United States Patent

[11] **3,549,090**

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[54] **RAILROAD TRACKS**
10 Claims, 18 Drawing Figs.

[52] **U.S. Cl.** **238/281,** 238/283
[51] **Int. Cl.** **E01b 9/68**
[50] **Field of Search** 238/281, 283, 374, 377, 349, 281

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Primary Examiner—Arthur L. LaPoint
Assistant Examiner—Richard A. Bertsch
Attorney—Waters, Roditi, Schwartz and Nissen

ABSTRACT: A track assembly in which a rail is held on a base by a flat spring having one end engaging the rail and an opposite end turnably engaging a wedge which is abutted against a projection extending along a side of the rail. A bolt is threaded into a plug in the base and the bolt engages the spring to clamp the rail to the base under the resiliency of the spring. A pad unit is interposed between the rail and the base to raise or lower the rail.

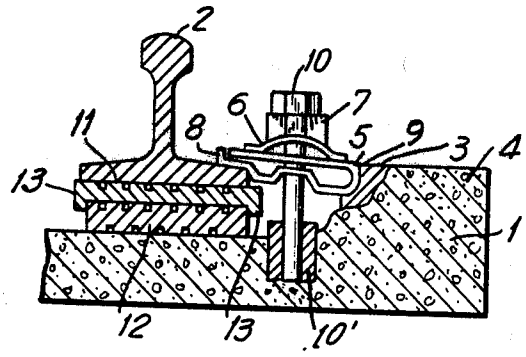


FIG. 1

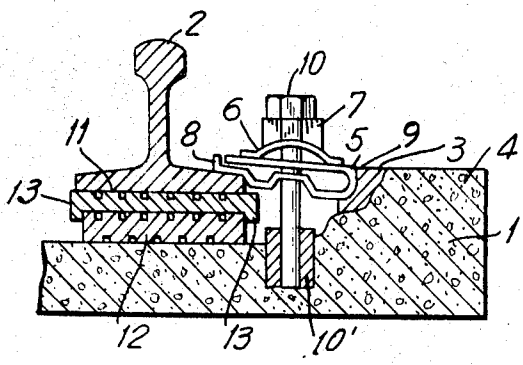


FIG. 2

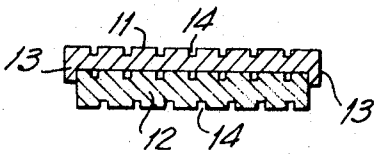


FIG. 3

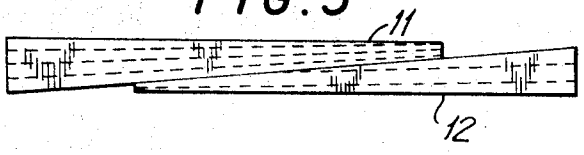


FIG. 6

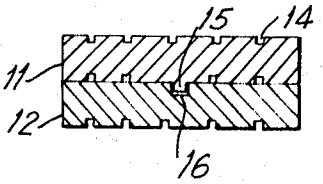


FIG. 4

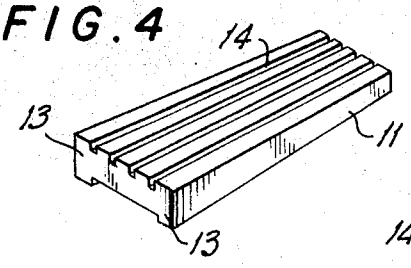


FIG. 5

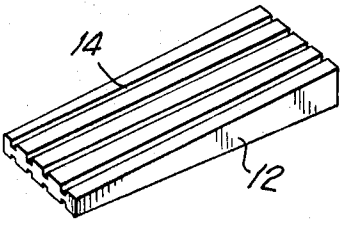
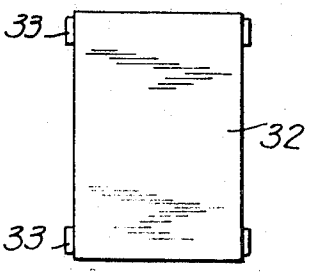


