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Metrailer

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[45] July 10, 1973

[54] **APPARATUS FOR MODULAR CONCRETE CONSTRUCTIONS**

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[51] **Int. Cl.** **E04g 11/36**
[58] **Field of Search** 249/13, 18, 26, 27, 249/29, 178–182; 425/62, 63

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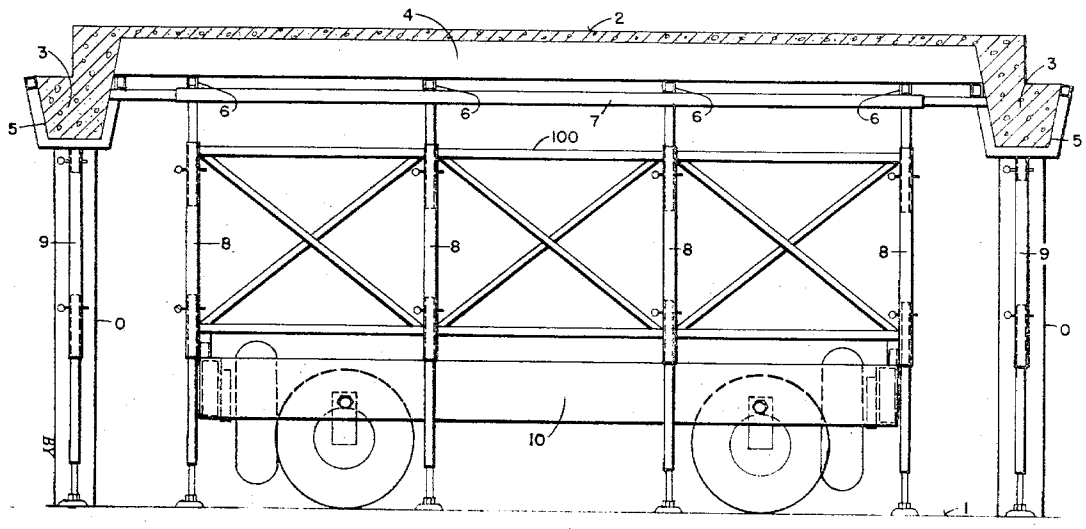
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[57] **ABSTRACT**

Apparatus for modular concrete constructions. The apparatus comprises a carriage and a concrete form. It also comprises the combination of a concrete form detachably mounted on a portable carriage the former of which can be set in place and positioned for pouring. The carriage can then be detached from the concrete form, removed for further service and later reunited with the form for transport to a new pour position, as desired. The concrete form per se is comprised generally of a support structure atop which is provided a pour form. The pour form is constituted of a central span and, preferably, a pair of upwardly faced troughs located on opposite sides of the central span. The central span of the pour form can range from flat to highly contoured. The troughs are each provided with a plurality of bottom openings, these being formed between removable panels. In forming a module, wet concrete can be poured upon the central span of the pour form to form a roof, ceiling, or floor while a tubular member or column form can be fitted into the openings of the troughs at the column locations and wet concrete can be poured therein and into the troughs to cast columns and beams for support of the roof, ceiling or floor. After the concrete has set the pour form can be lowered, the troughs freed by removal of the panels at the columns, and the beam forms moved inwardly. The carriage can then be removed to an adjacent location for further pouring.

