Aug. 27, 1963 G. K. KOCHER 3,101,899

RAILROAD TIE AND RAIL MOUNTING COMBINATION THEREOF

Filed Aug. 22, 1961 2 Sheets-Sheet 1

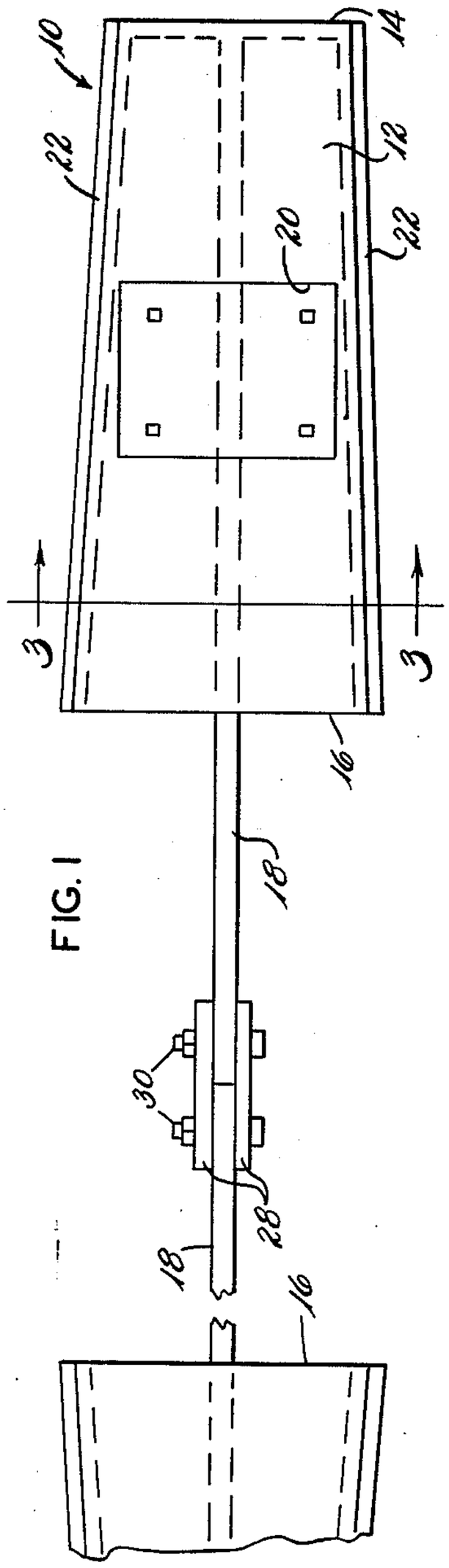


FIG. 1

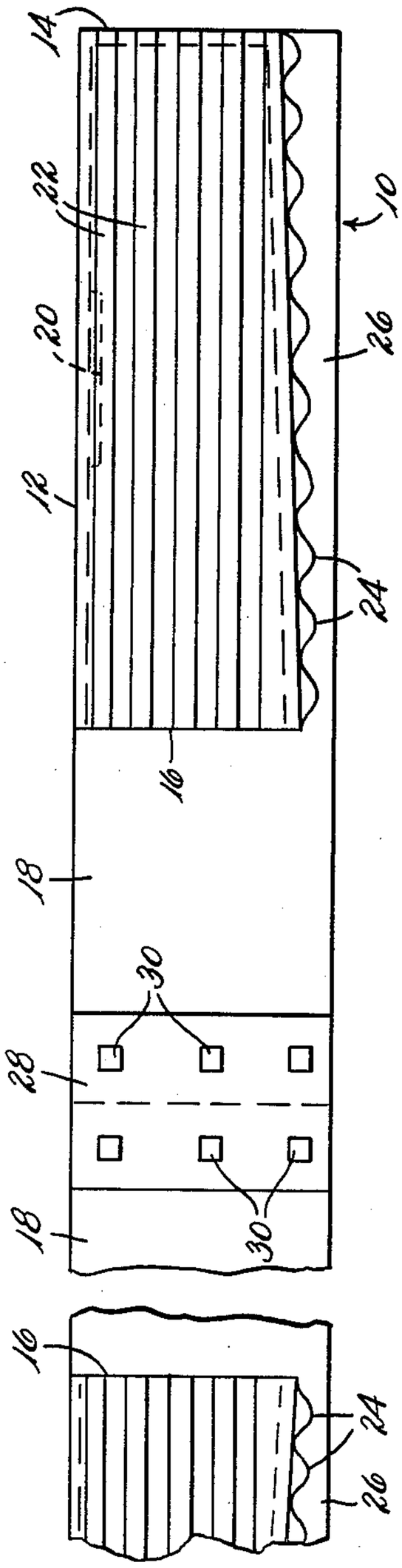
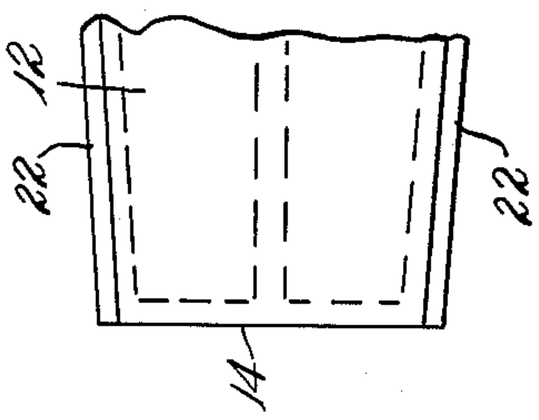


