June 13, 1967 R. F. LOEWENAU 3,324,614

ELEVATED FLOORING SYSTEM

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Fig. 1.

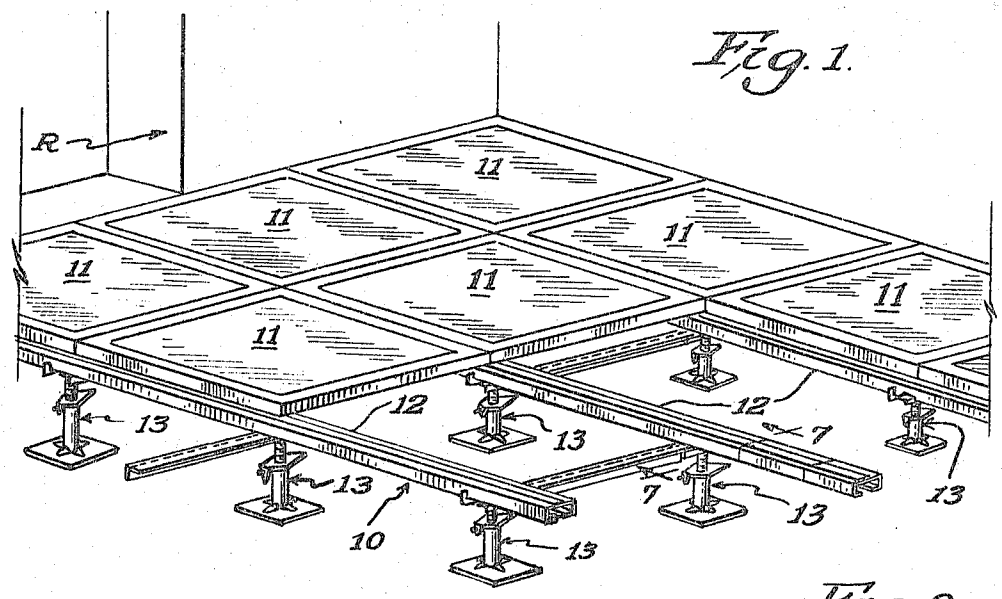
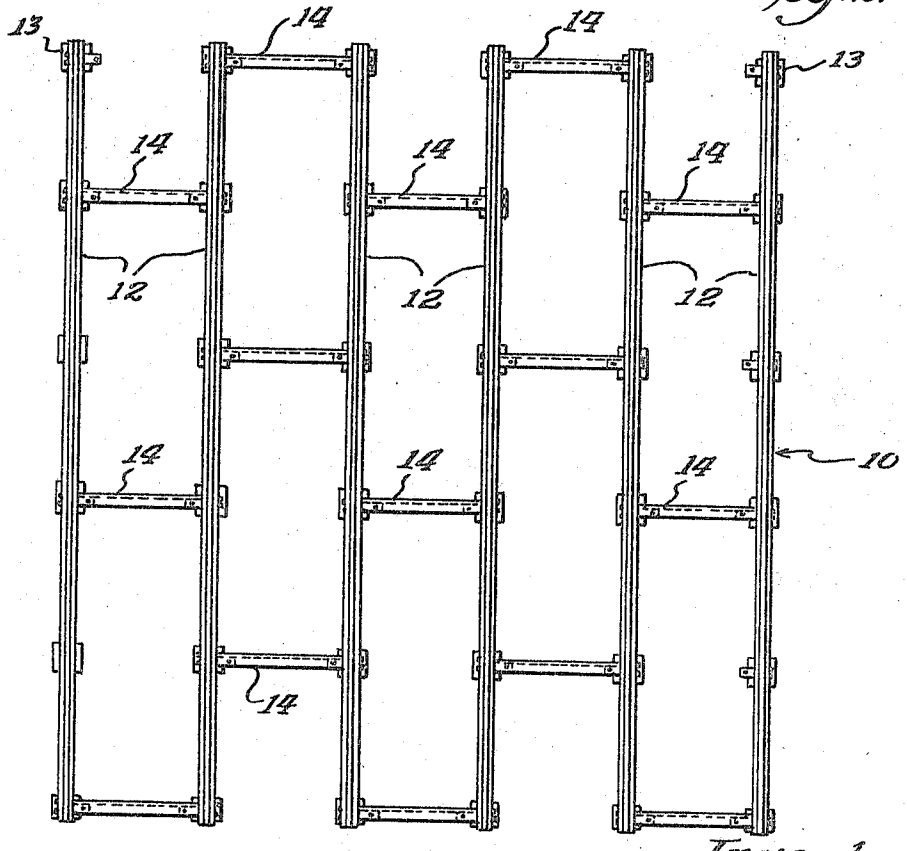


Fig. 2.