11 Claims, 17 Drawing Figures



Patented July 10, 1973 3,744,945

11 Sheets-Sheet 1

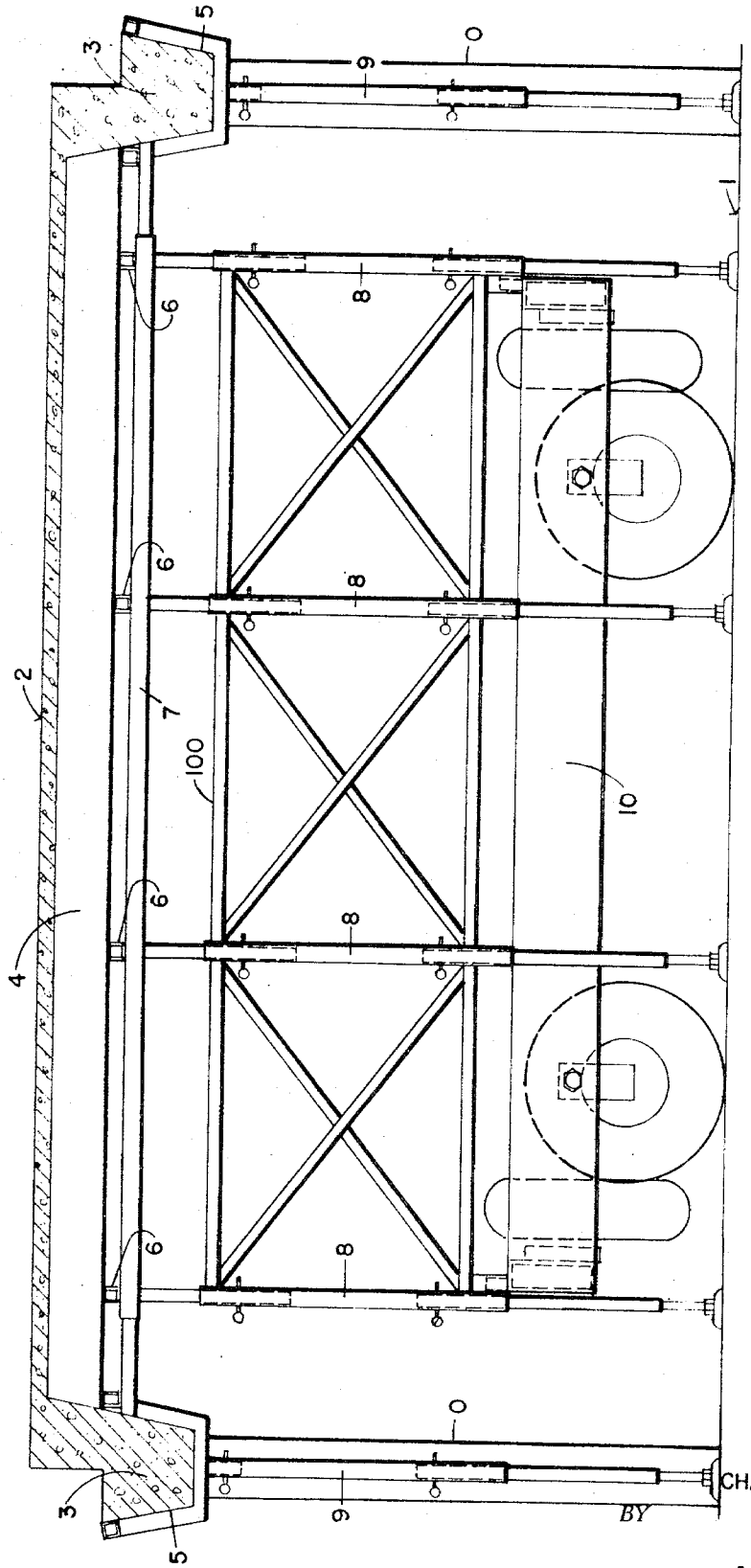


Fig. 1

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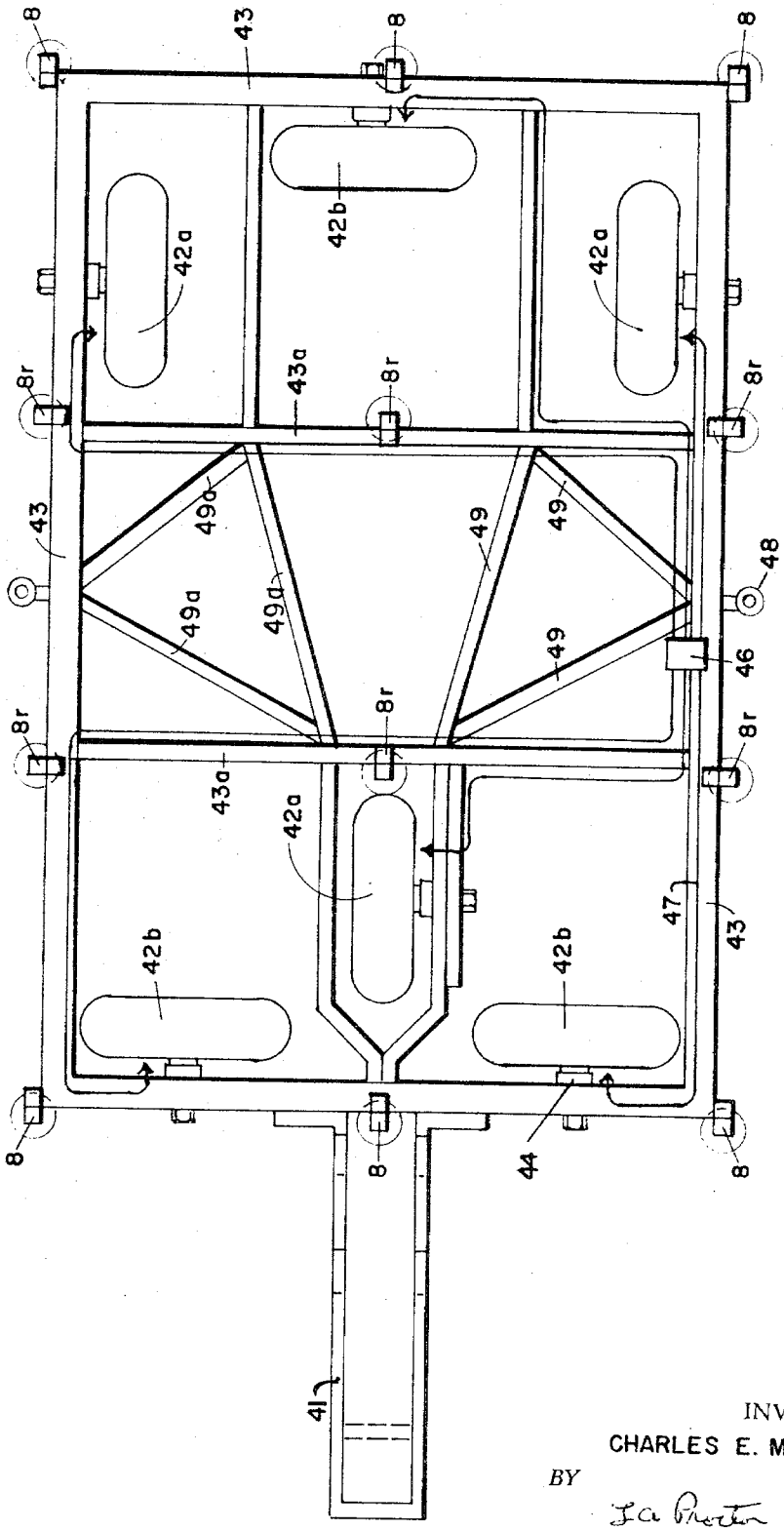


Fig. 2

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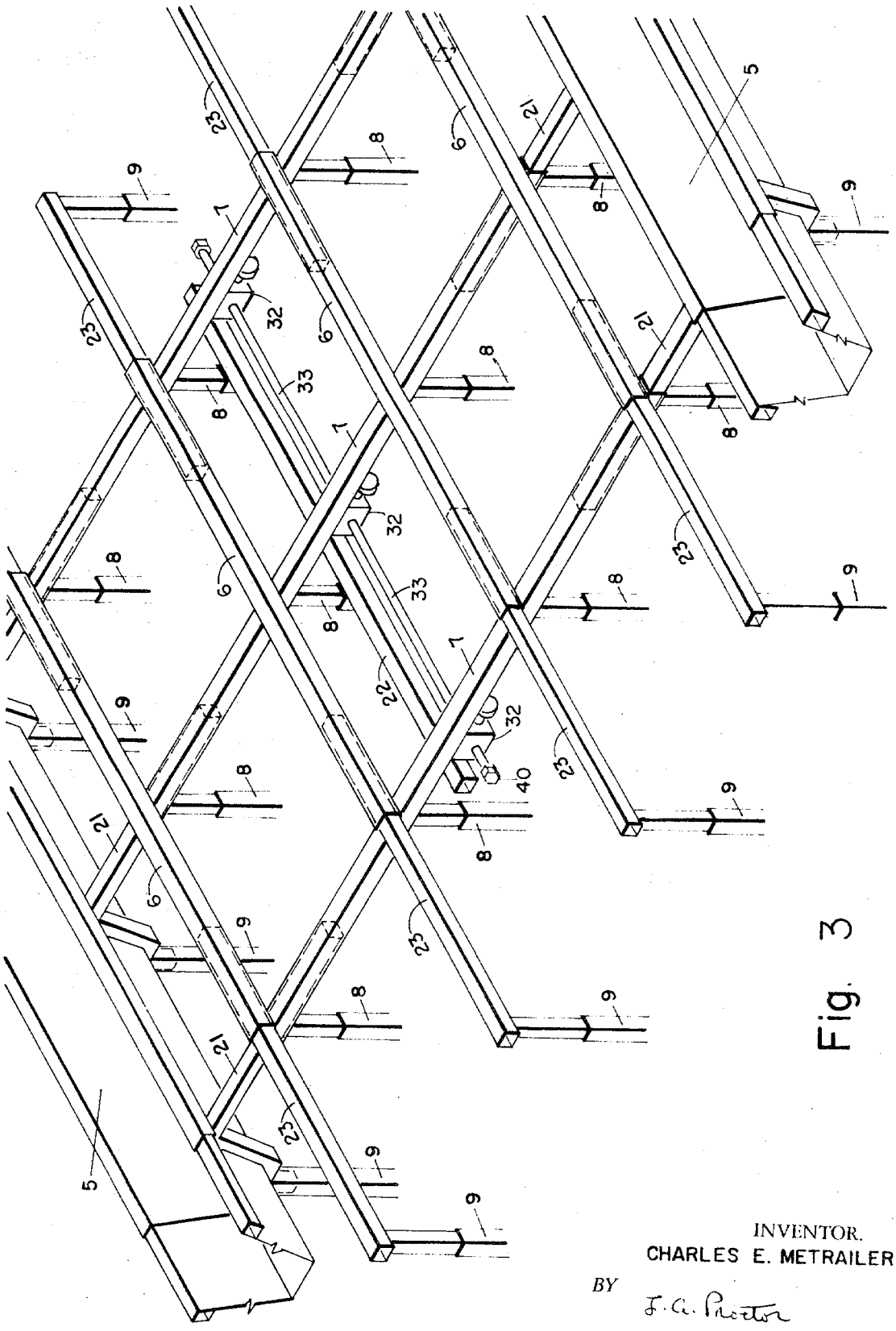


Fig. 3

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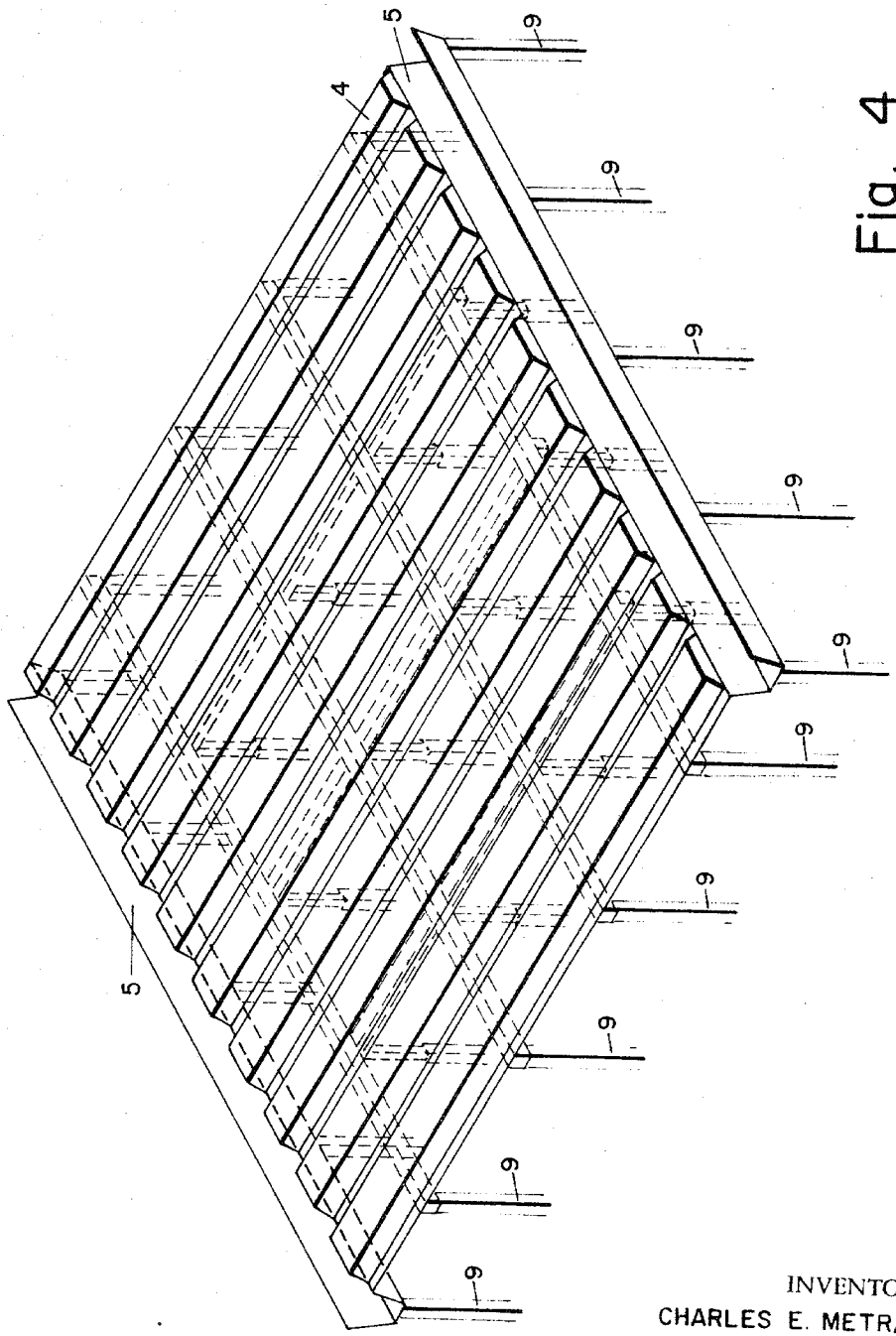


