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Gregory et al.

[11] **3,863,878**

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[54] **COLUMN-MOUNTED SHORING BRACKET ASSEMBLY FOR OVERHEAD FORMWORK**

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[52] **U.S. Cl.** ..... **248/295,** 249/219 R

[51] **Int. Cl.** **A47f 5/10,** A47h 33/00, E04g 17/16

[58] **Field of Search** ..... 248/205 R, 295, 296, 298, 248/55; 249/219 R, 210, 211, 18, 19, 20, 21, 22, 23, 24, 25

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[57] **ABSTRACT**

A column-mounted shoring bracket adapted for use in a concrete slab-supporting formwork beam during concrete-pouring operations, then lowering the formwork after slab completion so as to separate it from the slab, and finally permitting lateral withdrawal of the formwork from beneath the completed slab for purposes of reuse at a higher building level. A two-part bracket construction embodying a fixed part and a removable part enables the removable part to be shifted at will from story level to story level as building progresses.

10 Claims, 7 Drawing Figures

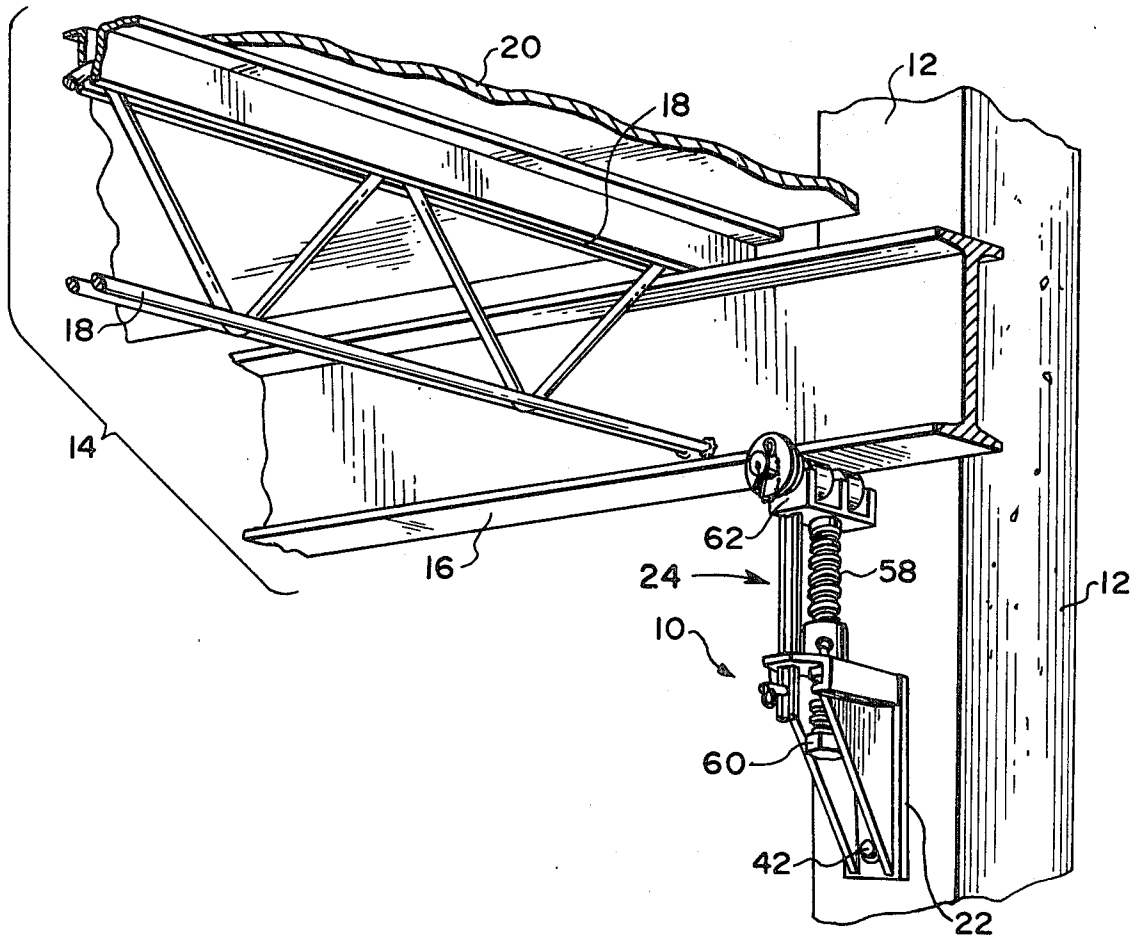


FIG 1