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Fig. 3.

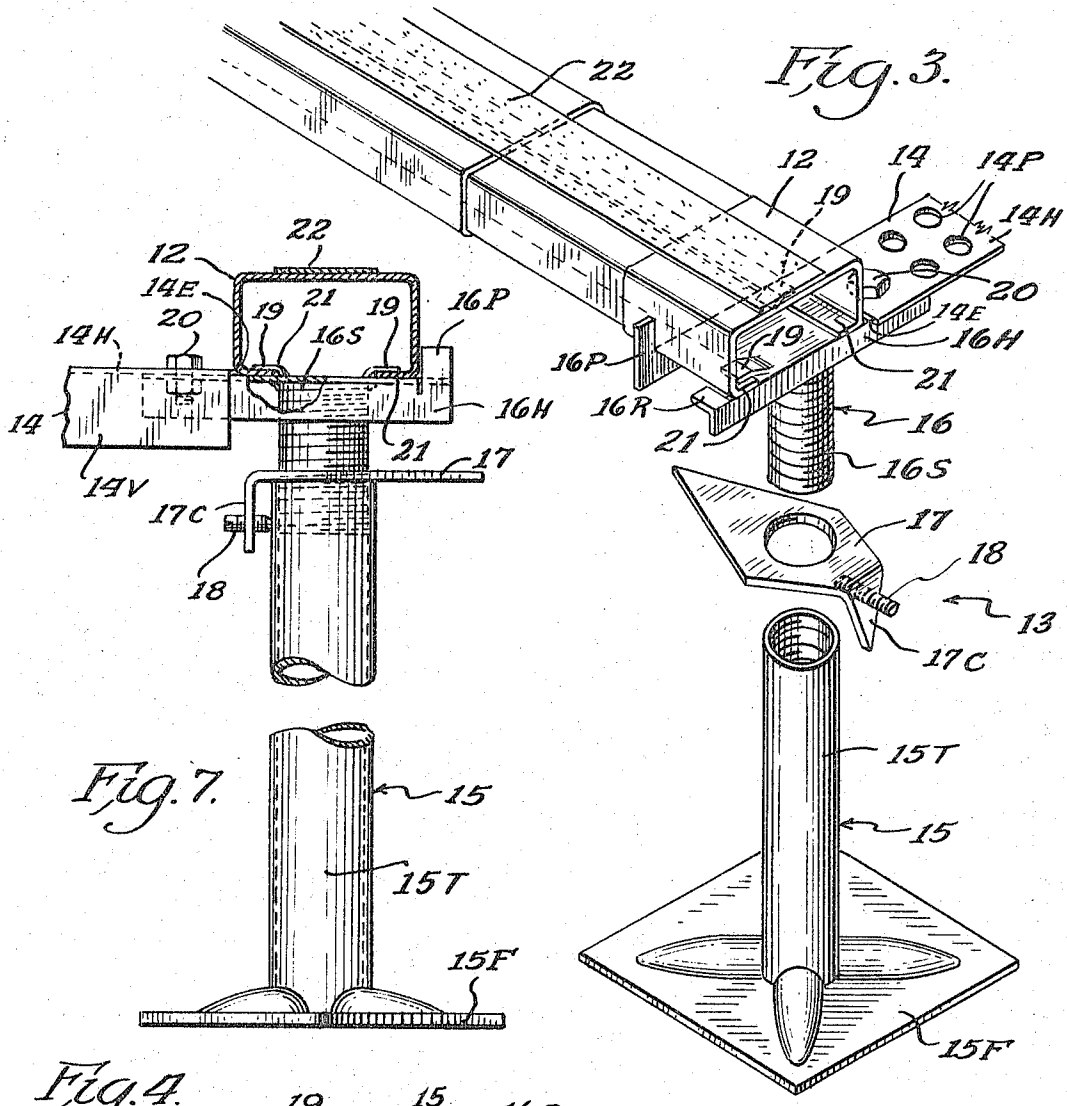


Fig. 7.

Fig. 4.