Fig. 4

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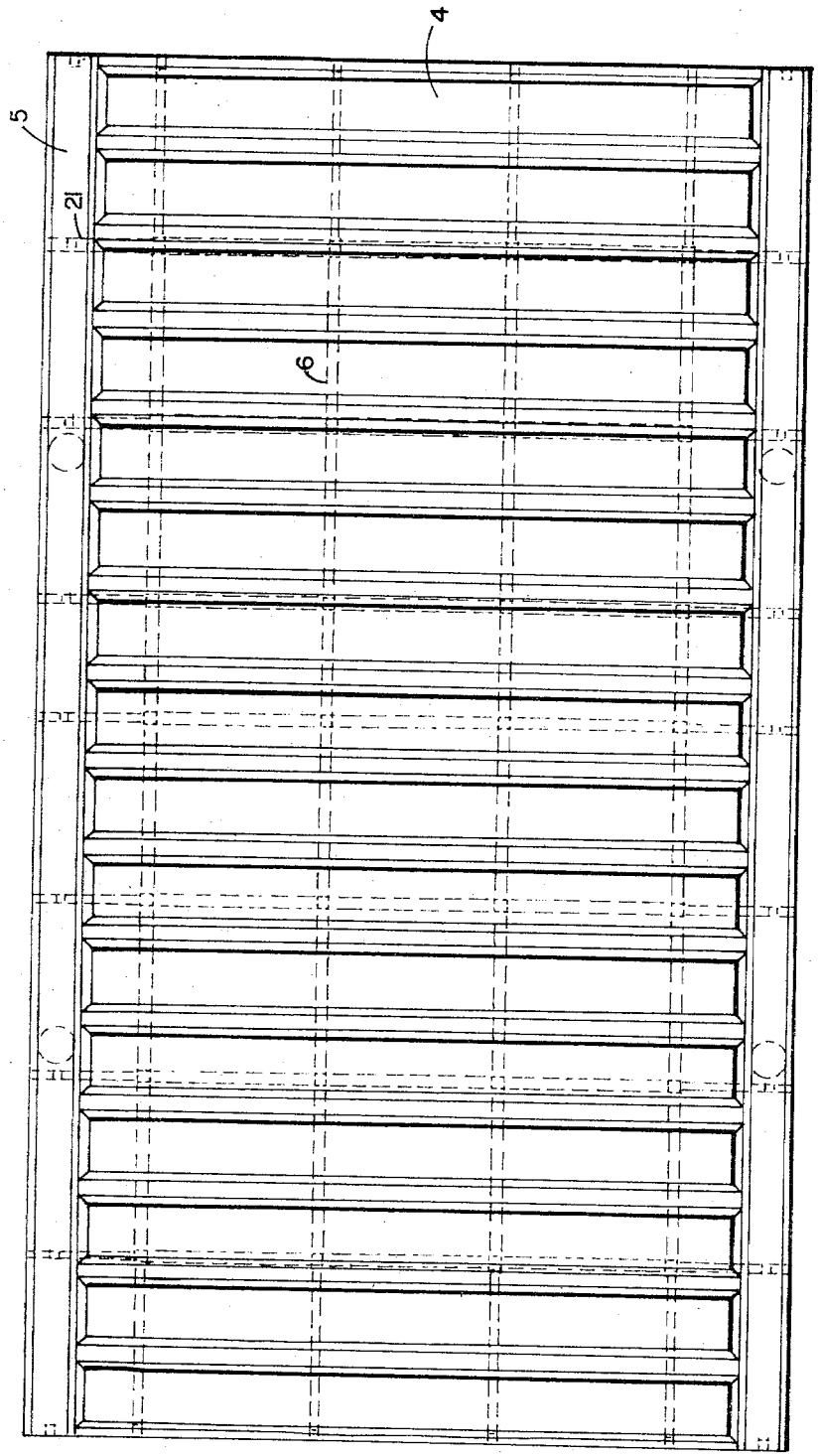


Fig. 5

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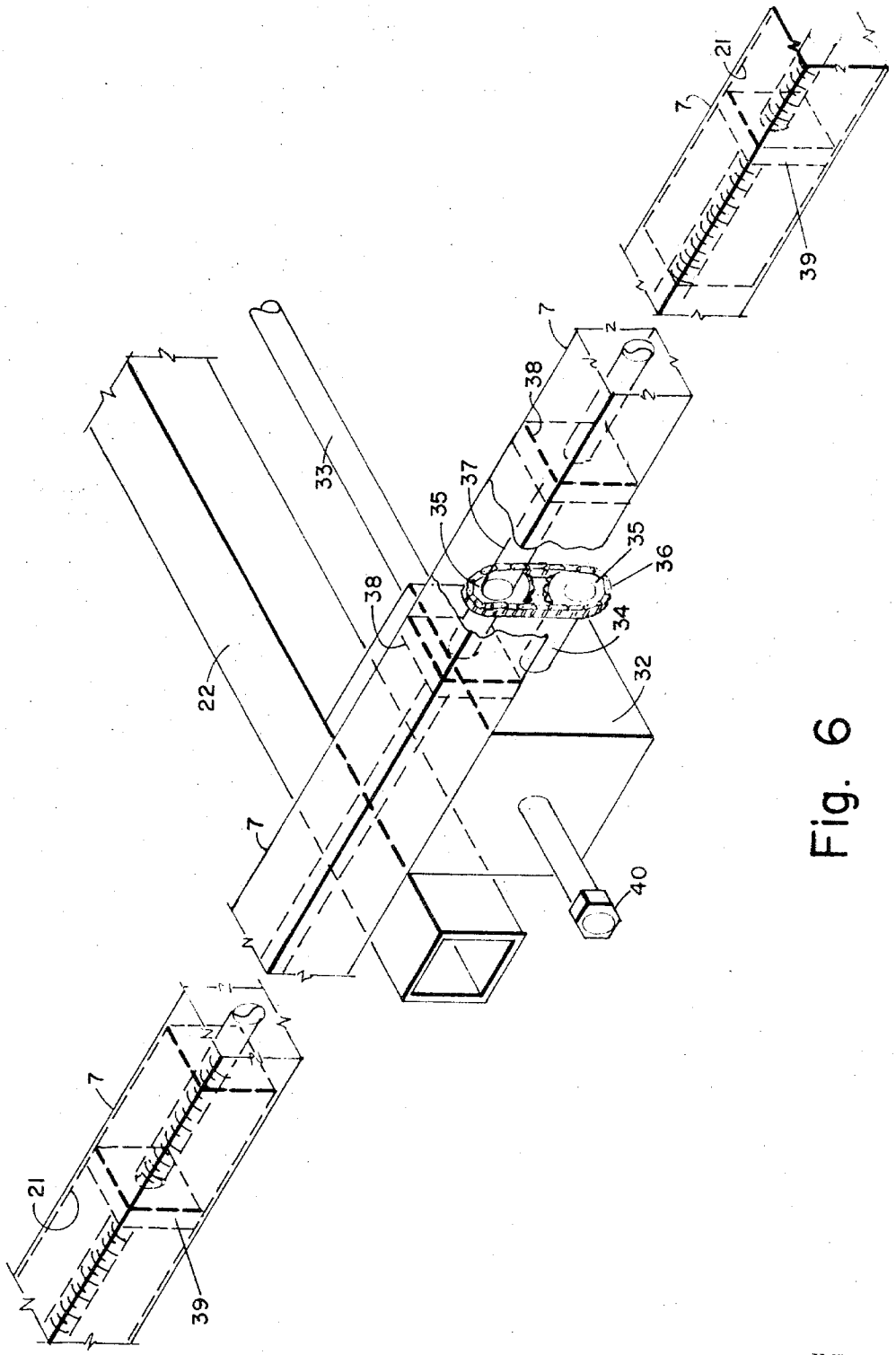