FIG. 2



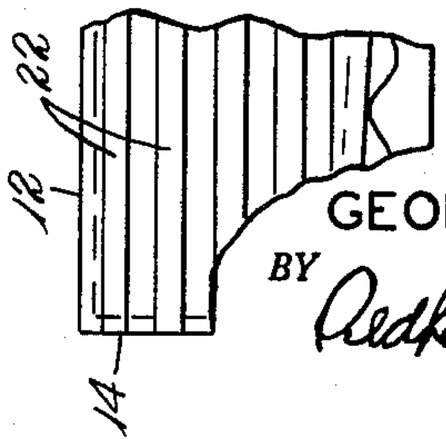


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FIG. 4

FIG. 5

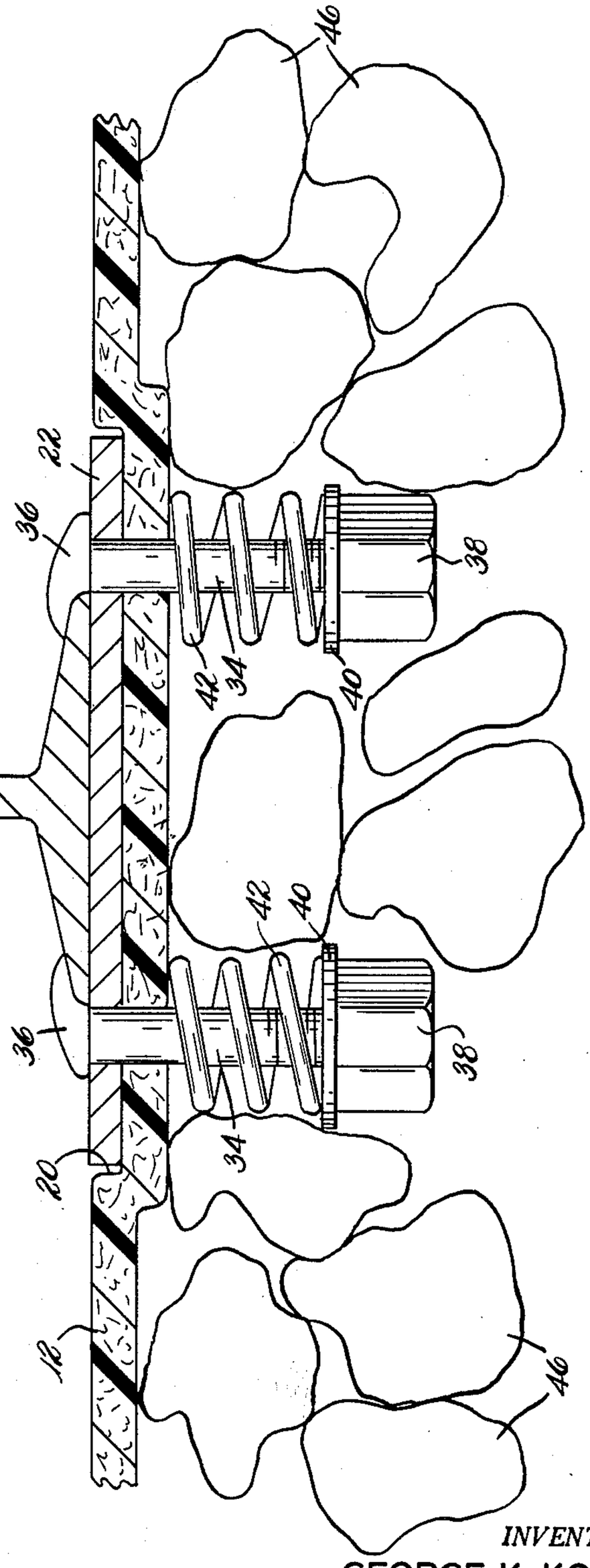
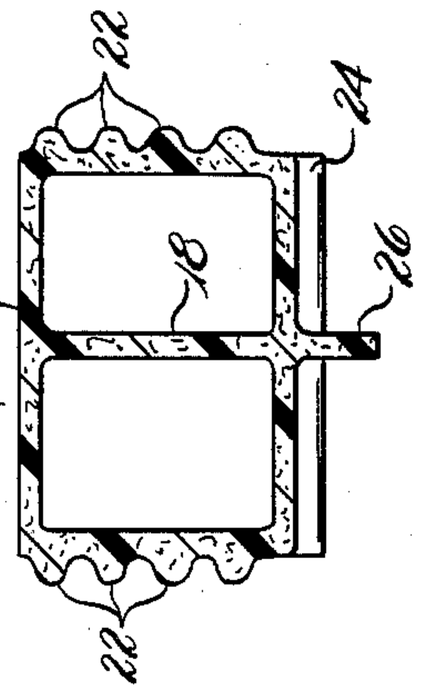


FIG. 3



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RAILROAD TIE AND RAIL MOUNTING COMBINATION THEREOF

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This invention relates to railroad ties and rail mounting combinations thereof.

Heretofore, it has been the usual practice for many years to employ wooden railroad ties, these being sometimes dipped or treated with chemicals to improve the life and durability thereof. However, the ties are necessarily positioned in the ground, are subjected continuously to the weather, and to very severe loads as heavy trains pass over the rails, so that it is often necessary to replace ties which have rotted, disintegrated, or which have otherwise been subjected to damage.

Moreover, it is the usual practice to secure the steel rails by way of steel tie plates and square metal spikes to the wooden ties. The driving of the heavy, usually square, metal spikes into the wooden ties often splits the wooden ties at the time the rails are secured thereto which further speeds the deterioration of the ties or the improper functioning thereof.

The continued passage of heavy trains over the rails often loosens the spikes in the wooden ties necessitating repeated drivings of the spikes back into the ties, only to have them reloosen and not properly secure the rails to the ties.

Conventional wooden ties are relatively heavy and hard to handle, and special heavy machinery has been provided for the handling and replacement of wooden ties.

It is the general object of the invention to avoid and overcome the foregoing and other difficulties of and objections to conventional wooden railroad ties by the provision of an improved relatively inexpensive, high strength, and long-lived railroad tie made of resin-impregnated fiber glass, the improved tie particularly adapting itself to the combination with the rail and tie plate to very positively secure the rail in position with little or no maintenance being required.

Another object of the invention is the provision of an improved railroad tie having two separable halves, so that the handling of the tie is facilitated, and whereby only one-half of the tie need be replaced in the event of damage to one end of the tie.