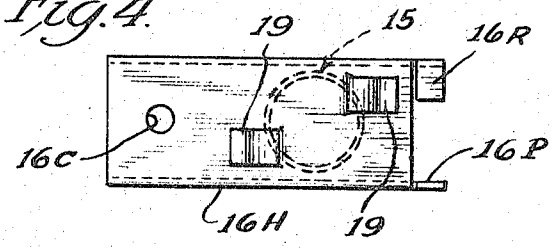


Fig. 6.

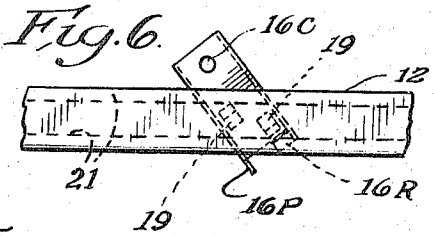
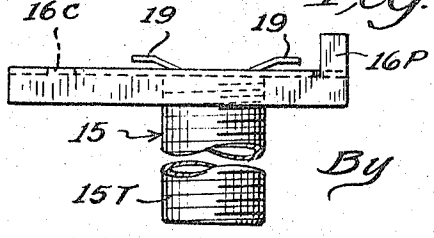


Fig. 5.



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ELEVATED FLOORING SYSTEM

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ABSTRACT OF THE DISCLOSURE

An adujstable level floor structure supported by jacks adjustable to vary the floor level. A detachable interlock between a jack head and floor support channel is obtained by rotation of the jack head to engage flanges thereon with flanges on the channel and a stop on the jack head limits rotation of the head to the fully interlocked position.

This invention relates to elevated flooring installations and more particularly is concerned with a reticulated floor supporting structure of simplified, high strength construction that may readily be installed.

Elevated flooring installations find important application in electronic data processing installations and for this purpose must provide great strength and rigidity to support the heaviest equipment with minimum deflection.

It is important that such flooring systems be adjustable elevationally to enable accurate leveling of the floor for insuring proper operation of the equipment. Strength and rigidity are absolutely necessary in adjustable elevated flooring systems for retaining the initial levelled adjustment.

The usual elevated flooring installation must serve as an air conditioning plenum and as a housing for the electrical wiring system. Therefore, the individual flooring panels must be easily removable for access to the subfloor region during initial equipment hook-up and for future maintenance.

Most elevated flooring systems require custom sizing at the installation site and standardized structural parts that may readily be cut to length and readily interconnected are important for speeding installation, reducing material supply problems, and eliminating waste.

Accordingly, the principal object of the present invention is the provision of an elevated flooring support arrangement: that utilizes uniform floor beam and cross piece construction of maximum strength and rigidity; that accommodates ready connection of each floor beam to a plurality of adjustable floor mounted support jacks; that is finally secured in permanent relation by cross pieces that impart lateral stability and that prevent accidental disengagement of the floor beams from the jacks; and that provides easy access to any region of the subfloor.

Other objects and advantages of the present invention will be apparent from the following description and claims, and are illustrated in the accompanying drawings which show structure embodying preferred features of the present invention and the principles thereof, and what is now considered to be the best mode in which to apply these principles.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same:

FIG. 1 is a perspective view of a portion of a room equipped with elevated flooring structure constructed in accordance with this invention, with portions of the flooring removed to facilitate disclosure of the support structure arrangement and interconnection;

FIG. 2 is a diagrammatic plan view illustrating the supporting structure layout utilized in the preferred practice of this invention;

FIG. 3 is an exploded perspective view illustrating a jack assembly and its connection to a floor beam;

FIG. 4 is a plan view of a jack head arranged for interconnection with a floor beam;

FIG. 5 is a side elevational view of the jack head and pedestal;

FIG. 6 is a diagrammatic plan view illustrating the manner in which a jack head is engaged to a floor beam; and

FIG. 7 is a fragmentary sectional view through a floor beam and illustrating the completed connection arrangement between a jack assembly, floor beam, and cross piece.

Referring now to the drawings, a room is designated generally at R in FIG. 1 and is shown provided with an elevated flooring system which includes a reticulated floor supporting structure **10** and a set of rectangular finished flooring panels **11** disposed in supported relation upon the flooring structure.