FIG. 8



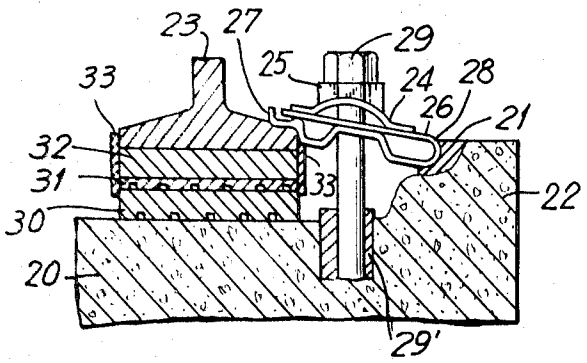


FIG. 7

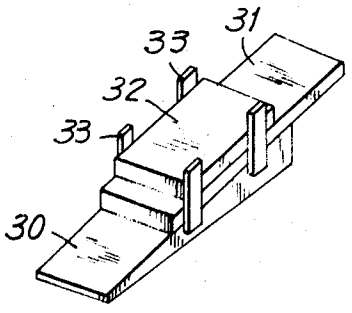


FIG. 9

FIG. 10

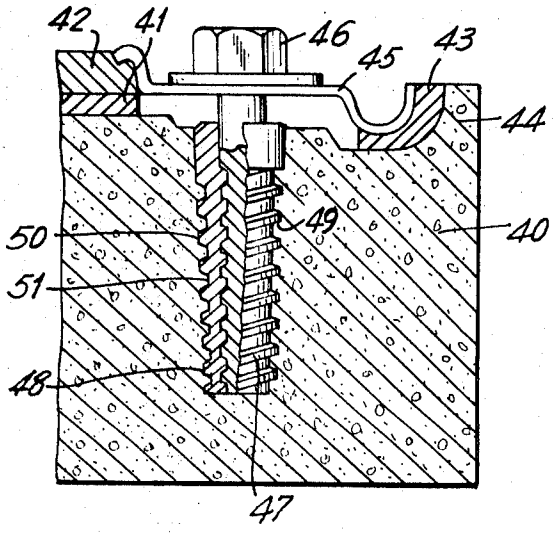


FIG. 11

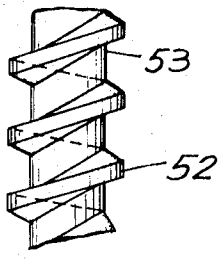


FIG. 14

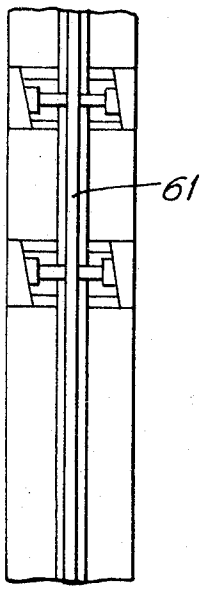


FIG. 17

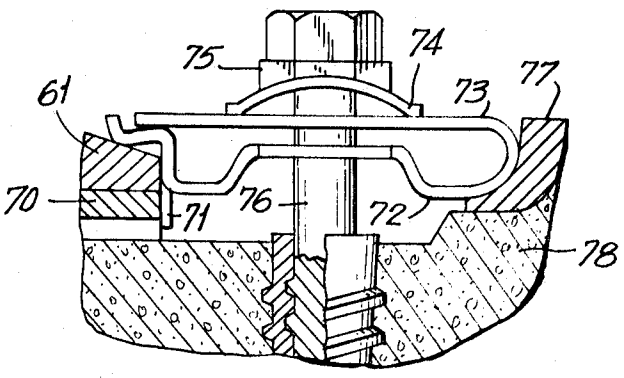




FIG. 18

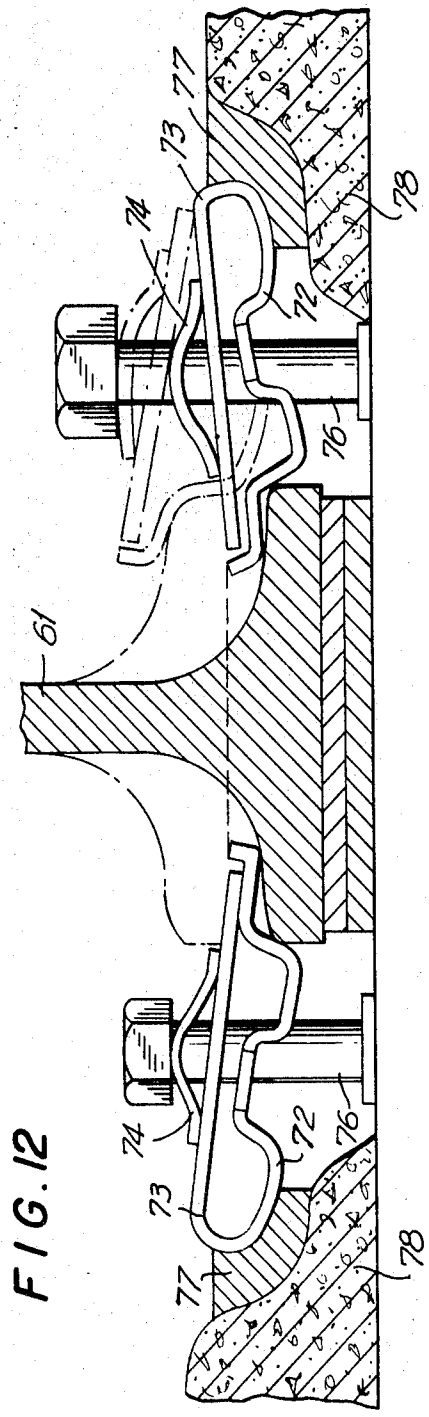


FIG. 12

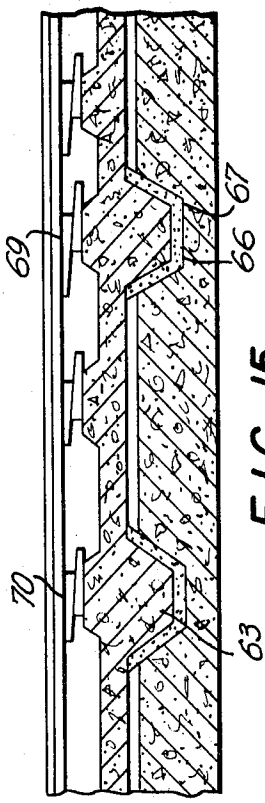


FIG. 15

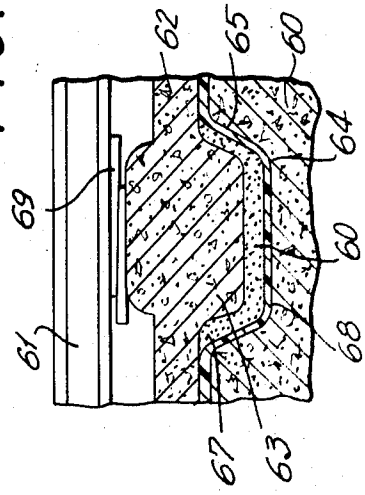


FIG. 16

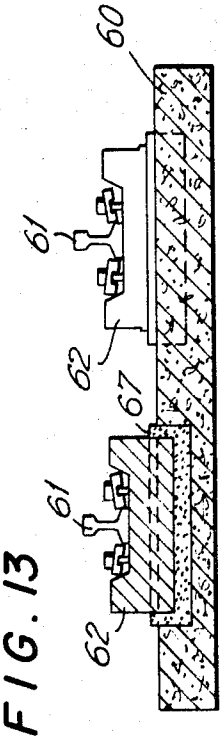


FIG. 13

RAILROAD TRACKS

BRIEF SUMMARY OF THE INVENTION

This invention relates to railroad tracks, and particularly to an improved unit for minutely raising and lowering rails. This invention also relates to an improved plug embedded in prestressed concrete ties, the plug being part of the assembly for securing the rail to the ties.

Heretofore, a gravel base of a railroad bed has been used to raise and lower rails, however, because the gravel tends to settle, the rails are frequently required to be raised. Also, rails laid on elevated railroad tracks and railroad bridges tend to settle to a great extent as a result of the settlement of the column supports. Therefore, a substantial expense for maintenance of tracks must be appropriated.

When gravel is used for the railroad bed of old type tracks, the gravel bed for ties are narrow thus enabling settlement by pounding with beaks, and although the gravel bed under the ties is compacted, the parts between the ties remain loose and rain water may permeate therein. With the bed in such a condition, the ties continue to settle due to the vibration of rails, and consequently trains may be subject to derailment due to deviation of the track line, unless the track is properly maintained by providing a vast maintenance budget.