Another object of the invention is the provision of an improved railroad tie and rail mounting combination wherein heavy tie handling equipment is eliminated without sacrifice of stabilizing characteristics by the provision of hollow box-like portions on the improved tie which portions are filled with the road bed aggregate when the tie is installed.

The foregoing objects of the invention, and other objects which will become apparent as the description proceeds, are achieved by providing in a railroad tie, an elongated hollow box having a cross sectional shape comparable to a conventional tie, said box being made from resin-impregnated fiber glass and having a closed outer end and an open inner end, the upper surface of the box having a recess for the reception of a rail tie plate, longitudinally extending corrugations on the sides of the box, transversely extending corrugations on the bottom of the box, the box having a length equal to about one-third of the length of a conventional tie, a vertically directed strengthening plate made from resin-impregnated fiber glass and molded integrally with the box, said plate extending through the box so as to bisect the box from the closed end of the box and on out the open end a distance about half the length of the box, said plate having a vertical height somewhat greater than the vertical height of the box so

as to extend vertically below the box to form a central longitudinal flange thereon, the top of the box and plate being in horizontal alignment, a second box and plate of identical construction, and means removably securing the ends of the plate of each box together to form the complete tie.

More complete, the invention provides in combination, a railroad tie having hollow box-like portions at each end extending about one-third the length of the tie, said portions being closed at their outer ends and open at their inner, plate means joining said boxlike portions, said portions and plate means being constructed of resin-impregnated fiber glass, the top of each portion being formed with a recess, a tie plate received in each recess, a rail carried by each tie plate, bolt means extending vertically through each tie plate, said bolt means having a head engaging the rail and the tie plate, and a shank extending inside the box-like portion, a compression spring on the shank engaging the underside of the top of the box, a nut on the shank compressing the spring, and aggregate filling the box-like portions and engaging the plate means.

For a better understanding of the invention reference should be had to the accompanying drawings wherein—

FIG. 1 is a plan view, partially broken away, of one embodiment of an improved railroad tie incorporating the principles of the invention;

FIG. 2 is a side elevation of the tie illustrated in FIG. 1;

FIG. 3 is a cross sectional view of the tie taken on line 3—3 of FIG. 1;

FIG. 4 is a slightly enlarged cross sectional view of a modified form of sidewall for the box portion of the tie; and

FIG. 5 is an enlarged fragmentary vertical cross sectional view through an improved tie of the invention and illustrating the manner of mounting a tie plate and rail thereon.

In the drawings, the numeral 10 indicates generally the improved railroad tie of the invention, this tie having hollow box-like portions 12 at each end, these portions 12 extending about one-third of the distance in from each end of the tie. In a typical construction, the overall length of the tie 10 was made 102 inches, and each box-like portion 12 was made of a length of 36 inches.

Each box-like portion 12 is made of a rectangular cross sectional shape, such as seen in FIG. 3. Preferably, the box-like portion of the improved tie of the invention is made from about three inches to about five inches wider than the conventional tie, and an inch to about two inches less in vertical height. Making the tie of the invention extra wide allows it to be placed farther apart than the 18 inch centers of conventional ties, for example,36 inches on centers.

The outer end 14 of each box-portion 12 is closed, while the inside end 16 is open.

A vertically directed plate or wall 18 extends from the closed end 14 of each box-like portion 12, the full length of each box-like portion, so as to bisect this portion in the manner illustrated, and with the plate 18 extending inwardly from the open end 16 of each box-like portion a distance about equal to one-half of the length of the box-like portion. In one particular example, the plate 18 extends 15 inches inwardly from the open end of the box-like portions.

Each box-like portion 12 and the plate 18 is made from resin-impregnated fiber glass, this having a relatively high weight strength ratio and actually being stronger than stainless steel. The entire box-like portion 12 and the plate 18 are simultaneously molded, with appropriate fillets at all corners, and with the box-like portion 12 being made with a slight taper from end to end, usually narrowest at the closed end 14, so as to

facilitate the withdrawal of the box-like portion 12 after a molding operation.