The flooring structure **10** as disclosed herein includes a set of uniformly spaced parallel extending floor beams **12**, a plurality of jack assemblies **13** arranged in a grid-like pattern to present a separate row of jacks in supporting relation to each floor beam and a set of crossties **14** connecting adjacent crosswise aligned jack assemblies in a staggered pattern. Such a staggered crosstie pattern is permissible as the crossties are not depended upon for direct support of the flooring panels, but only for imparting lateral stability to the structure. In the preferred practice of this invention it is contemplated that the flooring panels **11** have opposite lengthwise edges supported on adjacent floor beams **12**, with each beam having abutting ends of adjacent panels equally sharing the available beam support surface area.

It will be apparent that this elevated floor arrangement can be elevated to any desired height by adjustment of the jacks **13** to provide a plenum for air conditioning and for any required electrical service conduits. This plenum area is easily accessible by removal of the floor panels at the appropriate location, and this facilitates installation of data processing equipment with its underfloor mounted wiring, and it also facilitates maintenance.

The floor supporting jack assemblies **13** are all of identical construction and in the preferred form disclosed herein, comprise a base section **15** and a pedestal section **16** rotatably carried by the base in elevationally adjustable relation. The base section **15** as disclosed here consists of a floor plate **15F** arranged for direct securement to the main building floor and an upstanding hollow support tube **15T** centrally of the plate. The pedestal **16** comprises a connection head **16H** which supports and interlocks with the floor beam **12** and a depending threaded spindle **16S** which is equipped with an adjustment collar **17** that rests on the upper end of the support tube **15T** and that threadedly engages the spindle to transmit the loading forces. Rotation of the collar **17** while holding the pedestal **15** and base **16** varies the elevation of the head **16H** to accomplish initial leveling of the floor support structure. The collar **17** has locking means associated with it, and in the illustrated arrangement, the collar is of rhombic configuration and has a downturned corner **17C** provided with a tapped hole to receive a locking screw **18** that is engageable radially against the support tube **15T** to fix the collar against rotation.

The support head **16H** at the top of the pedestal is of generally channel-shaped configuration and is provided with holding clips **19** which preferably are in the form of upraised flanges struck out from the main wall of

the head and oriented in laterally oppositely outwardly directed relation. These flanges **19** are preferably offset as is best seen in FIG. 4. The main wall of the head has one end provided with a connection hole **16C** to receive a crosstie fastener **20** and has its opposite end provided with an upstanding positioning stop **16P** which preferably is struck out from the main wall and is positioned to engage laterally externally against the floor beam **12** when the floor beam is interlocked with the holding clips **19**. When a crosstie is employed, as shown in FIGS. 3 and 7, the inner edge **14E** of the crosstie is parallel to the floor beam **12** and this edge in conjunction with stop **16P** resists any rotation of the support head **16H**.

When a crosstie **14** is not employed with a jack assembly **13**, as when a jack assembly is positioned at a corner location indicated at the two upper corners of the structure shown in FIG. 2, an additional positioning stop **16R** can be bent out from the support head **16H** to engage laterally externally against the floor beam **12** when the floor beam is interlocked with the holding clips **19**. This stop **16R** in conjunction with stop **16P** resists any rotation of the support head **16H**.

The floor beams **12** are preferably formed steel flanged channels presenting continuous bottom flanges **21** that are laterally oppositely inwardly directed and transfer floor loads to the support jacks **13** by continuous beam action to afford maximum strength and rigidity and minimize deflection or distortion. As is apparent from a consideration of FIG. 7, the inner extremities of the head flanges **19** are spaced closer together than the inner extremities of the beam flanges **21** and the outer extremities of the head flanges **19** are intermediate of the inner and outer extremities of the beam flanges **21** to enable partial overlap of the flanges for effecting vertical interlocking between the beam and the jack heads.

The assembled relationship of a beam **12** and connection head **16H** is pictured in FIGS. 3 and 7, and it will be noted that the positioning stop **16P** engages laterally against the beam when the beam is oriented in properly aligned fully interlocking relation to the head flanges **19**. The positioning stop **16P** permits relative rotation of the connection head **16H** with respect to the beam in only one direction for the purpose of seating the beam upon the head as illustrated in FIG. 6 and thereafter interlocking the flanges in retained relation.

The crossties **14** as illustrated, are preferably steel structural angles having a multiplicity of perforations **14P** of various orientation and size to enable easy and precise positioning of the angles with respect to the connector holes of the heads. Since the angles **14** are preferably cut to length on the job site, the perforations give needed flexibility in sizing to offset any gain or loss from creeping, and the perforations are provided only in the horizontal wall **14H**, while the vertical wall **14V** is unbroken and provides adequate strength to function as a lateral control member and maintain the beams **12** in properly spaced stable relationship.

