No. 789,853. PATENTED MAY 16, 1905.

R. A. HADFIELD.

CAST STEEL RAILWAY CROSSING.

APPLICATION FILED FEB. 6, 1905.

2 SHEETS—SHEET 1.

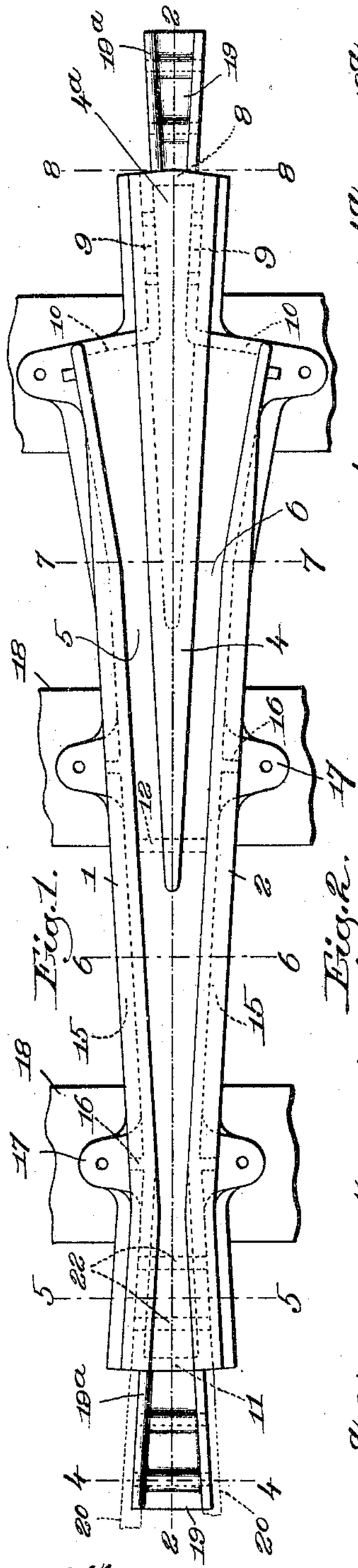


Fig. 1.

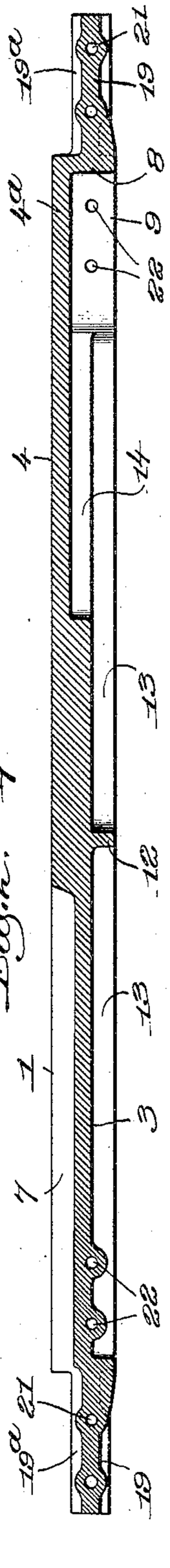


Fig. 2.

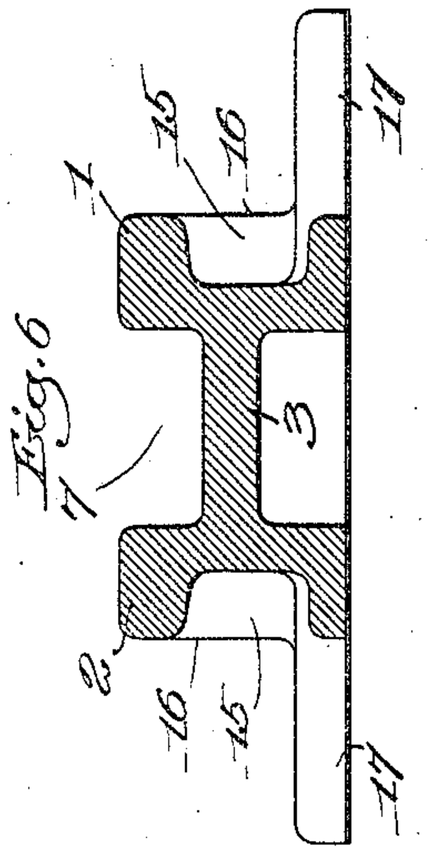
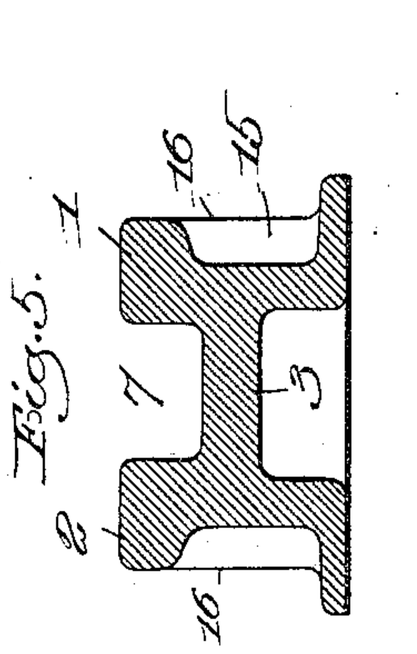


