To all whom it may concern:

Be it known that I, George Marshall, a citizen of the United States, residing in Fremont, in the county of Dodge and State of Nebraska, have invented certain new and useful Improvements in Reinforced-Concrete Cross-Ties, of which the following is a specification.

This invention relates to railway cross-ties constructed of cement or concrete reinforced by metal rods or similar reinforcing means, and the object of the invention is to provide a cross-tie of this class which can be easily made, laid and repaired and which, while strong and durable, has sufficient elasticity and flexibility to relieve the strain to which they would otherwise be subjected.

Further objects of the invention are to provide novel and efficient means for attaching the rails to the ties in such way that they may be securely held in place, tightened when required and renewed when necessary.

In carrying out my invention I construct each tie in three sections—a middle section and two end sections. Each of these sections is reinforced by metal rods and the rods of the two end sections are connected with the rods of the middle section by loops which bind the sections together but permit a limited amount of flexibility between the sections to afford sufficient elasticity to take strains from the ties and rails.

I mount the end sections on springs which afford yielding supports for the tie and permit it to sink to a small extent under heavy load and to assume its normal position when the load or weight is withdrawn.

The supporting springs are mounted on reinforced concrete blocks fixed in the road bed and the end sections of the tie have a telescopic connection with these blocks so that while the tie can move vertically, sidewise and endwise movement thereof is prevented. The downwardly projecting flanges of the end sections of the tie, which overlap the blocks, are provided with openings permitting access to the springs and other devices below the end sections of the tie and these openings are provided with sliding doors which, when closed, exclude dirt, etc., from the space or chamber between the ends of the tie and the supporting block.

The rails are supported on plates which carry rail fastenings engaging the flanges of the rails and these plates and fastenings are secured to the end sections of the tie by vertical bolts provided with fastening devices, and the connections between the bolts, the plates and the rail fasteners is such that the fasteners may be adjusted laterally with reference to the rails and may be tightened by devices carried by the bolts.

In the accompanying drawings, Figure 1 is a perspective view of a road bed with a portion of a railway track embodying my improvements. Fig. 2 is a section on the line 2–2 of Fig. 3. Fig. 3 shows an elevation of the tie made in accordance with my invention and supporting blocks therefor. It also shows the two rails in section and the fastening devices in elevation. Fig. 4 shows a vertical central section of the parts illustrated in Fig. 3. Fig. 5 is a plan view thereof. Fig. 6 is a view on an enlarged scale and in section showing more in detail the manner of securing the rails to the tie and the manner of connecting one of the end sections of the tie with the middle section thereof. Fig. 7 is a detail view in section on the line 7–7 of Fig. 6.

Fig. 1 shows a portion of a road bed and a portion of a railway track constructed in accordance with my invention. The cross-ties are indicated at A, the rails at B, and the road bed at C. Each tie comprises two end sections a, a', and a middle section a" all made of concrete reinforced by metal rods a, a', and a". The end sections are of the same shape, size and construction, while the middle section is of a different shape and is much smaller. The rods a, a', and a" are connected by loops b by which means, while the sections are firmly bound together, a limited flexibility is given to the tie as a whole. Any suitable material may be used for rendering the loops non-corrosive and the joints of the sections are covered by metal bands b' which serve to exclude dirt. Those portions of the rods which contain the loops may be constructed of copper, aluminum, or other non-corrosive material, and preferably those portions of the rods near the loops are twisted in the manner indicated in Fig. 6. The end sections of the tie are supported on concrete blocks D reinforced as indicated at d and fixed firmly in the road bed. Springs E are interposed be-
between the tie sections and the blocks and
yieldingly support the tie. Preferably, as shown, the springs are seated in recesses
formed in the block and tie sections and
wearing plates \( e \) are interposed between the
ends of the springs and the adjacent walls
of the blocks and tie sections.

In order to exclude dirt and to hold the
ties in position, the end sections of the tie
are formed with downwardly extending
flanges \( f \) which overlap the blocks \( D \) and
have a telescopic connection therewith, and
in order that access may be had to the spaces
containing the springs and other fixtures
carried by the tie, the flanges are formed
with openings \( F \) normally closed by sliding
doors \( G \) which are guided vertically in
guides or grooves \( g \) formed in the flanges \( f \)
adjacent the openings \( F \). The sliding doors
\( G \) may be held firmly in place by bolts,
rivets, or other fastening devices, \( g' \) so that
the doors will rise and fall with the tie, but
by withdrawing the fastening device the
door may be lifted and access may be had to
the springs and other fixtures. If desired,
the opening in the end of each section may
be large enough to permit of the removal of
the block \( D \) endwise without raising the tie.

The rails \( B \) rest on plates \( H \) which in turn
rest on the end sections \( a, a' \) of the tie and
these plates support rail fastenings \( I \) of
well known construction. Bolts \( J \) extend
through openings in the plates and through slotted openings \( i \) in the flanges of the rail
fastening and they also extend through the
tie sections \( a, a' \) and carry on their lower ends adjusting nuts \( j \) which are accessible through the openings \( F \). Lock nuts are
preferably also used and the nuts operate
against washers \( \hat{j} \) in the usual way. As
will be seen by reference to Fig. 6, the bolts
are not embedded in the concrete, but extend through vertical openings formed therein. The upper ends of the bolts have
transverse slots which receive wedge-shaped
keys \( L \), and these keys, when inserted, are
held in place by cotter pins \( l \). These devices permit the rail fasteners to be ad-
justed laterally to the proper extent and to
be then held firmly in place by proper ad-
justments given to the nuts \( j \) and to the
wedges \( L \). After the rails have thus been
connected with the tie any suitable material
\( m \), such as Babbit metal, may be poured
into the slots \( i \) to insure the strength and
durability of the fastening. Should the
rails at any time "heave" or rise from the
ties, shims may be applied in the usual way,
and should it be necessary at any time to
adjust the fastenings laterally, the material
\( m \) may be cut out and proper adjustments
effected.

I claim as my invention:
1. A railway cross-tie, comprising two
end sections and a middle section formed
of reinforced concrete, the middle section
being flexibly connected at each end to the
end sections in different vertical planes and
said end sections being spring-supported,
substantially as described.

2. A railway cross-tie, comprising a middle
section and end sections, a plurality of
vertically arranged rows of metal rods em-
bedded in the three sections and having in-
terlocking loops which connect the sections
with each other between their abutting ends
to permit a limited amount of flexibility be-
tween the sections.

3. A railway cross-tie, comprising a middle
section and end sections made of rein-
forced concrete and provided with a plu-
rality of vertically arranged rows of flexi-
ble connections between their ends, and
shields which cover the joints of the sec-
tions.

4. A railway cross-tie, comprising a middle
section and end sections having downwardly projecting flanges, a plurality of ver-
tically arranged rows of flexible connections
between the ends of the sections, reinforced
concrete blocks having a telescopic connec-
tion with the end sections of the tie and
springs interposed between said blocks and
the tie.

5. A railway cross-tie, comprising rein-
forced concrete members having downwardly extending flanges provided with side
openings, concrete blocks having a telescopic
connection with the tie, springs mounted on
the blocks and supporting the tie, and slid-
ing doors mounted on the end sections of the
tie.

In testimony whereof, I have hereunto
 subscribed my name.

GEORGE MARSHALL.

Witnesses:

W. J. COURTRIGHT,
E. J. LEE.