The simplified installation procedure, which is made possible by the disclosed arrangement, may now be described. The jack assemblies **13** are first placed in a grid pattern and are individually adjusted to proper height for establishing a desired uniform floor level with minimum variations. The locking screws **18** are actuated to fix the jack heads **16H** at their adjusted positions. The floor beams **12** are then cut to length as required for the particular room and each beam is applied to a row of jacks. With a beam **12** approximately positioned on the jacks **13**, each jack head is rotated to an oblique relation as pictured in FIG. 6 to accommodate flush seating of the beam flanges **21** on the head and thereafter, the jack is rotated back to an aligned relationship determined by the engagement of the positioning stop **16P** with the side wall of the beam. During this return rotation the upraised clips **19** on the head receive the beam flanges **21** and establish vertical interlocking engagement.

Since the collar **17** is preferably locked during this operation, the rotation of the head varies the elevation of the pedestal, but the positioning stop **16P** serves as a guide to insure that the pedestals are restored to their initially adjusted level condition. At this point, it is well to check the levels defined by the various beams, and if all is in proper adjustment, the crossties **14** are connected between adjacent heads **16H** to fix them in their aligned relation and prevent accidental disengagement of the components. It may be noted that the engagement of the beams with the jack heads requires no separate mechanical fasteners. The only mechanical fasteners involved in the construction being the fasteners (not shown) which are employed for securing the base plates to the sub-floor and the fasteners **20** which connect the crossties **14** to the heads **16H**.

After the beams **12** are in place and a final check of leveling has been made, an adhesive-backed cork tape **22** is applied to the top wall of the floor beam to insure proper seating of the flooring panels which are supported continuously along the beam to dampen any vibration or noise that may occur and to act as a seal for preventing air leakage from the plenum chamber. Finally, the flooring panels are set in place.

Any particular panel may be removed after the installation is completed by the use of a manual vacuum lifter (not shown.) This affords access to the sub-floor whereever desired. The thickness and sizing of the flooring panels **11** may be widely varied in accordance with strength and decor requirements.

Thus, while preferred constructional features of the invention are embodied in the structure illustrated herein, it is to be understood that changes and variations may be made by those skilled in the art without departing from the spirit and scope of the appending claims.

I claim:

1. In a reticulated floor support system for supporting a plurality or rectangular flooring units, a plurality of spaced apart parallel floor beams each provided with bottom portions that constitute a set of laterally oppositely directed bottom flanges, and a plurality of jack assemblies separately supporting each floor beam, each jack assembly having a base and a pedestal rotatably carried by said base, each pedestal having a support head provided with a set of laterally diagonally oppositely directed upraised flanges, the flanges of one set projecting oppositely inwardly and the flanges of the other set projecting oppositely outwardly and having inner extremities spaced apart closer than the inner extremities of the flanges of said one set and having outer extremities spaced apart intermediately of the inner and outer extremities of the flanges of said one set to enable initial rotation of said head to an oblique position to accommodate seating of said beam flanges on said head and to enable subsequent rotation of said head to aligned position to bring said upraised flanges into vertically interlocking relation with said bottom flanges.

2. In a reticulated floor support system for supporting a plurality of rectangular flooring units, a plurality of spaced apart parallel floor beams each provided with bottom portions that constitute a set of laterally oppositely directed bottom flanges, and a plurality of jack assemblies separately supporting each floor beam, each jack assembly having a base member, a pedestal member upstanding from said base member, a collar threaded on one of said members and engageable vertically against the other member to mount the pedestal member in elevationally adjustable relation upon the base member, and means for locking the collar relative to one of said members, each pedestal member having a support head provided with a set of laterally diagonally oppositely directed upraised flanges, the flanges of one set projecting oppositely inwardly and the flanges of the other set projecting oppositely outwardly and having inner extremities spaced apart closer than the inner extremities of the flanges of said one set and having outer extremities spaced apart

intermediately of the inner and outer extremities of the flanges of said one set to enable initial rotation of said head to an oblique position to accommodate seating of said beam flanges on said head and to enable subsequent rotation of said head to aligned position to bring said upraised flanges into vertically interlocking relation with said bottom flanges.