Fig. 6

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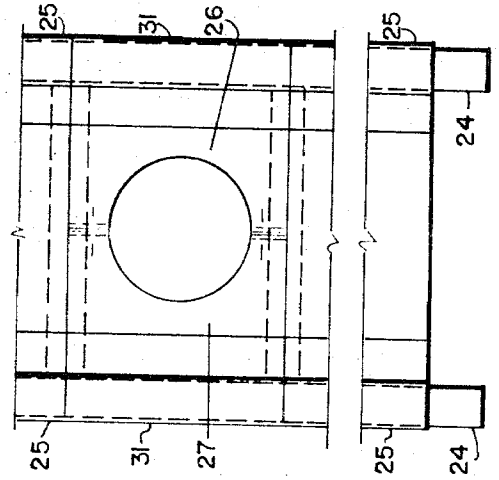


Fig. 7A

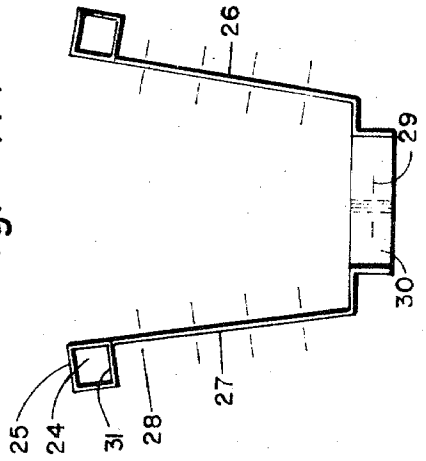


Fig. 7B

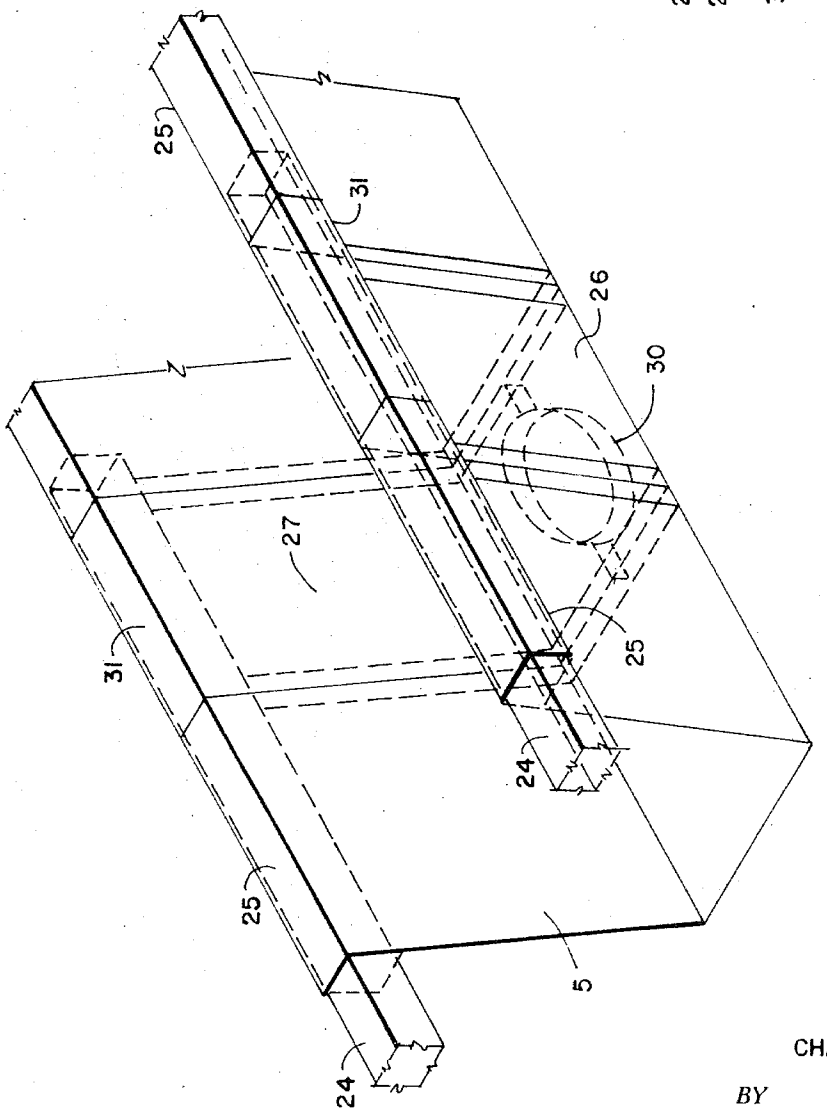


Fig. 7

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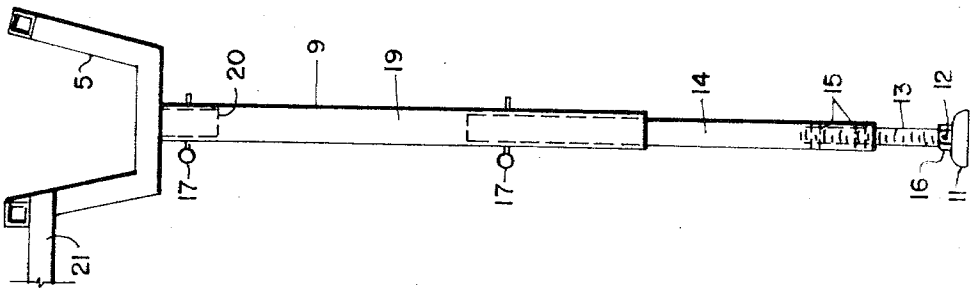