Fig. 6



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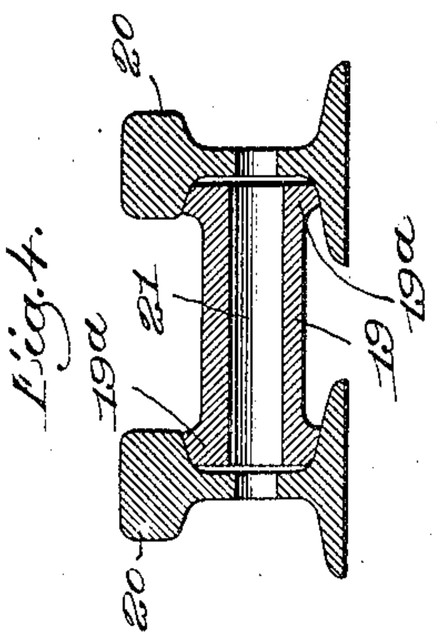

Fig. 4.

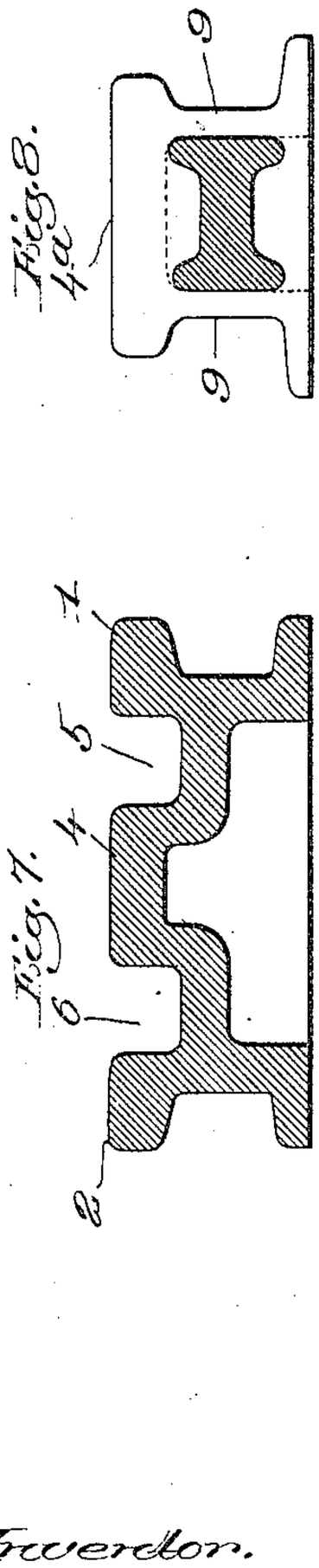

Fig. 8.

Fig. 7.

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2 SHEETS—SHEET 2.

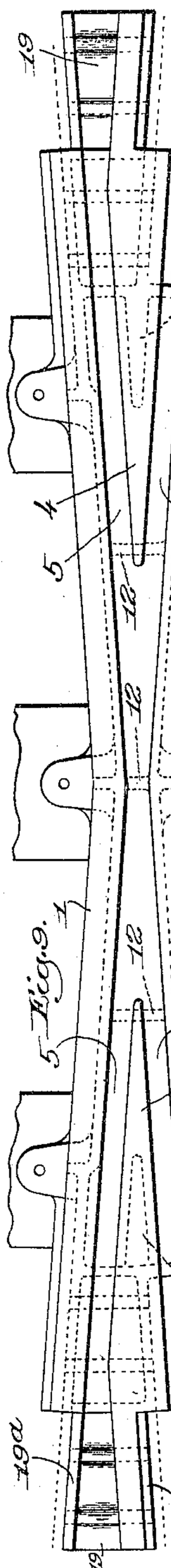

Fig. 9.

Fig. 10.