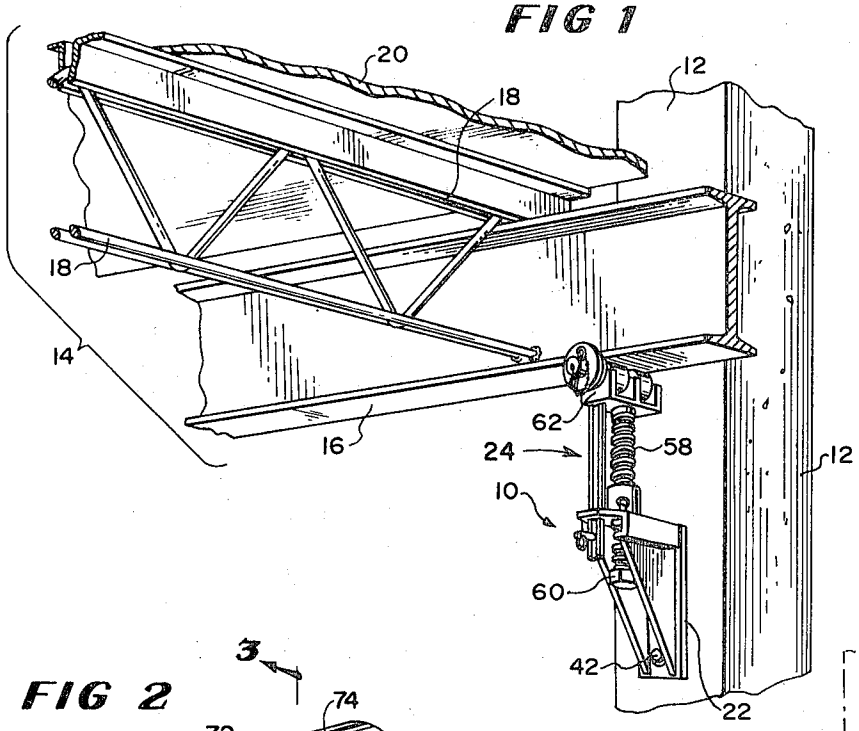


FIG 2

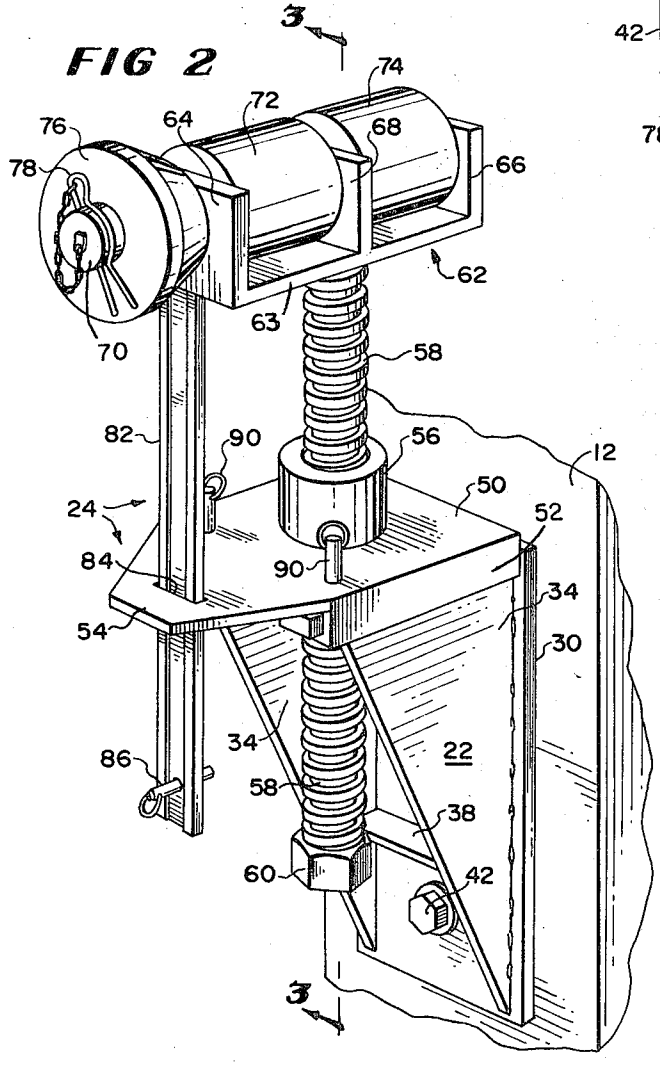


FIG. 3

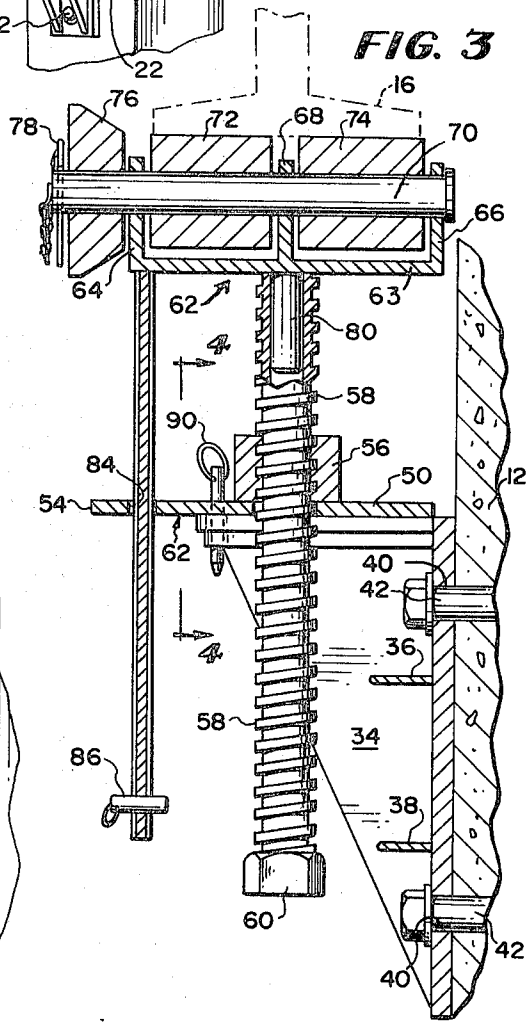


FIG. 4

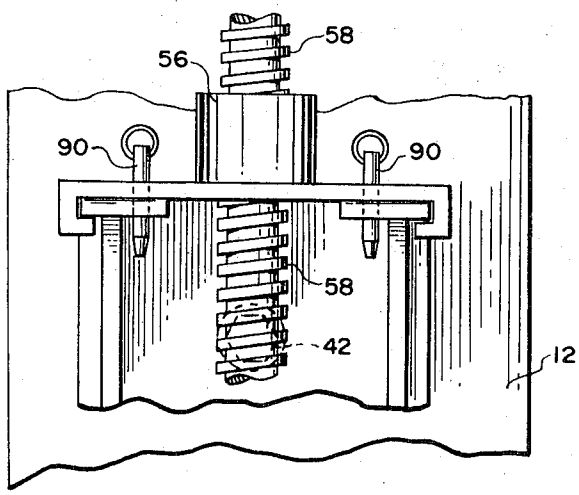


FIG. 6

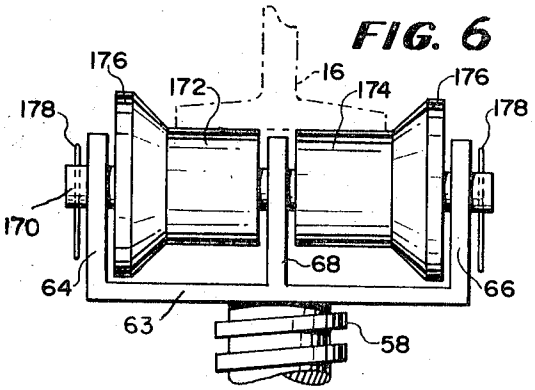


FIG. 7

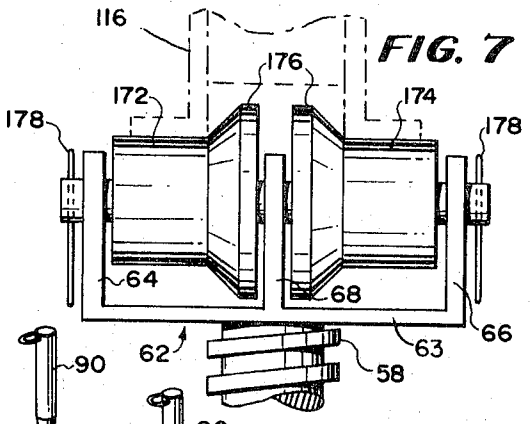
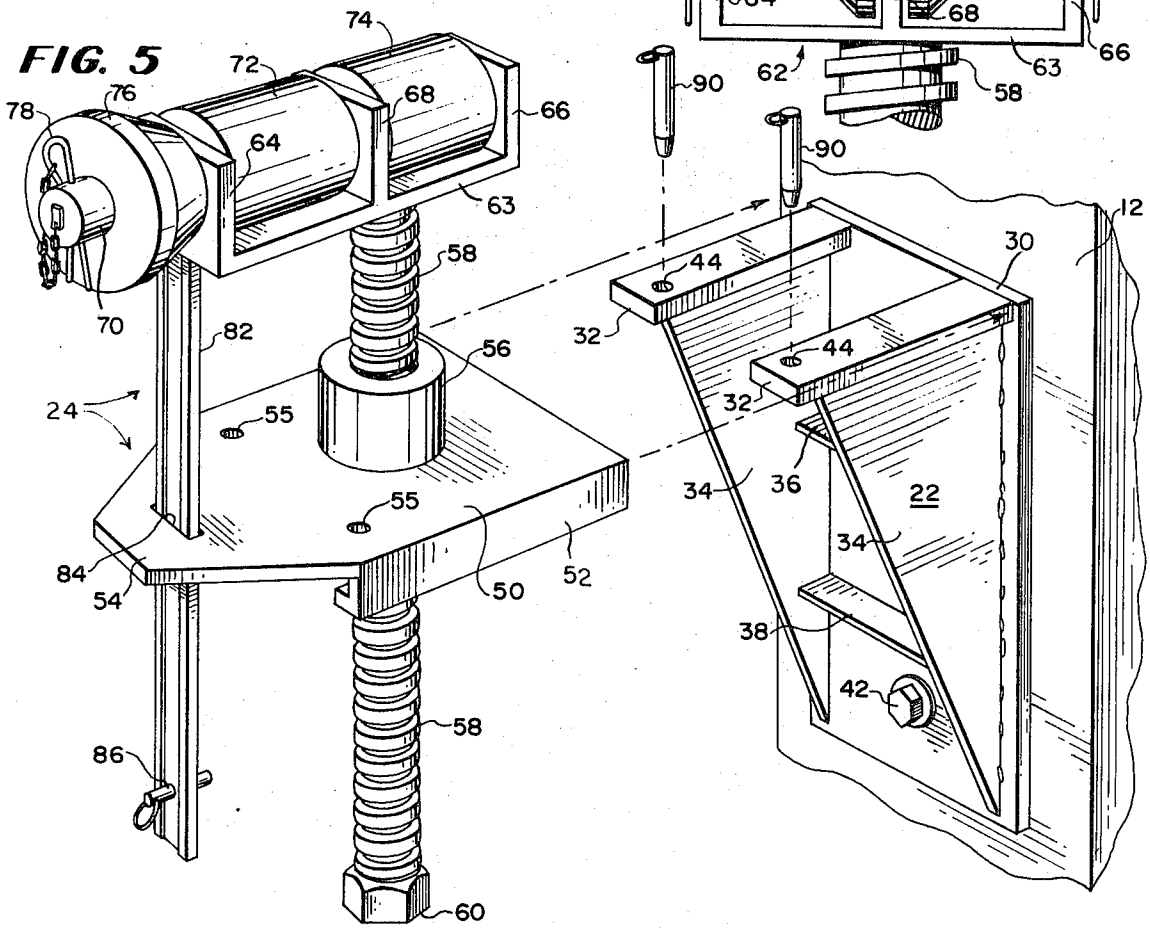


FIG. 5



COLUMN-MOUNTED SHORING BRACKET ASSEMBLY FOR OVERHEAD FORMWORK

The present invention relates to a column-mounted shoring bracket for supporting a concrete slab formwork during concrete pouring operations and, thereafter, when the concrete has become hardened, facilitating lowering of the formwork away from the slab and then shifting the same laterally from beneath the slab. The invention is particularly concerned with a column-mounted shoring bracket of the screw jack type wherein the load-bearing member of the bracket embodies a leveling screw which tractionally supports the formwork during concrete-pouring and hardening operations and, thereafter, is operated to allow the formwork to move downwardly away from the slab, after which traction-type roller means allows the formwork to be shifted laterally for removal purposes.