Fig. 12

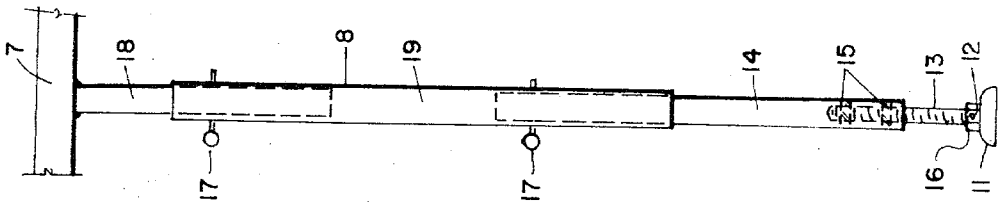


Fig. 13

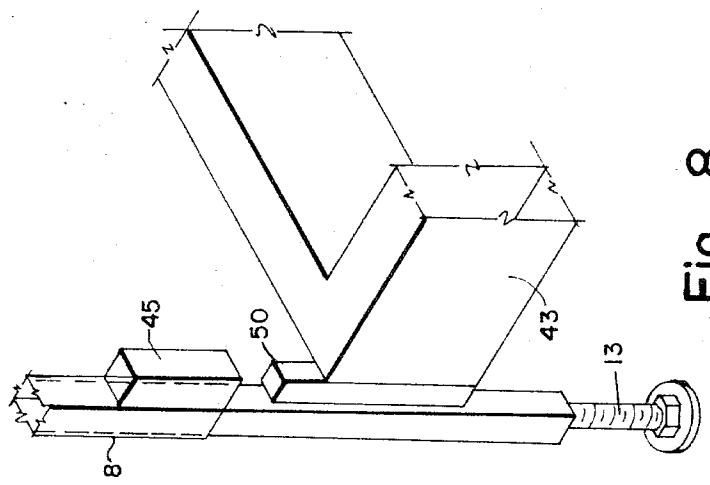


Fig. 8

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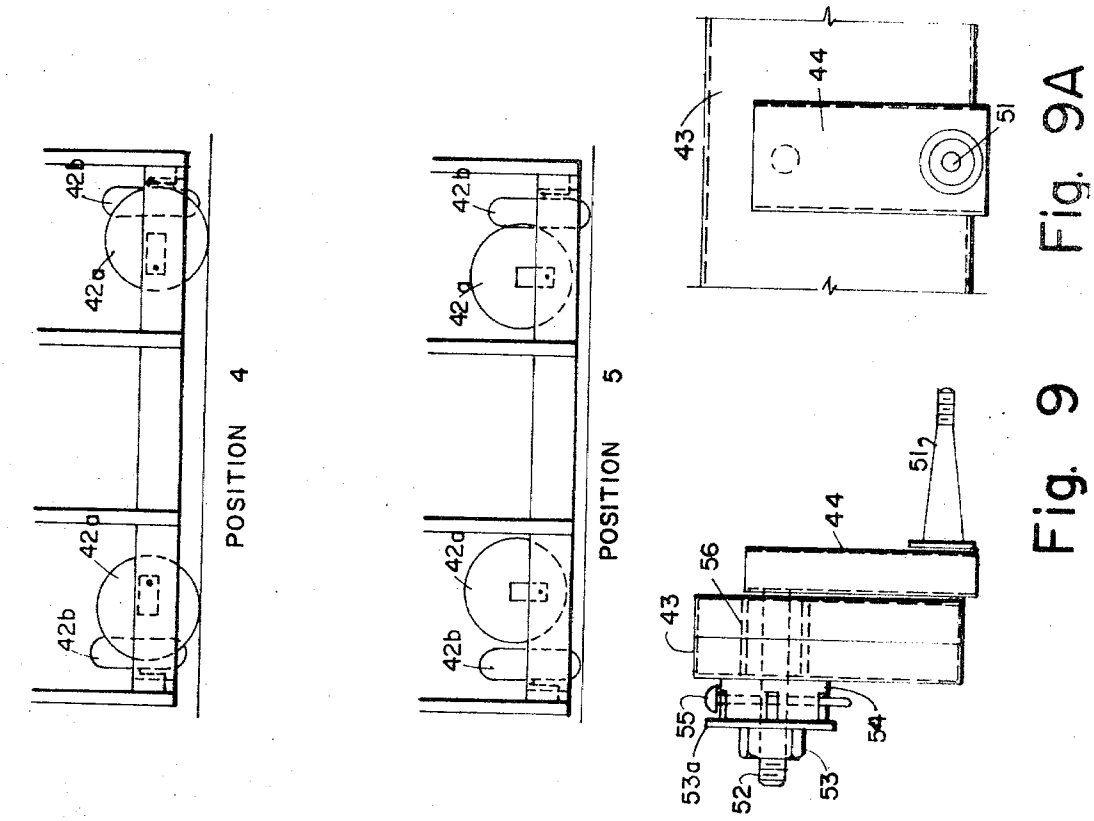


Fig. 9A

Fig. 9

Fig. 14

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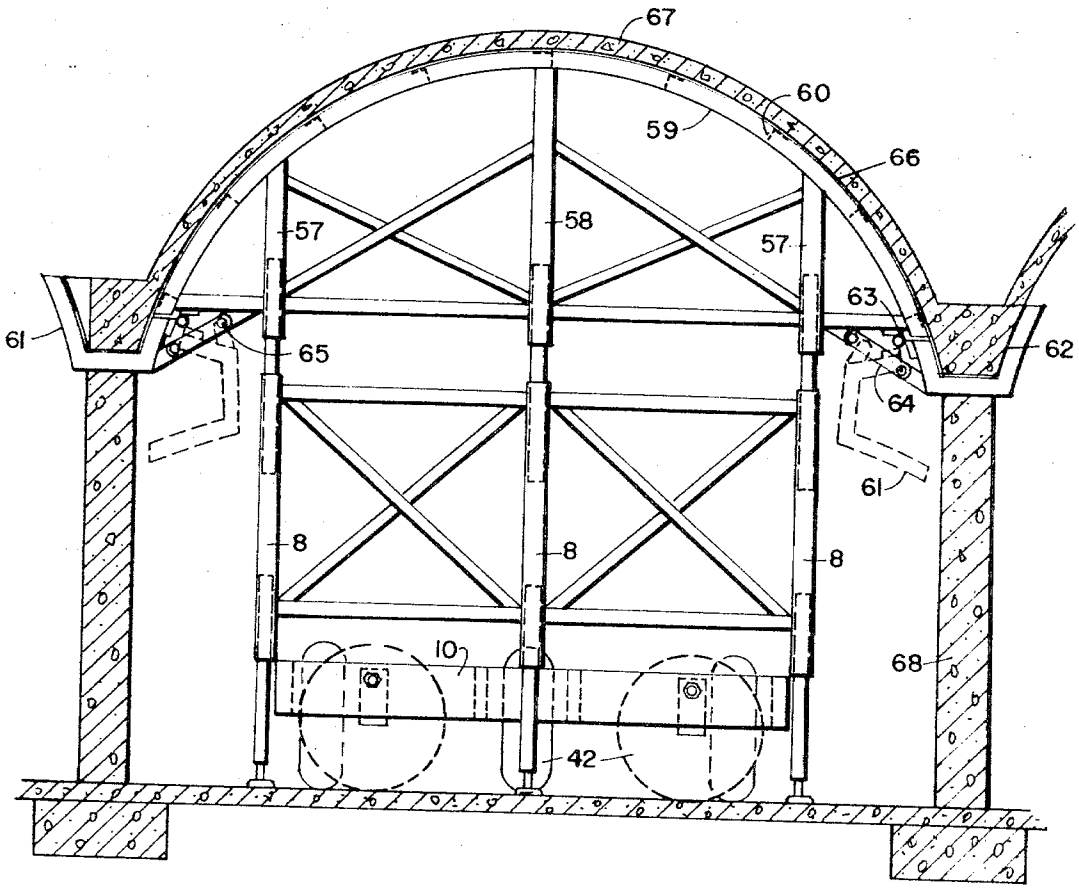


Fig. 10

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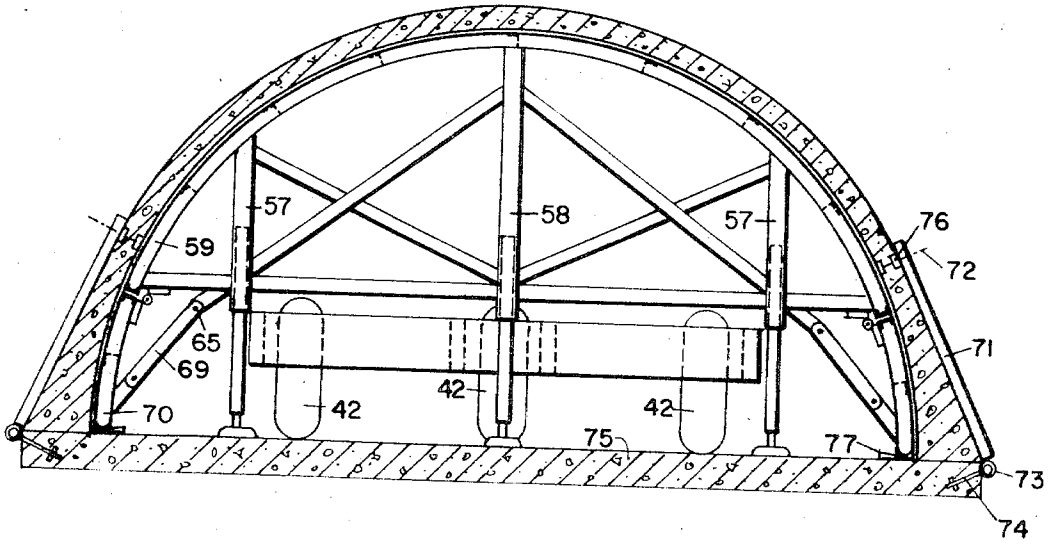


Fig. 11

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APPARATUS FOR MODULAR CONCRETE CONSTRUCTIONS

Portable carriages, the upper portion of which is provided with collapsible wall structures, or forms, for use in building or repairing arches, tunnels, and the like are known to the art. In a typical structure of such type, a railway flat car, or similar transportable carriage, is provided with a permanently attached elevatable form, usually of oval contour, for providing temporary support for stone, brick, concrete block, masonry or plastic like masses such as concrete. In a typical construction, a flat foundation slab is laid and rails are constructed thereon. The carriage is placed on the rails, The material to be used in the repair or construction is placed on the form, and the latter is used to elevate and place the materials in the proper position for the repair or construction. Where, e.g., a tunnel is being constructed of concrete, the wet concrete is thrust upward and held in place against the top of the tunnel until the concrete has set. The form is then collapsed, perhaps lowered and the carriage then moved with the form intact to an adjacent position to form another segment of the tunnel.

Such carriages have proven successful in the past for the repair and construction of sewers, tunnels and the like. They have saved time, labor and expense, particularly in concrete construction when contrasted with the use of forms which must be built and then torn down for each individual pour. The devices nonetheless have limited utility, and only in recent years have devices of such character been sufficiently improved that they have become acceptable in non-tunnel construction.

In U. S. Pat. No. 3,320,646 to A. H. Wilkins, for example, a portable carriage, equipped with an elevated pour section, with pivotally connected end portions, is employed for casting monolithic concrete roof structures. The roof section or roof modules that are formed are set on prefabricated pillars, and the carriage is moved from one pair of prefabricated pillars to another as a roof section is formed. This and other such prior art devices have their limitations.

Among the objects of this invention are:

To provide new and improved apparatus and method for modular constructions.

To provide a transportable concrete form with detachable carriage, both of unique design, the concrete form of which can be set in place for receipt of plastic-like masses such as concrete and the like, for setting and converting same to desirable modular construction forms, including not only roofs, ceiling, floors and the like, but also beams and columns.