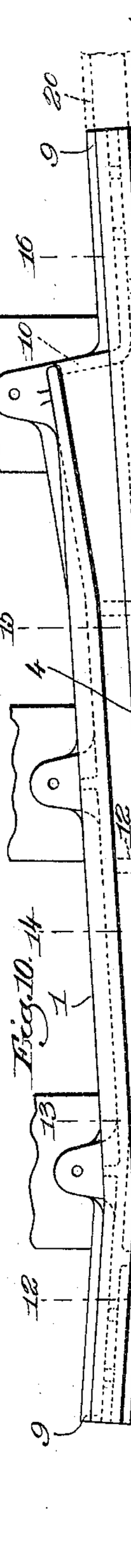

Fig. 11.

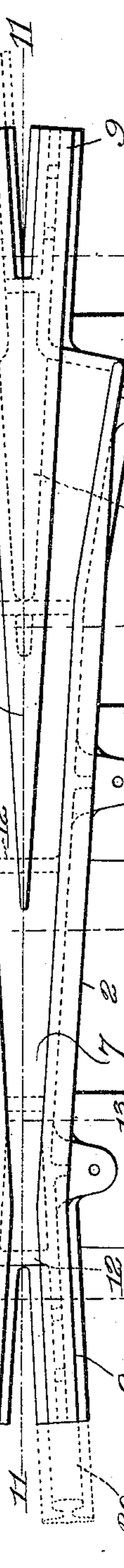

Fig. 15.

Fig. 14.

Fig. 13.

Fig. 12.

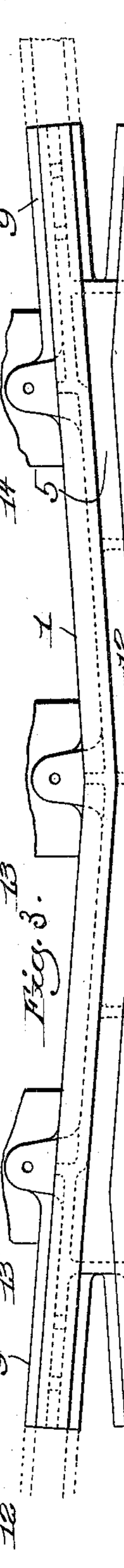

Fig. 16.

Fig. 8.

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No. 789,853. Patented May 16, 1905.

UNITED STATES PATENT OFFICE.

ROBERT A. HADFIELD, OF SHEFFIELD, ENGLAND.

CAST-STEEL RAILWAY-CROSSING.

SPECIFICATION forming part of Letters Patent No. 789,853, dated May 16, 1905.

Application filed February 6, 1905. Serial No. 244,521.

To all whom it may concern:

Be it known that I, ROBERT A. HADFIELD, a subject of the King of Great Britain, and a resident of Sheffield, county of York, England, have invented an Improvement in Cast-Steel Railway-Crossings, of which the following description, in connection with the accompanying drawings, is a specification, like figures on the drawings representing like parts.

The ordinary cast-steel crossing heretofore commonly used for railways, although sometimes made of similar shape at the top and bottom to render them reversible, are liable to rapid wear and require to be frequently renewed. They are also unduly heavy and when fixed in position for use form a much more rigid—*i. e.*, non-elastic—bed or base than the stock-rails with which they are used, so that vehicles cannot pass over them in so smooth and advantageous a manner as over the rails.

This invention has for its object the production of an improved railway-crossing of such structure that it will offer far greater resistance to wear than the ordinary cast-steel crossings referred to, which will also be lighter and when in use will possess a degree of elasticity more nearly approaching or conforming to that of the stock-rails with which the crossing is used than is now the case with crossings of ordinary construction.

A railway-crossing constructed in accordance with my invention will permit the passage of trains thereover in a smoother manner and with greater comfort to travelers than is now common.

To attain the end set forth a railway-crossing constructed in accordance with my invention is cast to shape of manganese steel, commonly known as "Hadfield's" manganese steel, and, as is well known, articles cast of such material are very hard and practically unmachineable. This material requires to be subjected to a heat treatment in order that it shall possess the desired qualities of hardness, toughness, and resistance to wear. Such "heat treatment," by which term I mean subjecting the casting to the action of heat to raise its temperature to a predetermined point and then cooling the same, cannot be employed in an advantageous and reliable manner if the various parts of the casting are of undue thickness or mass, and accordingly I construct the railway-crossing in such a manner that the major portion thereof will be of substantially uniform thickness.