The outer end 14 of each box-like portion 12 can be closed by a sliding door which can be opened for inspection of the rail fastening means, as by a flashlight.

The top of each box-like portion 12 is formed with a molded-in recess 20, this recess being of a size to snugly receive a railroad tie plate, indicated at 22 in FIG. 5. Or, the tie plate 22 can be made of fiber glass and molded integrally with the tie. The box-like portion 12 is also preferably formed with vertical sides having corrugations 22 formed thereon, these corrugations extending horizontally and longitudinally of the sides and serving to additionally anchor the box-like portions 12 in the road bed aggregate once the railroad tie of the invention has been installed. Corrugations 24 directed transversely of the bottom of the box-like portion 12 are preferably provided on each box-like portion, these corrugations also interlocking with the road bed aggregate when the tie has been installed in place, so as to help lock the tie in position.

The plate 18 is made of a greater vertical height than the vertical thickness of the box-like portion 12, and this is best seen in FIG. 2. This figure shows that the top of the plate 18 is flush with the top of the box-like portion 12 and forms a straight horizontal line therewith, whereas the lower edge of the plate 18 extends somewhat below the bottom surface of the box-like portion to provide a central longitudinal flange 26 extending downwardly from the bottom of each box-like portion 12.

It will be recognized that the structure described forms only one-half of a railroad tie. This is the intent of the invention so that two identical railroad tie halves as described, are removably joined together by bolster plates 28 and bolts 30 extending through the aligned ends of the plates 18, all in the manner shown particularly in FIGS. 1 and 2. This structure is important for the reason that should only one-half of the complete tie be damaged, as when a train jumps the track, or damaged in some other way, it is possible to replace only one-half of the tie by removing bolts 30 of the damaged tie half. A new tie half can then be substituted for the damaged half and the bolts 30 reinserted and tightened in position.

Before leaving the construction of the tie itself, attention is directed to the fact that the corrugations 22 and 24 are illustrated in FIGS. 1 to 3 of the drawings as being molded onto the outer sides of the box-like portion 12 with the inside of the box-like portion having flat surfaces. FIG. 4 illustrates a modification of the invention in this respect wherein the corrugations, shown as corrugations 22*a*, are molded into the walls of the box-like portion so that the corrugations extend both on the outer and on the inner surfaces of the walls of the box-like portion within the teaching of the invention, should this be desired.

Coming now to FIG. 5 of the drawings which illustrates the combination of the improved tie with the rail and tie plate, in this figure the numeral 32 indicates a conventional railroad rail mounted on the tie plate 22. The tie plate 22 is received down in the recess 20 molded in the upper surface of each box-like portion 12 of the tie 10. Extending through the tie plate 22 are bolt means 34 each having a conventional head 36 engaging with the lower flange of the rail 32 and with the top of the tie plate 22, and with the shank of each bolt means 34 preferably being made square near the head 36 so that this square portion of the shank extends through the conventional square holes in the tie plate 22, the tie plate 22 being normally conventional. Approximately the lower half of each shank 34 of the bolt means is made round with an appropriate screw thread thereon, these threads receiving axially long nuts 38 which engage washers 40 in turn contacting compression springs 42 which are compressed by the nuts 38 against the underside of the top of each box-like portion 12 under the

recess 20. Thus, the rail 32 and the tie plate 22 are held very strongly, but resiliently, down in the recess 20 of each box-like portion 12 of the railroad tie. This means that even though relatively heavy trains repeatedly pass on the rail 32 with corresponding flexing to some extent in the box-like portions 12 of the ties that the bolt means 34 do not work loose, but are adapted for long-substantially maintenance-free lives.

Each box-like portion 12 of each tie is filled on location with the road bed aggregate, this being usually of about egg size gravel, such aggregate being indicated in FIG. 5 by the numeral 46. The extra long nuts 38 protect the bolt threads from damage by the aggregate.