There are at the present time on the market and in use a wide variety of shoring brackets which operate upon the screw jack principle and also afford tractional roller means for shifting the formwork laterally from beneath the slab after such formwork has been lowered. While these shoring brackets may function reasonably well for the purposes intended, they nevertheless are possessed of certain limitations which it is the aim of the present invention to overcome.

Principal among these limitations is the fact that conventional column-mounted shoring brackets are fixedly mounted in toto on their respective columns, thus requiring the use of a large number of such brackets during the erection of any given multi-story building. Since each bracket is of a composite nature and involves a large number of both stationary and moving parts, duplication of these brackets throughout the building framework entails a large bracket inventory. Where the individual brackets are removably applied to their respective columns in an effort to obviate the necessity for such a large inventory, the labor that is involved in transferring them from one column to another on a different story level appreciably increases erection costs.

Another limitation which is attendant upon the construction and use of present-day column-mounted shoring brackets resides in the fact that the tractional roller means whereby the formwork is slid laterally from beneath the concrete slab is not so designed as to be of maximum efficiency.

The present invention is designed to overcome the above-noted limitations that are attendant upon the construction and use of known screw jack type column-supported shoring brackets and toward this end the invention contemplates the provision of a novel composite shoring bracket which is of two-part construction, one part being in the form of a fixed bracket support which is of an inexpensive nature and is temporarily left in position upon the associated column after removal of the other for reuse on another previously installed fixed bracket support at a higher level in the building being constructed, and the other part being a removable part which includes the screw jack, rollers and other load-receiving and load-shifting instrumentalities. By such an arrangement, the removable part, which is by far the most costly, may be transferred from column to column and fitted to any fixed part on another column, the transfer being made with a minimum of effort and the anchoring of the movable part to the fixed part being accomplished by the simple expedient of placing a fast pin in position.

The invention further embodies the use of a novel tractional roller means which is characterized by the fact that it affords a guiding means for lateral movement of the formwork from beneath the slab after such formwork has been lowered and thus freed from the slab. Whereas with conventional roller means the danger of slipping of the formwork beam from the roller means unless careful attention is paid to strict longitudinal shifting of the formwork is always present, the present tractional roller means is provided with edge guide means which causes the stringers to become self-centering but which will tolerate small departures from unidirectional load shifting operations, the same being true whether the formwork embodies an I-beam, a channel, or any other type of beam.

The provision of a column-supported shoring bracket such as has briefly been outlined above, and possessing the stated advantages, constitutes the principal object of the present invention. Numerous other objects and advantages not at this time enumerated will readily suggest themselves as the nature of the invention is better understood from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter described and are more particularly defined by the claims at the conclusion hereof.

In the accompanying two sheets of drawings forming a part of this specification, two illustrative embodiments of the invention are shown.

In these drawings:

FIG. 1 is a fragmentary perspective view of a concrete slab form installation, such view showing one of the improved column-mounted shoring brackets of the present invention operatively applied thereto and in its load-supporting relationship;

FIG. 2 is an enlarged fragmentary perspective view of the shoring bracket of FIG. 1;

FIG. 3 is a sectional view taken substantially centrally and vertically through the shoring bracket, the view being taken on the vertical plane indicated by the line 3—3 of FIG. 2 and in the direction of the arrows;

FIG. 4 is a fragmentary vertical sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a partially exploded and enlarged fragmentary perspective view of the shoring bracket of FIG. 1, such view illustrating schematically the manner of installation of the bracket on a building column;

FIG. 6 is a fragmentary side elevational view of the upper end region of the screw jack which is employed in connection with the invention and showing a modified form of reversible traction roller assemblymounted thereon, the roller assembly being designed for use in connection with the tractional support of an I-beam type of formwork beam; and

FIG. 7 is a side elevational view similar to FIG. 6 but showing the roller assembly converted to use in connection with the tractional support of a channel type of formwork beam.