To provide the apparatus combination such as described wherein the carriage can be readily detached from the concrete form, removed for further service and later reunited with the concrete form for transport thereof, such combination being particularly useful for simultaneously pouring the above construction forms, including specifically floors, roofs, beams and columns whereupon the form can be released from the set concrete and transported by the carriage across a foundation or floor for different continuous modular pours, and then moved, if desired, to the next upper level for further pouring.

These objects and others are achieved in accordance with the present invention the apparatus embodiment of which comprises a concrete form and carriage, particularly the combination of a concrete form and detachable carriage, as generally described. In operation, the concrete form is transported to and set in place by the carriage which is particularly adapted by two different sets of wheels, one set mounted at right angles to the other, to provide mobility for the setting and alignment of the concrete form. The concrete form is comprised of a concrete pour form, or forms, mounted on structural elements, including vertical posts supported on the carriage frame, by virtue of which the concrete pour form, or forms, can be supported and elevated or lowered with respect to the carriage, this providing flexibility such that the pour form, or forms, can be readily positioned for pouring. In position, the concrete form, in a preferred embodiment, is additionally supported by vertical shoring members. The carriage can be separated from the concrete form after the latter is positioned, removed for further service, and later reattached with the concrete form to transport the latter to a new pour position or location.

The invention, and its principle of operation, will be more fully understood by reference to the following detailed description of a specific embodiment, and to the attached drawings to which reference is made in the description. In the description, similar numbers are used to represent similar parts or components.

In the drawings:

FIG. 1 is a side elevation of a preferred type of portable carriage and concrete form or concrete form assembly, the preferred combination being shown in position for pouring concrete.

FIG. 2 is a plan view showing the carriage, or carriage assembly, which can be used for transport and positioning of a workpiece, particularly the concrete form, or concrete form assembly.

FIG. 3 is a fragmentary isometric view showing the vertical posts, shoring members and other telescoping components which constitute the upper portion of the concrete form support structure.

FIG. 4 is a isometric view showing the concrete pan form sections and beam forms of the concrete form assembly, or pour forms, installed over the supporting members ready for pouring concrete.

FIG. 5 is a plan view showing a contiguous pair of concrete pan form sections ready for pouring a monolithic self-supporting concrete structure including four columns two beams and central span.

FIG. 6 is an enlarged fragmentary isometric view showing the telescoping mechanism for retracting the main beam forms which carry concrete pour forms of the type used for forming beams and columns.

FIG. 7 is an enlarged fragmentary isometric view showing the removable section of the concrete pour form at columns used for pouring beams; FIG. 7A is a plan view of the said removable section at columns; and FIG. 7B is a cross-sectional view of said removable section at columns.

FIG. 8 is an enlarged fragmentary isometric view showing the carriage break away unit which allows the carriage to be removed from the concrete form support section.

FIG. 9 is an enlarged side view showing details of the eccentric axle by virtue of which the various wheels are attached to the frame member, and FIG. 9A is a front view of the same eccentric axle.

FIG. 10 is an end elevation view of the carriage and form support frame with a preferred type of arch form.

FIG. 11 is an end elevation view showing the carriage supporting the arch form with beam forms replaced with curved section as used to pour tunnels, drainage structures, or quonset type building structures.

FIG. 12 is a fragmentary elevation view showing one of the removable vertical support members or shoring members for the beam forms.

FIG. 13 is a fragmentary elevation view showing one of the vertical support members used in supporting the pan form frames.

FIG. 14 is a diagrammatic representation of a series of views showing a step by step sequence of lowering the carriage and form assembly for removal after concrete has cured sufficiently.

With reference to FIG. 1 of the drawings, reference character 1 designates a concrete slab on grade or the floor slab of lower floors in a multi-story building made in accordance with the present invention. The horizontally oriented slab 2 is constructed as a unitary member having a plurality of horizontally disposed ribbed lower sections, and it is abutted by vertically disposed reinforced beam members 3 disposed in parallel planes. The beam members 3 are supported by vertically oriented columns 0, also made in accordance with the present invention. The reinforcing members 3, as well as the horizontal slab 2 and columns 0, include internally disposed steel reinforcing (not shown) as is well-known in the building art, which reinforces these portions of the floor normally in tension. The design of the particular floors will, of course, be varied with the requirements of the building, in accordance with established engineering procedures, and need not be further elaborated upon in this disclosure.

The apparatus of this invention is comprised generally of a carriage 10 and a transportable concrete form 100. The portable carriage 10 and transportable concrete form 100, which is detachably mounted on the carriage 10, are preferably used in combination. The body of the portable carriage per se (FIG. 2) is constituted generally of a reinforced frame body fitted with wheels, and means whereby the said carriage can be attached to a vehicle and towed to a work site. The concrete form 100, which is adapted for transport upon the carriage 10, is constituted generally of a frame structure on the top of which is supported a pour form, including a central portion or span and upwardly faced troughs or trough-like members, with a plurality of bottom openings, located alongside the central span for receipt of poured concrete. The pour form of the transportable concrete form 100 is constituted generally of a central span 4 and upwardly faced troughs or trough-like members 5 for receipt of poured concrete. The frame structure per se comprises a plurality of telescoping tubular shaped vertical posts 8 secured together by supporting horizontal posts which connect to top and bottom portions of adjacent vertical posts 8. Diagonal reinforcing members are also connected to the bottom and top portions of vertical posts 8, these being employed to further support and strengthen the frame structure. Shoring members 9, constituted of telescoping tubular members similar in purpose and function to vertical posts 8 are also provided to support the troughs 5. Jacks 13 are provided within the lower terminal ends of each of the several vertical posts 8 as well as within the lower terminal ends shoring members 9 which are used to support the troughs 5.

Referring specifically to FIGS. 3 and 4, it will be observed that the pour form, which includes central span 4 and upwardly faced troughs 5% rests upon and are supported by horizontal beams 6, 7. Beams 7 are parallelly aligned one with respect to another, and are directly perpendicularly affixed to the top terminal ends of the innermost tubular members of vertical posts 8. Beams 6, on the other hand, are also parallelly aligned one member with respect to the other, but lie at right angles to beams 7, and are affixed to the upper sides thereof. The beams 6, 7 also contain smaller telescoping tubular members 23, 21, respectively. The terminal ends of the latter tubular members 21 are U-shaped to support troughs 5, and both tubular members 23, 21 are supported by shoring members 9 affixed to the ends thereof. The shoring members are particularly useful where, as observed by reference to FIG. 4, the troughs 5 are projected outwardly and the central span 4, which comprises a concrete form element, are loaded with wet concrete.

The design and function of the vertical posts 8 and the shoring members 9 are quite similar and accordingly a complete description of one each of these elements will describe all of the several elements employed. Referring specifically to FIGS. 12 and 13, which describes these members in detail, it will be observed that each vertical post 8 and shoring member 9 includes a pair of telescoping tubular members 14, 19 (the former being of smaller size than the latter) and the length of each member 8 and member 9 is adjustable. A jack is located at the lower terminal end of each member, a jack including foot or platform member 11, having a nut 16 welded on the upper side thereof, which engages with externally threaded member 13. The platform member 11 is fastened to the threaded member 13 by means of pin 12. Members 15 are nuts attached permanently within tubular member 14. Member 13 provides tool-engaging means 16 for elongating and contracting the length of vertical posts 8 and shoring members 9 by rotation of the said member 13 which moves it upwardly or downwardly within the tubular member 14. The telescoping tubular members 14, 19 are also provided with means for lengthening and shortening the vertical posts 8 or shoring members 9. the pins 17 are thus removable passing through tubular members 19, 14 and shank members 18, 20. Members 14, 18 have a plurality of lateral openings within which the pins 17 can be fitted or removed thus permitting elongating and contracting vertical posts 8 and shoring members 9 in uniform increments. Member 20 is an attaching lug or shank which permits attachment of member 19 to beam form 5. Member 18 is also a lug or shank which is permanently attached to member 7.

The troughs 5 are designed in such manner that both beams and columns can be cast simultaneously, the required structural elements of which operation is best shown by specific references to FIGS. 7, 7A and 7B. A trough 5 is thus provided with oppositely desposed paired removable panels 26, 27 each of which is provided with bottom semi-circular shaped notched lower edges and downwardly projected surrounding walls 30 which, when fitted together with fastner 29, form a circular opening with an enclosing downwardly projecting collar. The panels 26, 27 overall are generally of U-shaped cross-section when fitted together and each of the upper edges are welded to tubular member 31 to form a contiguous tubular edge member 25 through

which a slightly smaller tubular member 24 can be passed to hold or secure the panels 26, 27 in place. By such construction the upper portion of a tubular member or column pour form (not shown) can be secured within the opening formed between walls 30. The tubular member and the trough 5 itself can then be filled with wet concrete to form beams and columns. After the concrete has cured the panels 26, 27 at columns can be removed by withdrawal of bar 24 and fastner 29. The outer wall constituting the tubular column form member can then be removed from the concrete columns after which trough 5 can be lowered below the poured set of concrete beams and pushed inwardly to clear columns by telescoping tubular members 21 back within the member 7.

