**, one pilot projection winch **78**, a pair of main bridge assembly projection winches **79** and **80** and a pair of main bridge assembly retraction winches **81** and **82**. The winches are mounted on the forward portion of the platform **23**. Joined to the front ends of the inner tubes **37** of the auxiliary span tube sets **30** as by cable ties are retraction cables **83** and **84**. These cables are wound around the drums of the auxiliary span tube set retraction winches **76** and **77**. Wound around the drum of the pilot winch **78** is a pilot cable **85** which is looped about the pulley **47** on the front cross bar **43** between the inner tubes **37** of the auxiliary span tube set **30** and joined as by a cable tie to the cross bar **63** between the front inner tubes **53** of the main span beam sets **50**. Main projection cables **86** and **87** are wound about the drum of one main bridge assembly projection winch **79** and main projection cable **88** and **89** are wound about the drum of the other main bridge assembly projection winch **80**. These main projection cables **86**, **87**, **88** and **89** are looped over the vertically disposed cable guide surfaces of the guide means **46** mounted on the cross bar **45** between the second intermediate tubes **35** of the auxiliary span tube sets **30** and are secured as by cable ties to the corresponding front inner tube beams **53** of the inboard main span beam sets **50**. The main bridge assembly retraction winch **81** has wound about its drum main retraction cables **90** and **91** which lead directly to, and which are secured as by cable ties to, the front inner tubes **53** of the outboard main span beams sets **50** on one

side of the main bridge assembly **25**. The main bridge assembly retraction winch **82** has wound about its drum main retraction cables **92** and **93** which pass directly to the front inner tubes **53** of the outboard main span beam sets **50** on the other side of the main bridge assembly **25**.

The platform **23** provides a base for the bridging structure **22**. It has mounted thereon, in addition to the components already mentioned, portions of the pressure air system. On each side of the platform **23** in the region of the front end thereof there is provided a downwardly extending platform elevation position air jack **95** (see FIG. 1). In the region of the back end of the platform **23** there is provided on each side thereof another downwardly extending platform elevation position air jack **96**. In addition, as best shown in FIGS. 2 and 3, the platform **23** comprises in the region of the front and back ends thereof pressure air actuated platform-trailer locks **97** and **98** for locking the platform **23** to the trailer **21** when it is desired to move the bridge **20** from one site to another. The pressure air system **27** is provided for extending or projecting the auxiliary span tube sets **30**, for operating the elevation position air jacks **32**, for operating the cable and winch system, for operating platform elevation position air jacks **95** and **96** and for operating platform-trailer locks **97** and **98**. The pressure air system, an example of which is best shown in FIG. 5, comprises pressure air storage tanks **100**, a valve console or bank **101** and various conduits. The pressure air storage tanks **100** are mounted on the platform **23** and, if desired as in military operations, may be covered by a shroud **103** of armor plate as best shown in FIG. 1.

Main pressure air charging conduit **105** with a pressure air shut-off and flow control valve **106** and branch air charging conduits **107** with pressure air shut-off and flow control valves **108** are provided for charging pressure air into the storage tanks **100** and for transferring when desired and if necessary pressure air from one storage tank to another.

Connected to the outlet of one of the pressure air supply tanks **100** is a pressure air feed conduit **109** with a shut-off and flow control valve **110** and branch feed conduits leading to the pressure air head end closure members **40** of the auxiliary span tube sets **30**. Between the shut-off and flow control valve **110** and the pressure air head end closure members **40** there is connected to the pressure air feed conduit **109** an exhaust conduit **111** with an outlet to the atmosphere and a shut-off valve **112** for exhausting pressure air from the auxiliary span tube sets **30**.

Connected to the outlet of another pressure air supply tank **100** is a winch motor pressure air supply conduit **113** with a pressure air shut-off and flow control valve **114**. The winch motor pressure air supply conduit **113** is coupled to the inlets of two four-way valves **115** and **116**.

One four-way valve **115** has an exhaust outlet **117** and two ports, one of which is coupled by a conduit to one side of the air motors of the main bridge assembly projection winches **79** and **80**, the other of which ports is coupled to the other side of these motors. With the valve body of four-way valve **115** turned in one direction, pressure air is led to one side of the air motors and exhausted from the other side whereby the air motors are turned in a direction, for example, to cause the winch drums to wind up cable. With the valve body of the four-way valve **115** turned in the opposite direction, pressure air is led to the other side of the air motors and exhausted from the first side whereby the air motors are turned in a direction, for example to cause the winch drums to pay out cable.