3. In a recticulated floor support system for supporting a plurality of rectangular flooring units, a plurality of spaced apart parallel floor beams of flanged channel shape to provide a set of laterally oppositely directed bottom flanges, and a plurality of jack assemblies separately supporting each floor beam, each jack assembly having a base and a pedestal rotatably carried by said base in elevationally adjustable relation, each pedestal having a support head provided with a set of laterally oppositely directed upraised flanges, the flanges of one set projecting oppositely inwardly and the flanges of the other set projecting oppositely outwardly and having inner extremities spaced apart closer than the inner extremities of the flanges of said one set and having outer extremities spaced apart intermediately of the inner and outer extremities of the flanges of said one set to enable initial rotation of said head to oblique position to accommodate seating of said beam flanges on said head and to enable subsequent rotation of said head to aligned position to bring said upraised flanges into vertically interlocking relation with said bottom flanges, and each head having an upstanding positioning stop located laterally externally alongside the corresponding beam to determine the aligned position for the head and to enable rotation in only one direction from such aligned position to the oblique position.

4. In a recticulated floor support system for supporting a plurality of rectangular flooring units, a plurality of spaced apart parallel floor beams of continuously flanged channel shape to provide a set of laterally oppositely inwardly directed bottom flanges, and a plurality of jack assemblies separately supporting each floor beam, each jack assembly having a base member, a member upstanding from said base member, a collar threaded on one of said members and engageable vertically against the other member to transmit loads between said member and mount said pedestal member in elevationally adjustable relation upon the base member, and means for locking the collar relative to one of said members, each pedestal member having a support head provided with a set of laterally diagonally oppositely outwardly directed upraised flanges generally aligned with said beam flanges and having inner extremities spaced apart closer than the inner extremities of said beam flanges and having outer extremities spaced apart intermediately of the inner and outer extremities of said beam flanges to enable initial rotation of said head to an oblique position to accommodate seating of said beam flanges on said head and to enable subsequent rotation of said head to aligned position to bring said upraised flanges into vertically interlocking relation with said bottom flanges.

5. In a reticulated floor support system for supporting a plurality of rectangular flooring units, a plurality of

spaced apart parallel floor beams of continuously flanged channel shape to provide a set of laterally oppositely inwardly directed bottom flanges, and a plurality of jack assemblies separately supporting each floor beam, each jack assembly having a base and a pedestal rotatably carried by said base, each pedestal having a support head provided with a set of laterally oppositely outwardly directed upraised flanges generally aligned with said beam flanges and having inner extremities spaced apart closer than the inner extremities of said beam flanges and having outer extremities spaced apart intermediately of the inner and outer extremities of said beam flanges to enable initial rotation of said head to an oblique position to accommodate seating of said beam flanges on said head and to enable subsequent rotation of said head to aligned position to bring said upraised flanges into vertically interlocking relation with said bottom flanges, and each head having an upstanding positioning stop located laterally externally alongside the corresponding beam to determine the aligned position for the head and to enable rotation in only one accurate span between said aligned and oblique positions.

6. In a reticulated floor support system for supporting a plurality of rectangular flooring units, a plurality of parallel rows of jack assemblies, each jack assembly having a permanently fixed base provided with an upstanding support tube, a pedestal having a threaded spindle rotatable in the support tube, a collar threaded on said spindle and disposed upon said tube to transmit load force from the pedestal to the base and mount the pedestal in elevationally adjustable relation upon the base, each pedestal having a support head provided with upraised abutments, and separate beam supported on the heads of each row of jacks and having bottom abutments adjacent each head for vertically interlocking engagement with the corresponding head abutments, said abutments being spaced in a configuration to enable rotation of said head to an oblique relation to accommodate flush seating of the beam upon the head and to enable final rotation of the head to bring the abutments into interlocking relation, each head having an upstanding positioning stop located laterally externally alongside the corresponding beam to determine the interlocking relation and to enable parti-circular rotation of the head in only one direction toward the oblique relation, and crossties connecting the heads of each pair of laterally adjacent jacks to prevent rotation of the heads after interlocking engagement of the heads and beams has been established.

References Cited

UNITED STATES PATENTS

1,681,010	8/1928	Raggio	248—354 X
2,271,250	1/1942	Buchholz	248—223 X
3,157,254	11/1964	Spiselman	52—456 X
3,222,030	12/1965	Thorpe	248—354 X

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