Referring now to the drawings in detail in in particular to FIG. 1, a shoring bracket embodying the principles of the present invention is designated in its entirety by the reference numeral 10 and is shown as being operatively installed upon a precast vertical concrete column 12 forming a part of a concrete building undergoing erection. The function of the bracket 10, in combination with identical or similar brackets which are applied to other columns of the building, is to support a

formwork such as that which is designated by the reference numeral **14.** Such formwork is of conventional construction and is for the purpose of forming a concrete floor slab by having wet concrete poured thereover. After the concrete hardens, manipulation of the bracket serves to lower the formwork away from the finished slab until sufficient clearance is established as to permit lateral removal of the formwork from beneath the slab.

Formwork such as the formwork **14** herein disclosed will vary widely in varying building installations. Such formwork is commonly referred to as a "pallet" and in the following description and in the appended claims it will be referred to as such. The particular pallet selected for exemplary illustrative purposes herein is only fragmentarily disclosed in FIG. **1** of the drawings and it embodies longitudinal beams or stringers **16** (only one being shown herein), transverse trussed beam members **18,** and a plywood or other deck plate **20** on which the wet slab-forming concrete is poured for ultimate production of the floor slab (not shown). The shoring bracket **10** serves to support the associated stringer **16** during concrete-pouring operations and, as will be described in detail presently, after the concrete of the slab has become set, the bracket is capable of manipulation for the purpose of lowering the superjacent stringer **16** and, consequently, the entire pallet (formwork **14**). After the lowering operation, a certain tractional roller arrangement which is associated with the bracket **10** afford a substantially frictionless support for the lowered pallet so that it may be slid endwise from the installation for reuse elsewhere in connection with construction of the building.

Referring now to FIGS. **2** and **3,** the improved shoring bracket **10** involves in its general organization two component parts, namely, a fixed column-attached shelf part **22** and a removable jack part **24** (see particularly FIG. **5**). The shelf part **22** is of unitary construction while the jack part **24** is of a composite nature and is in the form of an assembly of functional component parts.

The fixed shelf part **22** is, in the main, formed of flat plate metal stock and includes a rectangular backing plate **30** (see FIG. **5**), a pair of forwardly projecting, horizontally extending shelf arms **32,** a pair of triangular, vertically extending gusset-like side plates **34,** and upper and lower transverse reinforcing and strengthening braces **36** and **38,** respectively, the various parts being suitably welded together in order to produce a unitary and rigid whole. Two vertically spaced holes **40** (see FIG. **3**) are formed in the backing plate **30** for reception therethrough of the shank portions of respective horizontally extending bolts **42** by means of which the fixed shelf part **22** as a whole may be fixedly secured to the column **12.** Small pin-receiving holes **44** are formed in the arms **32** adjacent to the distal ends thereof and serve a purpose that will be set forth presently.

As best shown in FIGS. **2, 3** and **4** of the drawings, the jack part **24** of the shoring bracket involves in its general organization of polygonal base plate **50** having parallel side edges from which there depend a pair of opposed channel-forming flanges **52** (see FIG. **4**). A trapezoidal nose portion **54** projects forwardly from the main body of the plate **50** and overhangs in fascia fashion the front or outer end portions of the channel-forming flanges **52.** A pair of holes **55** is formed in the base plate and these holes are designed for register with the aforementioned holes **44** in the arms **32** when the two parts **22** and **24** are assembled.

An upstanding internally-threaded boss **56** is welded to and projects upwardly from the central region of the base plate **50** and threadedly receives therein an elongated, vertically disposed jack screw **58,** the lower end of the jack screw being provided with a torque nut **60** for jack screw-turning purposes by way of a wrench or similar turning tool.