Recently with the development of high speed electric trains, an arrangement wherein the rails are directly clamped to concrete beams and bed bases has become popular. In such a case, it is very difficult to couple the rails due to uneven surfaces of the concrete beams and bases. Furthermore, when the bed bases settle locally, the track will deviate in line, which is a dangerous condition, particularly in high speed tracks for electric trains.

Since electric trains running at high speeds impart a strong shock to the clamped portions of the rails, a vibration force is produced in the springs which acts on bolts used in the clamped portions tending to loosen the bolts.

These high speed trains have made conventional apparatus for laying rails inadequate due to the various disadvantages thereof.

The present invention, therefore, contemplates the provision of improved apparatus for reliably maintaining rails of modern tracks completely in line, while eliminating disadvantages of the methods and apparatus of the prior art.

When rails are to be directly clamped to concrete beams and concrete bed bases, it is extremely difficult to clamp the rails to the concrete members so as to maintain them completely in line due to unevenness of the concrete surfaces. Uneven settlement of the bed bases should be prevented, because such settlements will cause extremely dangerous conditions of track misalignment.

One of the objects of the present invention is to provide tapered pad means which are adjustable for raising and lowering the rails, and packing means for preventing irregular arrangement of such a pad means used to raise and lower rails.

Another object of the present invention is to provide an improved screw plug embedded in a prestressed concrete tie for preventing a clamping bolt in the plug from loosening since strong shocks imparted by frequently operating high speed trains to the clamped rail portions will tend to loosen the bolt.

A further object of the present invention is to provide an improved arrangement for directly clamping rails to concrete bed bases and concrete beams of elevated tracks.

According to one aspect of the invention, there is provided an assembly comprising a rail, a base for said rail including projections on both sides of said rail, spring means engaging each projection and said rail, bolt means engaging said base and each spring means to tightly press the rail against the base by the resiliency of the spring means, and a pair of superposed tapered pads between the rail and the base for raising and lowering the rail by relative sliding adjustment between the pads.

In further accordance with the invention, the bolt means is threadably engaged in a plug embedded in the base, said plug being of wedge shape and including external threads thereon to prevent removal of the plug from the base. The plug further has internal female threads with narrow lands at each crest and root, the bolt means having corresponding male threads for engagement therewith.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a cross-sectional view showing an assembly which incorporates a taper pad unit for raising and lowering rails;

FIG. 2 is an enlarged cross-sectional view of a portion of the pad unit of FIG. 1;

FIG. 3 is a side view of a set of assembled upper and lower pads of a pad unit;

FIGS. 4 and 5 are perspective views of an upper pad and a lower pad respectively;

FIG. 6 is a cross-sectional view of another embodiment of an assembly of upper and lower pads;

FIG. 7 is a cross-sectional view showing means for preventing disarrangement of a unit for raising and lowering a rail;

FIG. 8 is a plan view of a packing of the present invention;

FIG. 9 is a perspective view of the packing of FIG. 8 shown superposed on taper pads;

FIG. 10 is a sectional view showing a rail clamped to a prestressed concrete tie with a screw plug embedded in the tie;

FIG. 11 is an enlarged side view of a part of the improved screw plug of the present invention;

FIG. 12 is a cross-sectional view of a rail directly coupled to a tie;

FIG. 13 is a cross-sectional view of a track, the rails of which are of the direct-clamped type;

FIG. 14 is a plan view of the track of FIG. 13;

FIG. 15 is a longitudinal cross-sectional view of the track of FIG. 13;

FIG. 16 is a cross-sectional view of a direct-clamped base showing the space under the base filled with mortar;

FIG. 17 is an enlarged sectional view of a clamped portion of a rail; and

FIG. 18 is a side view of a set of rail raising and lowering pads.

DETAILED DESCRIPTION

In FIG. 1 there is shown a concrete bed base 1 formed with projections 4 for receiving wedges 3 on both sides of a rail 2 to be clamped to the base. Wedges 3 abut against projections 4 and against a main spring 5 on which is mounted a curved washer spring 6 and a concave washer 7. The spring 5 is disposed between the wedge 3 and the rail 2. one end 8 of the main spring 5 is formed in a shape suitable to grasp the rail while the other end 9 is turnably abutted against the wedge 3. A bolt 10 engages washer 7 and passes through washer 6 and spring 5 into a screw plug 10′ embedded in the base 1. Thereby the rail 2 is tightly pressed against the base at all times by the resiliency of the main spring 5 which is capable of varying its inclination as the rail is raised and lowered.