The other four-way valve **116** has an exhaust outlet **118** and two ports. One port is joined as by a conduit to one side of the air motor for the pilot projection winch **78** which the other port is similarly joined to the other side of this air motor. Operation of this portion of the pressure air system **26** is similar to that just described. The outlet of another pressure air supply tank **100** is coupled to another winch motor pressure air supply conduit **119** with a pressure air shut-off and flow control valve **120**. The pressure air supply conduit **119** is connected to the inlets of two four-way valves **121** and **122**.

Four-way valve **121** has an exhaust outlet **123** and a pair of ports, one of which is connected through conduits to one side of the air motors of the auxiliary span tube set retraction winches **76** and **77**. The operation of the four-way valve **121** and corresponding air motors is similar to that described for the first mentioned four-way valve **115** and air motors.

Four-way valve **122** likewise has an exhaust outlet **124** and two ports. One port is joined by a conduit to one side of the air motors of the main bridge assembly retraction winches **81** and **82**. The other port is joined by a conduit to the other side of these air motors. Operation of the four-way valve **122** is similar to that of the first described four-way valve **115**. The last of the pressure air supply tanks **100** is associated with the auxiliary span tube set elevation position setting air jacks **32**, the platform elevation position air jacks **95** and the platform-trailer locks **97** and **98**. Coupled to the outlet of this pressure air supply tank **100** is a feed conduit **125** with a pressure air shut-off and flow control valve **126** and on the other side of this valve a number of branch conduits. One branch conduit is coupled to the inlet of a four-way valve **127** with an exhaust outlet **128** and two parts, one coupled to a conduit leading to the piston extend air inlet of the auxiliary span tube set elevation position air jacks **32** and the other coupled to a conduit leading to the piston retract air inlet of these air jacks. Another branch conduit is coupled to the inlet of another four-way valve **129**. This valve **129** likewise has an exhaust outlet **130** and two ports, one of which is connected to the piston extend air conduit of the front, platform elevation position air jacks **95** and the other of which is connected to the piston retract air conduit of these air jacks **95**. Still another branch conduit is coupled to the inlet of a third four-way valve **131** with an exhaust outlet **132** and two ports. One of the ports is coupled to a pressure air conduit leading to the piston extend air inlets of the rear, platform elevation position air jacks **96** while the other port is coupled to a pressure air conduit leading to the piston retract air inlet of these air jacks **96**. Finally, another branch conduit with a pressure air shut-off and flow control valve **133** is coupled to the air intakes of the platform-trailer locks **97** and **98**.

The various valves of the pressure air system **27** are preferably located in the valve bank **101**. However, for military operations it may be desired to operate the bridge apparatus **20** from a remote location as, for example, in the vehicle which moves trailer **21**. This can be arranged by providing a similar valve bank in the vehicle with the valves thereof being connected by suitable conduits in parallel with the valves in the valve bank **101** on the platform **23**.

The trailer **21** as best seen in FIGS. 2 and 3 comprises a trailer bed **135** mounted on wheels and having transverse horizontal rollers **136**, **137** and **138** to facilitate relative movement between the trailer bed and platform **23** upon removing the trailer from underneath the platform or upon returning the trailer to a position underneath the platform. The trailer bed **135** is adapted with bracket means (not shown) for engaging the latch members of the air actuated lock **97** and **98** on the platform **23**.

Operation

To operate the bridge apparatus **20**, assuming that the bridging structure **22** is mounted on the trailer **21** therefor, the trailer **21** is backed into position as indicated in FIGURE 8.

The auxiliary span tube set elevation position air jacks **32** are then adjusted by the operator by opening the air shut-off valve **126** and manipulating the four-way valve **127** therefor. This adjustment should result in an initial elevation of the front end of the precursor bridge assem-

bly 24 and main bridge assembly 25, which will enable the front end of the inner tubes 37 when projected or extended to arrive above the level of the far bank.