The jack screw **58** of the removable part of the shoring bracket **10** is of tubular construction and the upper end thereof has swiveled thereto a roller-supporting frame **62** embodying, in addition to a horizontal bottom plate **63,** vertically extending outer side plates **64** and **66** and a central, vertically extending plate **68,** the three plates serving to support a horizontal shaft **70.** Said shaft **70** serves as a mount for a series of three rollers including a pair of cylindrical rollers **72** and **74,** and a frusto-conical roller **76.** The roller **72** is straddled by the plates **64** and **68,** while the roller **74** is straddled by the plates **66** and **68.** The roller **76** lies outside the confines of the frame **62** and is disposed adjacent to the outer side plate **64,** the small base of the cone facing inwardly of the frame. A cotter pin **78** at one end of the shaft, together with an enlarged head on the other end of the shaft captures the shaft **70** in its operative position with respect to the frame **62.** The swivel connection between the frame **62** and the upper end of the jack screw **58** is established by means of a vertically extending pilot pin **80** which is secured centrally to the underneath side of the bottom plate of the frame **62** and projects downwardly into a vertically extending socket in the upper end of the jack screw.

A vertically extending outrigger anti-torque slide member **82** is secured at its upper end to the frame **62,** projects downwardly therefrom, and passes through a guide slot **84** in the trapezoidal nose portion **54** of the base plate **50.** A fast pin **86** which is removably received in a horizontal opening in the lower end of the anti-torque slide member **82** captures the slide member in the slot **84** and prevents upward separation of the slide member and its associated frame **62** from the base plate **50.**

Assembly of the jack part **24** on the fixed shelf part **22** is accomplished by sliding the channel-forming flanges **52** of the base plate **50** over the outer side edge portions of the two shelf arms **32** of the fixed shelf part **22** as indicated by the broken lines in FIG. **5,** and then, after the jack part **24** has been moved to its home position on the shelf part **22,** passing a pair of fast pins **90** through the aforementioned holes **55** in the base plate **50** and through the holes **44** in the support arms **32,** thus locking the two parts **22** and **24** in their assembled position.

In actual use of the herein described shoring bracket **10,** the requisite number of brackets will be mounted on the concrete columns **32** to accommodate the particular formwork or pallet being utilized in the formation of a concrete floor slab. The various jack screws **58** will be adjusted to bring the associated rollers **72, 74** approximately to the same horizontal plane at the desired height and thereafter the pallet **14** will be lowered onto or otherwise caused to rest upon the rollers. Initial application is made by bolting the shelf parts of the bracket assembly to the columns and thereafter installing the jack parts in the manner previously described.

Considering only the functioning of the illustrated shoring bracket **10**, and assuming for purpose of discussion that the pallet **14** employs longitudinal I-beam type supports such as the illustrated stringer **16**, it will be noted from an inspection of FIGS. **1** and **3** that the lower flange of the I-beam type stringer rests squarely on the rollers **72** and **74** so that these rollers share the load, while the roller **76** serves as an edge guide for preventing inadvertent derailing of the stringer. At such time as the pallet is thus positioned on the various brackets **10**, a leveling operation may be instituted so as to bring the plywood deck to the required level position, such leveling operation being accomplished by turning of the jack shafts in one direction or the other. Also at this time, slight adjustment of the pallet longitudinally may be resorted to if necessary.

With the pallet **14** thus installed, pouring of the wet concrete and other forming operations are conducted and, when it is time to remove the pallet, the jack screws **58** are manipulated by application of a wrench or other torque-applying tool thereto so as to bring the pallet downwards while still supported on thte rollers **72** and **74**. When it is ascertained that the pallet is at a proper level for removal thereof from the installation, it can readily be rolled longitudinally on the supporting rollers out from beneath the formed slab.

From the above description, it will be apparent that the shoring brackets **10** of the present invention, when utilized in the manner setforth above, are admirably adapted for use in the erection of a multi-story building wherein, after a given floor slab has become hardened to such an extent that it is self-supporting, the formwork or pallet **14** may be slid endwise on the rollers **72** and **74** outwardly through the open end of the building and, by means of suitable overhead hoists or the like, elevated to the next adjacent upper story level. The removable bracket parts **24**, i.e., the jack parts, which have just been used at the lower story level, may be withdrawn from their associated fixed shelf parts **22** by the simple expedient of withdrawing the two fast pins **90** of each assembly, after which the parts **24** may be pulled outwardly away from the columns **12**, transported to the next adjacent upper story level, and applied to the concrete columns **12** at appropriate elevations for cooperation of their counterpart jack parts **24** with the next pallet to be handled.