In accordance with the best mode of practicing the present invention, in preference to manual manipulation, mechanical means are provided wherein both troughs 5 can be simultaneously projected or withdrawn, after panel members 26, 27 have been removed or swung away from the poured set columns. A series of miter gear boxes 32, aligned for convenience upon a fixed tubular member 22, are communicated one with another via a shaft 33 and each can be operated by rotation of the shaft 33 to extend or retract the troughs 5. One such unit is described by reference to FIG. 6. A shaft 37, having threads of opposite cast, can thus be fitted within tubular members 7, 21, aligned with the axis of the tubular members via passage through bushings 38, affixed within tubular members 7, and threadably engaged with nuts 39 affixed within tubular member 21. The shaft 37 is fitted with a sprocket 35 and coupled via a chain 36 with a parallely aligned drive shaft 34 provided with a similar sprocket 35, the latter being driven through a miter gear box 32 affixed upon the tubular member 22. Rotation of the shaft 33, e.g. by rotation of the nut 40 affixed thereon as by operative engagement therewith of a machine tool, will produce rotation of shaft 34 and, consequently rotation of shaft 37. Rotation of shaft 37 in one direction, on the one hand, will cause tubular members 21 to telescope inwardly and, conversely, rotation in the opposite direction will cause the tubular members 21 to telescope out wardly.

The carriage 10, best described by specific reference to FIG. 2, is preferably used in combination with the concrete form 100 detachably mounted thereon, but is also susceptable for use in other services for transporting or positioning other different types of equipment or workpieces which need not be described herein. The frame of the carriage is constructed of a channel frame 43 resembling a parallelogram. The structure of channel members 43 is reinforced by the inner channels 43*a* which are perpendicular to, intersect and connect with the side channels 43. Additional structural support is added by channel members 49 and 49*a*. Two independent sets of wheels are mounted on the carriage 10. A set, generally, of three wheels 42*a*, and a second set, generally, of three wheels 42*b*, are rotatably mounted upon eccentric axles 44 which are secured to frame 43. By utilizing two sets of three wheels independently mounted at right angles with one another, the carriage 10 has infinite mobility for the positioning and alignment of workpieces, particularly the concrete form 100.

The carriage 10 is engaged to the form support structure at points marked 8 and 8*r* as shown by reference to FIG. 2. The means of engagement or disengagement from the form support structure is best illustrated by reference to this figure and to FIG. 8, the structural elements of which are as follows: Member 45 is a tubular segment which is permanently attached at a corner of frame 43 of the carriage. With the members 45 and 50 engaged and the carriage wheels 42 inflated, a foot 11 of each of the vertical support members 8 and 8*r* rests on the floor or foundation. Vertical support members 8*r* are retracted with foot members 11 removed. Member 13 is retracted within member 14 and with pin 17 removed member 14 is retracted within member 19 (See FIG. 13). The remaining vertical support members 8 remain to support the weight of the form support structure. The carriage 10 is separated from the concrete form 100 by deflating tires 42. On deflating tires 42, lug 50 will lower and become disengaged with socket 45 and the carriage can be removed from beneath the form support structure. Members 8*r* are then extended and adjusted to provide further support for the concrete form on subsequent pouring of the concrete. Towing eye 48 is utilized in maneuvering the carriage laterally while tires 42 are supporting. Control console 46, mounted on frame 43 is a means of rapidly varying air pressure to tires 42*a* and 42*b* through air tubing members 47. Member 41 is a detachable towing arm utilized in transporting the carriage, or both the carriage support structure and concrete form, via highway from one jobsite to another with the carriage supported on the pair of rear wheels 42*a* (dual tires optional), while the other wheels are retracted.

A key and novel feature of the present invention relates to the method of raising and lowering the carriage 10, and supported concrete form 100, by rapid inflation and deflation of the pneumatic tires in combination with the adjustable eccentrics on which the wheels are mounted upon the carriage. The means by which one set of wheels 42*a* supports the carriage while the other set of wheels 42*b* is non-supporting, and vice versa, is best shown by specific reference to FIGS. 9 and 9A. Each wheel is thus affixed to the carriage frame or channel 43 by use of an eccentric wheel mounting device such as described by reference to these figures. An eccentric member 44 is mounted upon the carriage frame 43 and a spindle 51, which carries a wheel, is permanently attached to eccentric member 44. Eccentric member 44, permanently attached to the bolt 52 which is pivotally mounted upon the channel 43 via passage of bolt 52 through the bearing element or sleeve 56 mounted within an opening through the channel, and the bolt 52 is held in place by the washer 53A and the nut 53. A collar 54, permanently affixed upon channel 43 on the side of channel 43 opposite the eccentric member 44, is slotted at desired increments to permit adjustment of the wheels at different levels of elevation. In this instance 90° increments are provided, thus permitting the spindle 51 to be elevated or lowered by latching the said spindle 51 in one or the other of four position levels by passage of the pin 55 through the openings formed between the slots of collar 54 and the washer 53A, and through an opening through the bolt 52.

The manner in which a set of wheels is lowered or raised relative to another to lower or elevate the carriage 10 is illustrated by reference to FIG. 14. FIve different positions which illustrate the lowering (or raising) of the carriage 10 is described as follows:

Position 1: This figure illustrates the carriage resting on wheels **42***b* as would be the position of the carriage at maximum height. The sets of eccentrics of wheels **42***b* and **42***a* are inflated and are in the down position.

Position 2: The tires of wheels **42***b* are deflated until the carriage weight is supported on wheels **42***a*. As soon as wheels **42***a* are supporting the weight the eccentrics of wheels **42***b* are loosened and **42***b* is reinflated and **42***a* partially deflated causing **42***b* to rotate 90° to the horizontal position, and the eccentrics on **42***b* are then locked in this position.

Position 3: The tires of wheels **42***a* are further deflated until the carriage weight is again supported on wheels **42***b*. The eccentrics of wheels **42***a* are loosened and **42***a* is reinflated and **42***b* partially deflated causing **42***a* to rotate 90° to the horizontal position and the eccentrics on **42***a* are locked at this position.

Position 4: The tires of wheels **42***b* are again further deflated until the carriage weight is supported by wheels **42***a*. The eccentrics for wheels **42***b* are loosened and **42***b* is reinflated and **42***a* partially deflated causing **42***b* to rotate 90° to the up position and the eccentrics on **42***b* are locked at this position.

Position 5: The tires of wheels **42***a* are again further deflated until the weight of the carriage is supported on wheels **42***b*. The eccentrics for wheels **42***a* are then loosened and **42***a* is reinflated and **42***b* deflated causing **42***a* to rotate 90° to the up position and the eccentrics on **42***a* are locked at this position. Further lowering can be done by deflating the tires of wheels **42***b*.

To elevate the carriage the above procedure is merely reversed. In order to accomplish the above procedures rapidly an air console **46** design will incorporate two levers with deflate, inflate, and off positions, so each set of three tires can be inflated or deflated simultaneously.

In an operation, the concrete form **100**, mounted on the carriage **10**, is brought to a job site for use usually after the columns, footings, or foundations and floor slab **1** has been completed. An initial concrete module comprising a roof, ceiling or floor supported upon columns and beams is begun after the concrete form **100** has been set in place, detached from the carriage, supported and positioned for pouring as described. The carriage **10** is disengaged from the concrete form **100** and can be used to transport and position other concrete forms for pouring.

When the concrete has sufficiently cured to be self-supporting the carriage **10** can be re-engaged with the concrete form structure **100** by reversing the removal procedure described above, as suggested. The concrete form structure is then lowered so the beam forms or troughs **5** will pass below the poured concrete beam as described and illustrated by reference to FIG. **14.** The removable sections of the troughs **5** at columns (FIG. **7**) are removed allowing the said troughs **5** to be retracted as described in conjunction with FIG. **6.** The carriage is then moved to the next position and aligned with the previous construction by over-lapping the concrete pour forms over concrete previously poured. The beam forms or troughs **5** are then extended outwardly and the form supports are then raised to the proper height, the removable trough or beam form sections of columns are reinstalled and the carriage can be disengaged for use with other form sections.

Modified designs of the concrete form, in association with the carriage previously described or a somewhat modified version thereof, are shown by reference to FIGS. **10** and **11.** The principle difference between these designs and those previously described relates to the use of a highly contoured or semi-circular arch upon which a roof or ceiling is to be poured, and the difference in structure by virtue of which the beam forms or troughs are disengaged or freed from the poured concrete beams and columns.