With air shut-off valve 112 closed, and the winch drums in free running unlocked condition air shut-off valve 110 in conduit 109 is opened and pressure air is charged thereby to the end closure pressure air heads 40 of the auxiliary span tube sets 30. This causes the tubes of the auxiliary span tube sets 30 to shoot out into an extended position as in FIG. 9.

At this point the pressure air shut-off and flow control valve 120 is turned on to admit air to the four-way valve 121. This four-way valve is then manipulated to cause the air motors for the auxiliary span tube retraction winches 76 and 77 to rotate and cause the winch drums to take in the retraction cables 83 and 84 until they are pulled tight and the extended auxiliary span tube sets 30 have formed a simple arch.

The four-way valve 127 for the auxiliary span tube sets elevation position air jacks 32 is then manipulated to cause the far end of the precursor bridge assembly 24 to be lowered into place on the far bank. The bridge apparatus 20 is now in condition for projection of the main bridge assembly 24.

The operator now manipulates the four-way valve 115 to cause the main bridge assembly projection winches 79 and 80 to turn over and take in the main projection cables 86, 87, 88 and 89. This causes the main span beam sets to extend across the extended precursor bridge assembly 24 and at the same time to pull the road bed panel sections 51 into position over the extended main span beam sets 50 as in FIG. 10. The main projection cables 86, 87, 88 and 89 are taken in until the main bridge assembly 25 is in fully projected position and the cables are also held in sufficient tension to apply a slight preload to the projected main bridge assembly. Four-way valve 122 is also manipulated to cause the main bridge assembly retraction winches 81 and 82 to take in the slack in main retraction cables 90, 91, 92 and 93 and maintain these cables under slight tension. All winches are now placed into locked condition.

The operator now turns air lock valve 133 to disengage the air locks 97 and 98 from the trailer 21 and operates four-way valves 129 and 131 to extend the platform elevation position air jacks 95 and 96 sufficiently to take the load of the platform 23 off the trailer bed 135. The trailer 21 is removed from under the platform 23 as shown in FIG. 11. Four-way valves 129 and 131 are then actuated to retract the platform elevation position air jacks 95 and 96 and lower the platform 23 to the ground. Preferably pressure air is left in these air jacks 95 and 96 to absorb shock loads when the bridge 20 is being used. The rear road bed end ramps 69 is then lowered into place, and the front road bed ramp 72 is turned over. The bridge structure 22, shown in FIG. 12, is ready for use.

To retract the bridge 20 the procedure is reversed. The road bed end ramp 69 is raised into travel position and the front road bed ramp 72 is turned back. The platform elevation position air jacks 95 and 96 are extended by turning of the four-way valves 129 and 131 therefor. The trailer 21 is backed into position under the platform 23 as in FIG. 11 the platform elevation position air jacks 95 and 96 retracted and the air locks 97 and 98 actuated by manipulation of the valve 133 to lock the platform 23 to the trailer bed 135 as in FIG. 10. All winches are placed into unlocked, free running condition. Portions such as main span beams, auxiliary span tube sets, etc., of the bridge which may be latched, if latch means are used, are unlatched. The main bridge assembly retraction winches 81 and 82 are then actuated by operation of four-way valve 122 to take in the main retraction cables 90, 91, 92 and 93. This causes the main span beam sets 50 to telescope and the road bed panel sections 51 to return to nested position above the platform 23 as in FIG. 9.

When the main bridge assembly 25 has returned to its retracted position, the flow shut-off valve 110 is closed and the flow shut-off valve 112 is opened, if not already done in launching the bridge 20, to release air from the auxiliary span tube sets 30. The auxiliary span tube set retraction winches 76 and 77 are actuated by operation of the four-way valve 121 into taking in the retraction cables 83 and 84. This causes the auxiliary span tube sets 30 to telescope into retracted position as shown in FIG. 8. All flow shut-off valves are now turned off and the bridge apparatus 20 is ready to be moved to another site.

Thus, there is provided a portable projection bridge which can be readily and quickly placed into position and readily and quickly erected. Under projected conditions the cables provide tensile chord members and thereby lend structural strength to the bridging structure.

Another advantage of the bridge of this invention is the ease with which the same may be retracted and in retracted condition transported from one place to another.