Interposed between the bottom of the rail and the base is a pad set comprising an upper pad 11 and a lower pad 12. Each of said pads has a slight angle of taper from one end to the other and the upper pad 11 is provided with projections 13 on both sides. The pads 11 and 12 are provided with a plurality of longitudinal channels 14 to provide resiliency and the width of the lower pad 12 is made slightly larger than the distance between the inner walls of the projections 13 of the upper pad so that the lower pad may be fitted tightly in the upper pad. The rail may then be placed on the thus assembled pads.

In the embodiment shown in FIG. 6, the projections 13 have been eliminated and instead the upper pad 11 is provided with at least one projection 15 extending downward from the under surface and the lower pad 12 is formed with the same number of channels 16 in the top surface for receiving a corresponding projection 15. The width of the channel 16 is slightly smaller

than that of the projection 15 so as to receive the projection in tightly fitting relation.

The pads 11 and 12 are restrained against relative sliding in the longitudinal direction since pad 12 is tightly fitted in the space between the projections 13 of upper pad 11 in the embodiment of FIG. 4. MOreover, the pads are restrained irrespective of the presence of any unevenness on the concrete beams 2 or the concrete bed bases 1. Thus the rail may be raised or lowered minutely by forcibly moving the pads 11 and 12 relative to one another and thereafter the adjusted rail can be clamped in position to the base by spring 5 which is inclinable in any direction. When the pad unit as shown in FIG. 6 is employed, the adjustment is the same since pads 11 and 12 are tightly secured to each other by virtue of the downward projection 15 of the pad 11 and the receiving channel 16.

In order to prevent irregular arrangement of rail raising and lowering, a suitable packing is interposed between the bottom of the rail and the pad unit, as shown in FIG. 7. Therein is seen a concrete base 20 with projections 22 on both sides of a rail 23 to receive wedges 21 thereagainst in a manner similar to FIG. 1. It is to be understood that projections and springs can be provided on both sides of the rail, even though only shown on one side. A main spring 26 having a curved washer spring 24 thereon and a concave washer 25 on washer 24 are disposed between the wedge 21 and the rail 23. One end 27 of the main spring 26 is suitably shaped so as to tightly engage the rail, while the other end 28 thereof is rollably abutted on the wedge 21. A bolt 29 is engaged in a screw plug 29' embedded in the base 20 to secure the rail and the main spring to each other so that the rail 23 is tightly pressed against base 20 at all times by the resilience of the main spring 24. A set of pads 30, 31 is provided to raise and lower the rail. A packing 32 selected from a group of packings having different thickness is is superposed on the pad set 30, 31, depending upon the desired value that the rail is to be raised and flanges 33 are welded to the packing 32.

With the above arrangement, even if there is any unevenness in the surface of the concrete base, the rail may be minutely raised or lowered by a sliding adjustment of the upper and lower pads. Additionally, the raising and lowering of the rail may be further adjusted by insertion or removal of one or more additional packings 32. The pads 30, 31 and the packing 32 are laterally held in place by the flanges 33 and therefore any irregular arrangement thereof is completely prevented.

There will next be described an improved screw plug to be embedded in a prestressed concrete tie with reference to FIGS. 10 and 11.

In the arrangement in FIG. 10 there is shown a rail 42 placed on a prestressed concrete tie via a pad 41. A wedge 43 abuts against projection 44 and the rail is clamped to the tie by a main spring 45 which is engaged by a bolt 46 screwed into a plug 47 embedded in the tie 40. In order to facilitate removal and replacement of a damaged plug 47, the plug 47 is formed in a wedgelike or convergent shape and provided with a helical thread 49 on the peripheral surface so that the plug cannot be pulled out vertically. Additionally, the plug 47 is formed with female threads 50 in the inner surface with narrow lands 51 between the screw threads. The bolt 46 is also provided with lands 53 between male threads 52 thereon corresponding to the lands 51 of the inner threads of the plug. The bolt 46 is screwed into the plug and engages the main spring 45. The screw threads of the plug are substantially lower and less inclined than that of conventional screw plugs, and hence loosening of the bolt may be completely prevented even if grease is applied thereto.