Figure 1 is a top or plan view of a railway-crossing embodying one form of my invention. Fig. 2 is a longitudinal section thereof on the line 2 2, Fig. 1. Fig. 3 is a view of an angle-crossing similar to Fig. 9, but with means for attaching the stock-rails similar to what is shown in Fig. 10. Figs. 4, 5, 6, 7, and 8 are cross-sections of the railway-crossing on the lines 4 4, 5 5, 6 6, 7 7, 8 8, respectively, Fig. 1, but on a larger scale. Fig. 9 is a top or plan view of an angle-crossing constructed in a manner similar to the common crossing shown in Figs. 1 and 2 and 4 to 8. Fig. 10 is a top or plan view of a crossing, showing a different arrangement for connecting the stock-rails. Fig. 11 is a longitudinal section on the line 11 11, Fig. 10. Figs. 12 to 16 are cross-sections on the lines 12 12, 13 13, 14 14, 15 15, and 16 16, respectively, Fig. 10, but on a larger scale.

The improved crossing, which is cast in one piece of manganese steel of the kind hereinbefore referred to, comprises two side portions 1 and 2, that are connected together throughout their length and between their upper and lower surfaces by an intermediate horizontal portion or transverse web 3, which for a part of its length and for a part of its width is extended upward, as shown in Figs. 1 and 7, to form the hollow wedge-shaped point or tongue portion 4, which, in conjunction with those parts of the upright webs of the side portions 1 and 2 that are above the horizontal portion 3, form the ordinary converging wheel-grooves 5 and 6, which merge into the single groove or recess 7, one part of each side portion 1 and 2—namely, the left-hand part in the example—constituting, in effect, a portion of the running-rail, and the remaining part—viz., the right-hand portion—constituting a check-rail. The gradually-diverging wedge-shaped portion 4 of the crossing is extended longitudinally beyond the horizontal portion 3, as shown at 4^a, and such extension is combined

with a downwardly-extending transverse end piece 8 and also with vertical side portions 9, (see Fig. 8,) which in cross-section are made of a shape corresponding to that of the stock-rails to be used with the crossing and are connected by vertical laterally-inclined portions 10 to the side portions 1 and 2.

Extending downward from the opposite or smaller end of the horizontal web 3 of the crossing and connected to the side portions 1 and 2 is an end piece 11, and between the two ends of the crossing and extending downward from the under side of the web 3 thereof and connected to the side portions 1 and 2 is or are one or more vertical intermediate stiffening cross-ribs 12, so as to form in the lower portion of the crossing, according to the length thereof, two or more hollows or recesses 13, open at the bottom. One such rib is shown in Figs. 1 and 2 and three in Figs. 3, 9, and 10.

The wedge-shaped portion 4 of the crossing is also formed at the lower side of its wider end portion with a hollow or recess 14, (see Figs. 1, 2, and 7,) that is in free communication with the adjacent hollow or recess 13, which, as shown, extends below the extension 4^a of the wedge-shaped portion 4. The narrow-pointed end of such portion 4 may be left solid, as shown, as it is sufficiently thin not to cause any trouble in the subsequent heat treatment to which the crossing is subjected.

The outer surfaces of the side portions 1 and 2 are also deeply recessed, as shown at 15, and provided at intervals with transverse vertical strengthening-ribs 16 and with means, such as perforated lugs 17, by which the crossing can be fixed by bolts or screws in the ordinary way to transverse sleepers 18.

The upper free-end portions 1^a and 2^a of the side portions 1 and 2 are preferably made of the taper shape shown.

From each end of the crossing extends a longitudinal horizontally-arranged portion 19, that is of gradually-increasing width outward, as seen in plan, and resembles, as seen in vertical cross-section, a double-headed rail, (see Figs. 4 and 8,) the bulb-shaped side portions 19^a of which are of less depth than the crossing and of a shape adapted to admit of two stock-rails (indicated by dotted lines at 20 in Fig. 1 and in full lines in Fig. 4) being secured against the opposite outer sides thereof with their heads and feet fitting over and under them. Each portion 19 has horizontal holes 21 cast therethrough to admit of the passage of bolts for holding the stock-rails 20 against its opposite outer sides and for holding one-half of each of two fish-plates against the outer sides of the rails, other holes, 22, being cast in the crossing for the passage of bolts for holding the other halves of the fish-plates against the recessed outer surfaces of the side portions 1 and 2 at one end of the crossing and against the outer surfaces of the side portions 9 of the extension 4^a at the other end of the crossing.