A major advantage is that the bridging structure 22 is a complete, integral unit and in retracted condition is compact. No additional structures are needed.

These and other advantages, features and embodiments will occur to those in the exercise of ordinary skill in the art upon reading the foregoing description. Hence, it should be recognized that the specific embodiment just described is set forth for purposes of illustration and not of restriction and that the scope of the invention is measured by the claims attached hereto and not by the description preceding them and all embodiments, modifications and variations are intended to be embraced by those claims unless the claims by their language expressly state otherwise.

We claim:

1. A projectable and retractable bridge assembly comprising: platform means; telescopable, span forming beam means with one end portion thereof secured to said platform means and the other end portion thereof being relatively, longitudinally moveable; plural road bed section means hingedly connected together in series with an end section secured to said one end portion of said beam means and the other end being relatively, longitudinally moveable and connected to said other end portion of said beam means; and means for moving said beam means and road bed section means into a longitudinally projected, spanning position and from said spanning position into a longitudinally retracted position, said means comprising auxiliary, telescopable, span forming tube means with one end thereof secured to said platform means and the other end thereof being relatively, longitudinally moveable, means for extending and retracting said auxiliary, telescopable tube means, cable guide means mounted on forward ends of said telescopable auxiliary tube means, and cable means connected at one end to said beam means at said relatively, longitudinally moveable ends thereof, with the other ends being secured to winch means and between said ends being engaged about said cable guide means.

2. A projectable and retractable bridge assembly comprising: platform means; telescopable, span forming beam means with one end portion thereof secured to said platform means and the other end portion thereof being relatively, longitudinally moveable; plural road bed section means hingedly connected together in series with an end section secured to said one end portion of said beam means and the other end being relatively, longitudinally moveable and connected to said other end portion of said beam means; and means for moving said beam means and road bed section means into a longitudinally projected, spanning position and from said spanning position into a longitudinally retracted position; said means comprising auxiliary, telescopable, span forming tube means with

one end thereof secured to said platform means and the other end thereof being relatively, longitudinally moveable, pressure air and cable-winch means for respectively extending and retracting said auxiliary, telescopable tube means, cable guide means mounted on forward ends of said telescopable auxiliary tube means, and cable means connected at one end to said beam means at said relatively, longitudinally moveable ends thereof, with the other ends being secured to winch means and between said ends being engaged about said cable guide means.

3. A portable projection bridge which when retracted is in nested position and when projected is in span position, which comprises: platform means; a precursor bridge assembly mounted on said platform means; precursor bridge assembly comprising at least a pair of generally horizontally and longitudinally disposed auxiliary span tube sets, each set comprising a plurality of telescopable, pressure air extendable, lightweight tubes with stop means providing a maximum length of extension for said set and cross bars joined to corresponding tubes in said sets with cable guide means mounted thereon, the back ends of said auxiliary span tube sets being pivotally mounted on mounting means secured to said platform means, said auxiliary span tube sets forwardly of said back ends being supported on elevation position setting means; pressure fluid means for extending said auxiliary span tube sets; cable means in combination with winch means on said platform means and the forward ends of said auxiliary span tube sets for retracting said auxiliary span tube sets into nested position; a main bridge assembly mounted on said platform means in combination with said precursor bridge assembly, said main bridge assembly comprising a plurality of generally horizontally and longitudinally disposed main beam tube sets and a plurality of road bed panels, each main beam tube set

comprising a plurality of telescopable, extendable beam tubes with stop means providing a maximum length of extension of said set and cross bars joined to corresponding tubes in said sets and resting on said auxiliary span tube sets, the back ends of said main beam tube sets being pivotally mounted on mounting means secured to said platform means, said road bed panels being transversely disposed on top of said main beam tube sets and hingedly connected together end to end with the rear road bed panel being hingedly secured to back ends of said main beam tube sets and the front road bed panel being hingedly secured to front ends of said main beam tube sets; cable means looped about said cable guide means and operatively engaged to said winch means on said platform means and the front ends of said main beam tube sets for extending said main bridge assembly when said precursor bridge assembly is at maximum extension; and cable means operatively engaged to said winch means on said platform means and the forward ends of said main beam tube sets for retracting said main bridge assembly into telescoped and nested position.

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