In the use and installation of the improved railroad tie of the invention, each tie half is molded from resin-impregnated fiber glass, by any known molding techniques, and of the construction described. The resulting structure, while of light weight, is of very high strength, and with each box-like portion 12 acting as a hollow girder which is reinforced in the vertical, or load-bearing direction, by the integral plate or wall 18. These tie halves can be transported to the job and handled on location by a single man, rather than by expensive and heavy tie-handling equipment.

Once on location, each tie half is stood upon its closed end and aggregate 46 is shoveled into the box-like portion 12 through the open end 16 to at least partially fill the box-like portion with the aggregate. Thereafter, each tie half is laid down on the road bed in proper position, and a pair of tie halves are secured together by the bolster plates 28 and bolts 30 to form the complete tie. When the necessary number of ties have been properly aligned along the road bed, tie plates 22 are dropped into the recesses 20 of each box-like portion 12, the rails 32 are positioned on the tie plates, and the bolt means 34 are inserted downwardly through the tie plates. Now a worker can insert his hand through the open end 16 of each box-like portion 12 and apply the springs 42, washers 40, and nuts 38 on the lower threaded ends of the bolt means 34, and with a long ratchet-type wrench can tighten the nuts 38 to compress the springs 42 and very tightly secure the rails 32 and the tie plates 22 in position. The fact that the box-like portions 12 have not been completely filled with the aggregate 46 and the aggregate flows to a horizontal position when the tie is laid down allows the operation of securing the springs 42, washers 40, and nuts 38 in position.

In a minor modification of the operation just described, two of the four bolt means 34 securing the tie plate 22 to the rail can be put through the tie plate to secure it to the tie before the box-like portion 12 is filled with aggregate. These two bolt means are the ones which do not engage the rail 32 but merely extend through the tie plate.

With the ties, tie plates and rails assembled as described, the box-like portions 12 can be completely filled with the aggregate 46 from the open ends 16, with the road bed aggregate being also piled up against the sides of the plate 18, and around the outside of the box-like portions 12 to thereby secure the tie 10 in the road bed in very stabilized manner. Additionally, the complete filling of each box-like portion 16 with the aggregate 46 further strengthens the already strong box-like portions of each tie. The corrugations 22 and 24 on the outside of each box-like portion, and on the inside as well if desired, interlock with the road bed aggregate to provide a combination possessing resiliency and yielding characteristics, which is necessary when a heavy train passes over the track, but with the combination not loosening up, or working out of position, or deteriorating from weather whereby maintenance is kept to a minimum.

The replacement of a tie, or a tie half, is a relatively simple operation, should this become necessary due to damage, as for example which may occur if a train jumps

a track. In the replacement of a tie half some of the aggregate 46 can be removed from each box-like portion 12 of the tie permitting access to the nuts 38, which can be removed. Likewise, the aggregate is removed from around the bolts 30, and these are removed, whereupon the entire tie half can then be slid out from under the rail and a new tie half substituted with the assembly steps already described.

While a certain representative embodiment and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in this art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

What is claimed is:

1. In a railroad tie, an elongated hollow box having a cross sectional shape comparable to a conventional tie, said box being made from resin-impregnated fiber glass and having a closed outer end and an open inner end, the upper surface of the box having a recess for the reception of a rail tie plate, longitudinally extending corrugations on the sides of the box, transversely extending corrugations on the bottom of the box, the box having a length equal to about one-third of the length of a conventional tie, a vertically directed strengthening wall made from resin-impregnated fiber glass and molded integrally with the box, said wall extending through the box so as to bisect the box, said wall extending from the closed end of the box through the open end outwardly a distance about half the length of the box, a rib formed integral to the box so as to extend vertically below the box to form a central longitudinal flange thereon, the top of the box and the wall being perpendicular to each other, a second box and strengthening walls of identical construction, and means removably securing the ends of the plate of each box together to form the complete tie.