In FIGS. **6** and **7** of the drawings, a modified form of supporting roller assembly is shown. In this form of the invention, the outside frusto-conical roller **76** of shoring bracket of FIGS. **1** to **4** is dispensed with and two half-spool rollers **172** and **174** are substituted for the rollers **72** and **74**, respectively. Each of these half-rollers is provided with a frusto-conical spool flange **176** at one end. In such a roller assembly, it is possible to utilize a shorter roller-supporting shaft **170** that is used when the outside roller **76** is employed, and it is desirable to employ two cotter pins **178** in place of the single cotter pin **78**. Otherwise, the removable jack parts of the shoring bracket remains the same as that which has been described herein in connection with the form of the invention to FIGS. **1** to **5**, inclusive.

When the rollers **172** and **174** are disposed on the shaft **170** so that the flanges **176** assume remote positions in close proximity to the outer side plates **64** and **66**, respectively, the roller assembly is suitable for supporting an I-beam type of beam **16**, the two frusto-conical spool flanges **176** serving to confine the base flange of the I-beam against either inward or outward shifting toward and away from the column **12**.

Where a channel-type beam or stringer is employed in connection with the pallet **14**, and with certain other types of composite stringers having medial clearance facilities such as the stringer **116** shown in broken lines in FIG. **7**, the rollers **172** and **174** may be reversed so that the frusto-conical spool flanges **176** thereof are in close proximity to each other (see FIG. **7**). No. claim is made herein to any patentable novelty in the reversible roller feature inasmuch as such feature is the sole invention of one of the present applicants and forms the subject matter of copending U.S. Pat. application Ser. No. 365,957, filed on June 1, 1973 and entitled "TRACTION HEAD FOR A COLUMN-MOUNTED SHORING BRACKET."

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit or scope of the invention. Therefore, only insofar as the invention is particularly pointed out in the accompanying claims is the same to be limited.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. A shoring bracket adapted releasably to support a horizontal stringer forming a part of a concrete-receiving formwork-type pallet used in the erection of a multi-story building, said bracket comprising a two-part structure of a shelf part and a jack part, said shelf part being adapted for mounting it on a vertical column of the building and having an arm projecting outwardly from such column, said jack part including a base plate mountable on said arm, means for releasably securing said base plate to said arm, an elongated vertically extending jack screw having threaded engagement with the base plate and projecting upwardly thereabove, a frame mounted for swiveling movement on the upper end of said jack screw, a stringer-supporting roller carried by said frame and mounted for rotation about a horizontal axis, and an anti-torque connection extending between said frame and base plate and adapted to prevent rotational movement of the frame about the vertical axis of the jack screw when the latter is rotated for stringer raising or lowering purposes.

2. A shoring bracket as set forth in claim **1** and wherein said anti-torque connection comprises a vertically extending slide member fixedly secured at its upper end to the frame and projecting downwardly through a guide slot in the base plate.

3. A shoring bracket as set forth in claim **2** and wherein a fast pin projects through the lower end of said slide member and prevents removal of the slide member upwardly from the base plate.

4. A shoring bracket as set forth in claim **1** and wherein said frame embodies a pair of upstanding side plates and a roller shaft supported at its ends by said side plates, and the stringer-supporting roller is of a composite nature and is rotatably mounted on said shaft.

5. A shoring bracket as set forth in claim **4** and wherein said composite roller includes two cylindrical roller sections which are interposed between said side plates and are adapted to bear the load of said stringer, and an edge guide roller section disposed exteriorly of

the frame and of a diameter greater than that of the cylindrical roller sections.

6. A shoring bracket as set forth in claim 5 and wherein said edge guide roller section is frusto-conical and has its small base facing said frame.

7. A shoring bracket as set forth in claim 6 and wherein said frame includes a central shaft-supporting plate which projects between said cylindrical roller sections.

8. A shoring bracket as set forth in claim 1 and including channel means along opposite sides of said base plate slidably receiving said arm in the channels thereof.

9. A shoring bracket as set forth in claim 8 and in which the releasable securing means is in the form of registering openings in said base plate and arm, respectively, and removable fast pin means insertable through said openings.

10. A shoring bracket as set forth in claim 9 and including enlarged diameter roller means adapted for engagement with said stringer to prevent derailing of the stringer from said roller.

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