In Fig. 9 an angle-crossing is shown constructed in a manner similar to the common crossing hereinbefore described, but with an extension 19 on each end cast to correspond with the section of the stock-rails to be secured thereto, so that the rails can be bolted to such extensions by means of ordinary fish-plates in the manner hereinbefore explained. In this case each of the wedge-shaped points or tongue portions 4, of which there are two, is formed at its thicker end with a hollow or recess 14 open at the bottom for the purpose hereinbefore mentioned.

Referring now to Figs. 10 to 16, inclusive, showing a common crossing, such as illustrated in Figs. 1 and 2 and 4 to 8, inclusive, it will be seen that the two extensions 19 of the previous construction are omitted, each of the diverging end portions of the casting being divided vertically, so that the pair of diverging vertical side portions 9, which in cross-section are made of a shape corresponding to that of the stock-rails 20 (see dotted lines) to be used with the crossing, are unconnected at their outer ends, thus forming a diverging pair of legs to which the stock-rails can be secured by fish-plates fixed to each side of each leg, and the corresponding stock-rail by bolts extending through holes 22 in the leg and corresponding holes in the rail. In this structure the ends of the rails will be butt-jointed with the legs.

In the construction shown in Fig. 3 the angle-crossing is substantially like that illustrated in Fig. 9, but with extended pairs of legs 9, such as are shown in Fig. 10.

As will be seen, each of these modified forms of crossing is in other respects constructed in substantially the same manner as those hereinbefore described with reference to and shown in Figs. 1 and 2 and 4 to 8, inclusive, similar parts in the several constructions having similar reference-numerals attached thereto.

A manganese-steel crossing after being cast to shape in one integral piece, as hereinbefore described, which is preferably done in a green-sand mold, is subjected to a special heat treatment. Preferably the heat treatment consists in placing the casting in a cold furnace, slowly heating it to rather bright redness, the operation requiring several hours, then allowing it to cool down, afterward again gradually heating it to a temperature of from about 875° centigrade (eight hundred and seventy-five degrees centigrade) to about 1,050° centigrade, (one thousand and fifty degrees centigrade,) and then cooling it by immersion in water.

As will be seen from the several sectional views, no part of the crossing is of great thickness or mass in the shortest direction, and the greater portion of the crossing is of substantially uniform thickness, so that the whole casting is specially adapted to withstand

the heat treatment to which it is finally subjected for the purposes hereinbefore mentioned without liability of injurious internal strains being set up therein. Furthermore, by the construction described the crossing is rendered light and also more elastic or yielding under loads traveling over it than heretofore usual.

The details may be more or less varied without departure from the characteristic features of the invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An integral cast-steel railway-crossing comprising elongated side portions each having an upright web connecting the head and foot thereof, a transverse web connecting said upright webs and a hollow tongue or point portion formed on said transverse web between the divergent ends of the side portions of the crossing.

2. An integral cast-steel railway-crossing comprising elongated side portions each having an upright web connecting the head and foot thereof, a transverse web connecting the webs of the side portions throughout their length, a tongue or point portion formed on said transverse web between the divergent ends of the side portions and recessed on its under side, and stiffening cross-ribs between the side portions and below the transverse web.

3. An integral manganese-steel railway-crossing cast to shape and comprising elongated side portions longitudinally recessed externally, a transverse web connecting said portions between their heads and feet, a hollow tongue or point portion formed on said web between the divergent ends of the side portions, and an extension at each end of the transverse web, for attachment to the stock-rails.

4. An integral railway-crossing cast of manganese steel and comprising upright web, elongated side portions, a transverse web connecting said portions by the upright webs thereof, and a hollow point or tongue portion formed on the transverse web between the divergent ends of the side portions, the major portions of the casting being of substantially uniform thickness, said casting being heat-treated by heating up to a predetermined temperature and cooled by immersion, the structure permitting such treatment without setting up injurious internal strains.

5. An integral railway-crossing cast of manganese steel and comprising upright web, elongated side portions, a transverse web connecting said portions by the upright webs thereof, a hollow point or tongue portion formed on the transverse web between the divergent ends of the side portions, stiffening cross-ribs between the latter and below the transverse web, and extensions at the ends thereof shaped to coöperate with the adjacent ends of stock-rails, the major portions of the casting being of substantially uniform thickness to permit treatment by heating and cooling without the formation of injurious internal strains.

6. An integral manganese-steel railway-crossing cast to shape and comprising elongated side portions longitudinally recessed externally and connected between their heads and feet by a relatively thin transverse web, and a tongue or point portion formed on said web between the divergent ends of the side portions and recessed on its under side, to present the major portions of the casting of substantially uniform thickness.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT A. HADFIELD.

Witnesses:

G. H. HEMSOLL,

ERNEST RODGERS.