Referring specifically to FIG. **10,** it will be seen that the carriage **10** and shoring elements **8, 9** are as previously described, but herein are utilized with posts **57, 58** to support the member **59** which are rolled in a semi-circular arch. The members **60** are permanently attached to members **59** and run in perpendicular planes thereto. The troughs or beam forms **61** readily fit upon previously shaped concrete beams **62,** and hence continuous pouring of modular shapes by moving the concrete form in quite feasible. The trough or beam form **61** is hinged to the arch shaped member **59** via hinge **63** and can be readily swung free of the poured concrete beams and posts after the concrete **67** has set, as shown in phantom. The hinge **63** in the final position is braced with member **64** secured with pins **65.** Member **61** is lowered by removing pins **65** and member **64.** Member **61** is interrupted at equal intervals to provide a removable section at column lines similar to that previously described and illustrated by reference to FIG. **7.** Members **59** and **60** form a support for form **66** which may be sheet steel, plywood, formboard, etc. after hardening of the poured concrete **67,** members **61** are lowered and carriage **10** is lowered by deflating tires **42,** allowing the unit to be repositioned for next disposed section of structure. This configuration of the invention is suitable for producing concrete buildings with a plurality of arches running parallel to each other, these being supported by concrete columns **68** or steel columns, as desired.

A carriage and concrete form particularly useful for the construction of a concrete tunnel or drainage structure is described by reference to FIG. **11.** The carriage in this instance is provided with only a single set of wheels **42** and, since high elevation of the arch member **59** is unnecessary shoring posts **8** are not needed, and there are no troughs or beam forms. Referring specifically to the figure it will be observed that the basic difference between the structures relates only to the hinged lower section of the arch form by virtue of which the arch can be freed from the poured concrete and moved from one location to another, or positioned for the pour. It will be observed that the pivotable section **70** is adjoined to member **59** via a hinge, and it is braced with member **69** and secured in place with pins **65.** Eye bolt **73** is embeded in slab **75** to attach form **71** at its lower end. Bolt **72** with nuts **76** support the upper end of form **71.** After hardening of the concrete, the assembly is lowered by removing pins **65,** brace **69** and wedge **77,** this permitting the member **70** to swing inwardly and lowering carriage **10** by deflating tires **42** for movement of the assembly to next disposed section. Forms **71** are removed and eyebolt **74** and bolt **72** remain in the concrete structure. Carriage **10** utilizes the break-away feature shown in FIG. **8.**

It is thus understood that the invention is a highly useful means and method for constructing reinforced concrete buildings, tunnels, underground shelters or drainage structures utilizing a relatively small number of forms in succession to construct individual sections

of the structure, the forms being removable as the concrete supported thereby becomes sufficiently hard to support itself. Practically all of the available forms may be used simultaneously and continuously, with a minimum of idle time, whereby both material and labor savings are effected.

Having described the invention, what is claimed is:

1. Apparatus for modular concrete constructions comprising, in combination, a concrete form detachably mounted upon a carriage,

the concrete form including a frame assembly comprising a plurality of vertically oriented telescoping posts, suitable braces for maintaining said alignment of the posts, a concrete pour form ranging in shape from flat to highly contoured mounted atop the said telescoping posts, locking means whereby the telescoping posts can be raised, lowered and locked to support the concrete pour form at a desired elevation, means whereby the lower extremities of the posts can be detachably engaged with the carriage for transport and positioning of the said concrete form, and wherein the lower extremities of the vertical posts terminate on a common plane and the extremities are provided with jacks by means of which minor adjustments can be made to raise and lower the concrete form,

the carriage including a frame of channel members, two sets of wheels each set comprising at least three wheels provided with pneumatic tires, either set upon which the carriage can be independently supported and transported, one set of the wheels of which is mounted for movement at a 90° angle relative to the other, means whereby one set of the wheels can be alternatively retracted and the tires deflated while the other is inflated and in supporting position, and vice versa, and means for operative engagement with the concrete form,

whereby the concrete form can be engaged with the carriage for transport, set in place by the carriage and the pour form positioned for pouring concrete, detached from the carriage by deflation of one set of the tires, the carriage removed for further service and later reunited with the concrete form after the concrete has set for removal to a new pour position.

2. The apparatus of claim 1 wherein the vertical posts of the concrete form are constituted of tubular members with a plurality of lateral opening there through which pins can be passed to lock the posts and consequently the pour form at the desired elevation.

3. Apparatus for modular concrete constructions comprising, in combination, a concrete form detachably mounted upon a carriage,

the concrete form including a frame assembly comprising a plurality of vertically oriented telescoping posts, suitable braces for maintaining said alignment of the posts, a concrete pour form ranging in shape from flat to highly contoured mounted atop the said telescoping posts, laterally oriented telescoping members perpendicularly supported atop the vertically oriented telescoping posts, beam forms, in positions adjacent and one on each side of the said concrete pour form, supported upon the laterally oriented telescoping members, the said beam forms being provided with removable panels which form bottom openings within which can be fitted various sizes and shapes of column tubular forms, locking means whereby the telescoping posts can be raised, lowered and locked to support the concrete pour form at a desired elevation, means whereby the lower extremities of the posts can be detachably engaged with the carriage for transport and positioning of the said concrete form, and wherein the lower extremities of the vertical posts terminate on a common plane and the extremities are provided with jacks by means of which minor adjustments can be made to raise and lower the concrete form,

the carriage including a frame, a set comprising at least three wheels provided with pneumatic tires upon which the carriage can be rested and transported,

whereby the concrete form can be engaged with the carriage for transport, set in place by the carriage and the pour form positioned for pouring concrete, the carriage then removed after deflation of the tires, such that concrete can then be poured upon the said concrete pour form to provide a floor, ceiling or roof, into the beam forms to provide beams and into the tubular vertical forms to provide supporting columns, and the carriage can be later reunited with the concrete form after the concrete has set, for removal of the concrete form to a new pour position.

4. The apparatus of claim 3 wherein the top portion of the frame assembly of the concrete form additionally carries a plurality of gear boxes adjoined one to another through a rotatable shaft, the oppositely disposed laterally oriented tubular members which carry the beam forms are each provided with nuts affixed therein and shafts, having threads of opposite cast, operatively associated with the fixed nuts, and the rotatable shaft through the gear boxes are operatively connected together via appropriate linkage with the shafts having threads of opposite cast so that rotation in one direction of the shaft connecting the gear boxes will cause the beam forms to extend outwardly and rotation of the shaft in the other direction will cause the beam forms to retract.

5. The apparatus of claim 1 wherein each of the wheels of the set is mounted on a spindle perpendicularly mounted on an end of an eccentric member, the eccentric member is pivotally mounted on a channel member forming the frame of the carriage via a bolt provided with lateral openings which is passed through an opening through the opposite end of the eccentric member, a slotted collar is permanently affixed about the end of the bolt on the side of the channel member opposite that whereon the eccentric is located, the slots of the collar substantially corresponding with the location of the lateral openings through the bolt so that a pin passed through both the lateral openings and slots will secure and lock the eccentric, and consequently the spindle, at different position levels upon the frame whereby the carriage can be elevated and lowered by repositioning and locking the eccentrics at different levels with alternate inflation and deflation of the tires.

6. The apparatus of claim 5 wherein four slots are located at 90° angles, one relative to the other, and the lateral openings through the bolt are aligned therewith, so that the levels of elevation correspond to 90° increments about the circumference of the path of travel of the eccentric which is rotatable about the bolt.

7. The apparatus of claim 5 wherein the bolt is fitted within a bushing which is passed through the channel member forming the carriage frame, and the end of the bolt is threaded and held in place by a threaded nut.

8. The apparatus of claim 5 wherein air console means are provided for simultaneous rapid inflation and deflation of the pneumatic tires of a set of wheels.

9. The apparatus of claim 1 wherein outer corners of channel members forming the frame of the carriage are fitted with upwardly projecting lugs and the inside portions at the lower extremities of the vertical posts forming the frame assembly of the concrete form are provided with tubular segments, providing male and female members which secure the concrete form to the carriage and forms a ready breakaway feature for separation of the concrete form and carriage after the former has been positioned and set as desired.

10. The apparatus of claim 3 wherein a beam form is provided with oppositely disposed paired removable panels, of U-shaped cross-section, each of which is provided with shaped cut-away edges and downwardly projecting surrounding walls which, when fitted and secured together with fastening means, form an opening with an enclosing downwardly projecting collar within which a column tubular form can be fitted, the upper edges of which pair of removable panels are shaped as tubular sections which can be held in place upon a beam by passage of a bar therethrough.

11. The apparatus of claim 3 wherein a beam form is supported by a shoring member formed of telescoping tubular members, the height of which can be adjusted by locking means which support the said shoring member at the desired elevation.

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