The improved arrangement for raising settled rails of direct-clamped type tracks will now be described in conjunction with FIGS. 12—18.

In order to place one or two concrete rail bases 62 on a concrete track base 60 for an elevated track in such a manner as to prevent the creeping of the rail base 62 and the lateral movement of the rail 61 against lateral pressures, the lower end of the bottom projection 63 of the base 62 is slightly rounded and the track base 60 is provided with a corresponding recess 65 slightly rounded at the corners 64 of the recess 65. A space 66 is provided between the projection 63 of the base 62 and the recess 65 of the track base 60 which is filled with mortar 67. Since the rail base 62 may be required to be subsequently raised, a vinyl sheet 68 is placed in the recess 65 of the track base 60 to prevent the adhesion of mortar to the base. Mortar is poured into the space 66 to complete the setting of the rail base 62 in place. When the columns supporting the track settle, the rail base 62 is lifted by a jack which is inserted in the space 66, after which the necessary amount of mortar is poured into the space resulting from the lifting of the rail base 62. To compensate for any unevenness or bending of the rail base 62, long taper pads 69 having a slight taper are placed on one another under the rail and a minute raising or lowering of the rail is effected by sliding the pads relative to each other. If a further raising of the rail is required, an iron packing 70 with lateral flanges 71 may be used.

If a further raising of the rail is still required, this may be accomplished by employing pads 69 of increased taper and/or a thicker packing 70.

A pair of double spring units 72 are disposed on both sides of the rail 61. Each spring unit comprises a main spring 73, a curved washer spring 74 and a concave washer 75. A wedge 77 is driven between one end of the main spring 73 and a projection portion 78 of the rail base so as to forcibly abut against the spring.

With this arrangement, any minute raising and lowering adjustment of the rail may be achieved and the rail 61 may be clamped at all times as adjusted by the force of the main spring 73.

I claim:

1. An assembly comprising a rail, a base for said rail including projections on both sides of said rail, spring means engaging each projection and said rail, bolt means engaging said base and each spring means to tightly press the rail against the base by the resiliency of the spring means, a pair of superposed tapered pads between the rail and the base for raising and lowering the rail by relative sliding adjustment between the pads, and a packing interposed between the rail and the pads, said packing including marginal flanges thereon for laterally engaging the pads to hold the same in fixed relative transverse positions therewith is a vinyl sheet.

2. An assembly as claimed in claim 1, wherein said bolt means is in threaded engagement in said base.

3. An assembly as claimed in claim 2 comprising a wedge between each spring means and the associated projection, each spring means comprising a main spring member having one end in rolling abutment with the associated wedge and an opposite end resting on the rail whereby the main spring member is angularly adjustable and follows the raising and lowering of the rail.

4. An assembly as claimed in claim 3, wherein each spring means further comprises a curved spring member between the associated main spring member and the bolt means.

5. An assembly as claimed in claim 1, wherein each pad is provided with longitudinal channels therein.

6. An assembly as claimed in claim 1, wherein said pads are frictionally engaged with one another to resist relative sliding movement.

7. An assembly as claimed in claim 1, wherein said bolt means comprises a bolt member having a head engaging a respective spring means, said assembly further comprising a plug embedded in said base for threadably receiving a corresponding bolt.

8. An assembly as claimed in claim 7, wherein said plug is of wedge shape and includes external threads thereon to prevent removal of the plug from said base, said plug further having internal female threads with narrow lands at each crest and root, said bolt member having corresponding male threads engageable with the female threads of said plug.

9. An assembly comprising a rail, a base for said rail including projections on both sides of said rail, spring means engag-

ing each projection and said rail, bolt means engaging said base and each spring means to tightly press the rail against the base by the resiliency of the spring means, a pair of superposed tapered pads between the rail and the base for raising and lowering the rail by relative sliding adjustment between the pads, a beam supporting said base, said beam having a plurality of recesses and said base including a corresponding plurality of projections inserted in respective recesses, mortar means in said recesses between said projections and the beam, and means on said beam for preventing adhesion of said mortar means with the beam whereby the base can be adjustably raised from the beam and additional mortar means introduced into the thus formed space.

10. An assembly as claimed in claim **9**, wherein said means on the beam for preventing adhesion of the mortar means therewith is a vinyl sheet.