2. In a railroad tie, an elongated hollow box having a cross sectional shape comparable to a conventional tie, said box being made from resin-impregnated fiber glass and having a closed outer end and an open inner end, the upper surface of the box having a recess for the reception of a rail tie plate, the box having a length equal to about one-third of the length of a conventional tie, a vertically directed strengthening wall made from resin-impregnated fiber glass and molded integrally with the box, said wall extending through the box so as to bisect the box, said wall extending from the closed end of the box through the open end outwardly a distance about half the length of the box, a rib extending from the bottom of the box so as to extend vertically below the box to form a central longitudinal flange thereon, the top of the box and wall being in perpendicular alignment, a second box and wall of identical construction, and means removably securing the ends of the wall of each box together to form the complete tie.

3. In a railroad tie, an elongated hollow box having a cross sectional shape comparable to a conventional tie, said box being made from resin-impregnated fiber glass and having a closed outer end and an open inner end, the upper surface of the box having a recess for the reception of a rail tie plate, the box having a length equal to about one-third of the length of a conventional tie, a vertically directed strengthening plate made from resin-impregnated fiber glass and molded integrally with the box, said plate extending through the box so as to bisect the box said plate extending from the closed end of the box through the open end and outwardly therefrom a distance about half the length of the box, the top of the box and the top edge of the plate being in horizontal alignment, a second box and plate of identical construction, and means removably securing the ends of the plate of each box together to form the complete tie.

4. In a railroad tie, an elongated hollow box having

a cross sectional shape comparable to a conventional tie, said box being made from resin-impregnated fiber glass and having a closed outer end and an open inner end, the box having a length equal to about one-third of the length of a conventional tie, a strengthening plate made from resin-impregnated fiber glass and molded integrally with the box, said plate extending through the box so as to bisect the box, said plate extending from the closed end of the box through the open end and outwardly therefrom a distance about half the length of the box, the top of the box and the top edge of the plate being in horizontal alignment, a second box and plate of identical construction, and means removably securing the ends of the plate of each box together to form the complete tie.

5. In a railroad tie, an elongated hollow box having a cross sectional shape comparable to a conventional tie, said box being made from resin-impregnated fiber glass and having a closed outer end and an open inner end, the box having a length equal to about one-third of the length of a conventional tie, a strengthening wall made from resin-impregnated fiber glass and molded integrally with the box, said wall extending out the open end of the box a distance about half the length of the box, the top of the box and the top edge of the wall being in horizontal alignment, a second box and wall of identical construction, and means removably securing the ends of the wall of each box together to form the complete tie.

6. In combination, a railroad tie having hollow box-like portions at each end extending about one-third the length of the tie, said portions being closed at their outer ends and open at their inner, plate means joining said box-like portions, said portions and plate means being constructed of resin-impregnated fiber glass, the top of each portion being formed with a recess, a tie plate received in each recess, a rail carried by each tie plate, bolt means extending vertically through each tie plate, said bolt means having a head engaging the rail and the tie plate, and a shank extending inside the box-like portion, a compression spring on the shank engaging the underside of the top of the box, a nut on the shank compressing the spring, and aggregate filling the box-like portions and engaging the plate means.

7. In combination, a railroad tie having hollow box-like portions at each end extending about one-third the length of the tie, said portions being closed at their outer ends and open at their inner, wall means joining said box-like portions, said portions and wall means being constructed of resin-impregnated fiber glass, a tie plate received on top of each box-like portion, a rail carried by each tie plate, bolt means extending vertically through each tie plate, said bolt means having a head engaging the rail and the tie plate, and a shank extending inside the box-like portion, a compression spring on the shank engaging the underside of the top of the box, a nut on the shank compressing the spring, and aggregate filling the box-like portions and engaging the wall means.

8. In combination, a railroad tie having hollow box-like portions at each end extending about one-third the length of the tie, said portions being closed at their outer ends and open at their inner, plate means joining said box-like portions, said portions and plate means being constructed of resin-impregnated fiber glass, a tie plate received on top of each box-like portion, a rail carried by each tie plate, bolt means extending vertically through each tie plate and securing the rail and tie plate to the box-like portion, and aggregate filling the box-like portions and engaging the plate means.

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