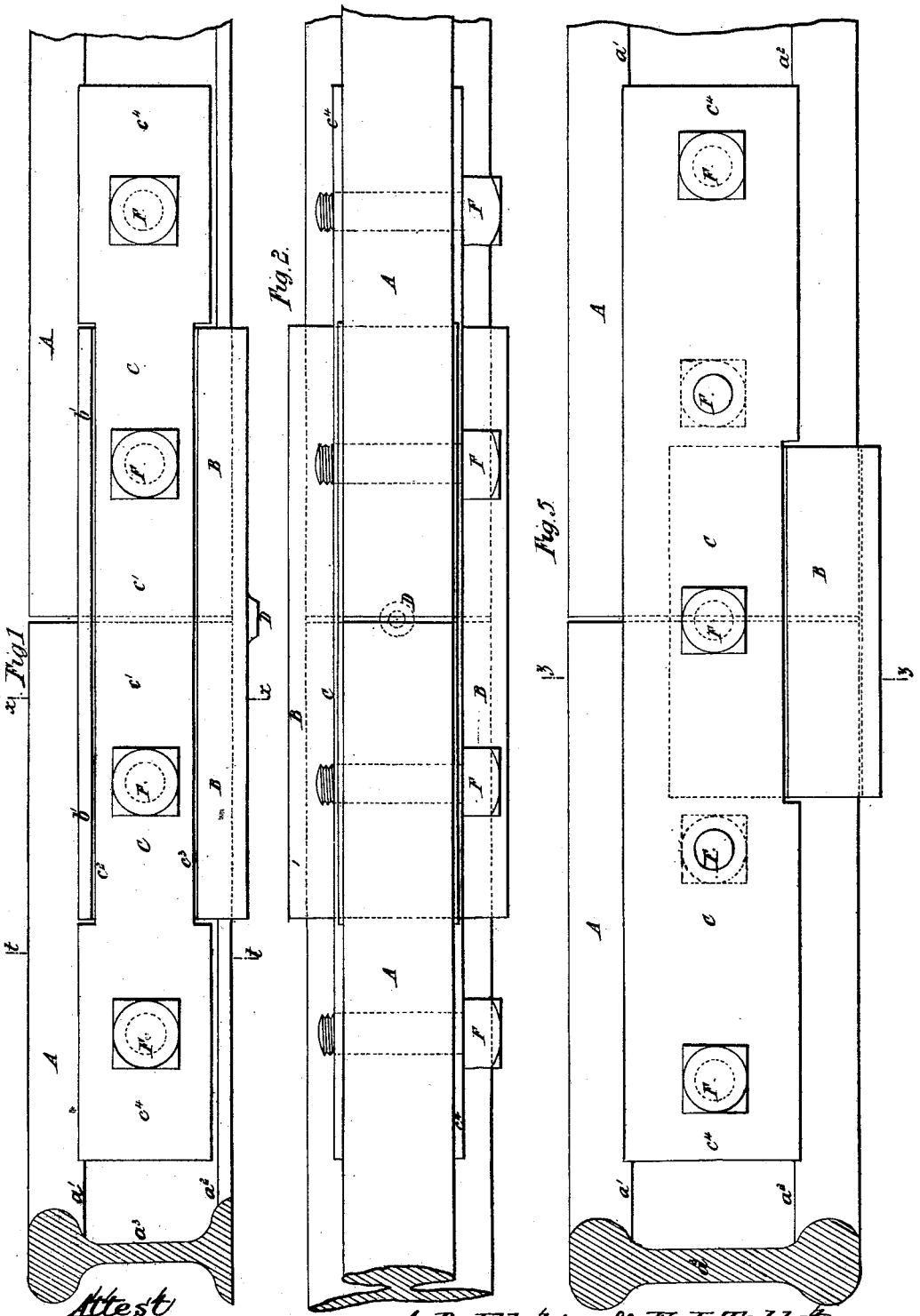
2 Sheets—Sheet 1.

A. B. IBBOTSON & F. J. TALBOT.

RAILROAD RAIL-JOINT.

No. 190,863. Patented May 15, 1877.



Attest
H. C. Perrine
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A. B. Ibbotson & F. J. Talbot. Inventors.
By. James L. Norris. Attorney.

2 Sheets—Sheet 2.

A. B. IBBOTSON & F. J. TALBOT.

RAILROAD RAIL-JOINT.

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Fig. 6.

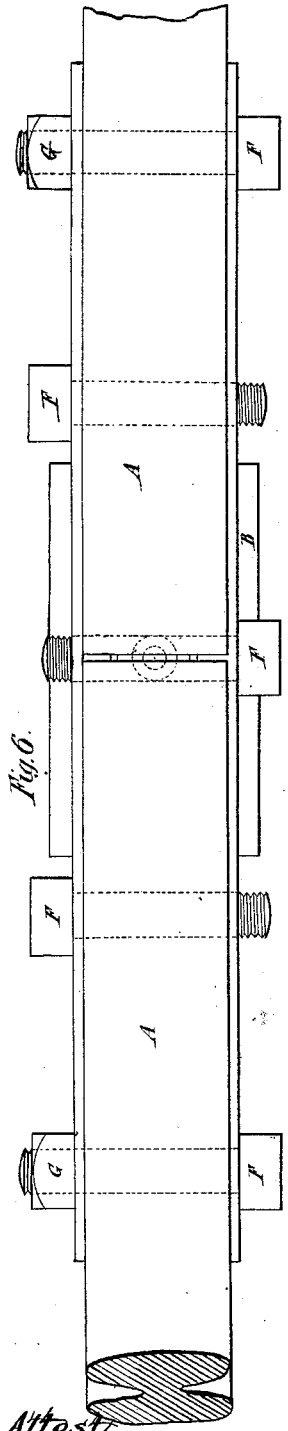


Fig. 8.

Fig. 9.

Fig. 7.

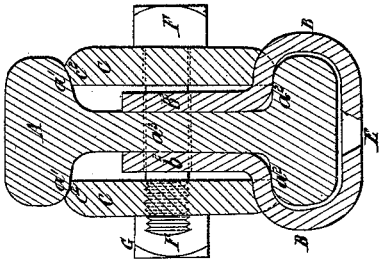


Fig. 4.

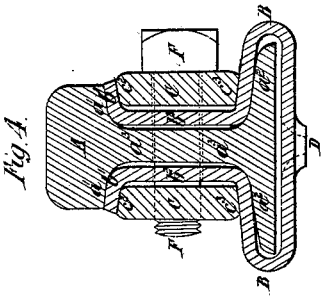


Fig. 3.

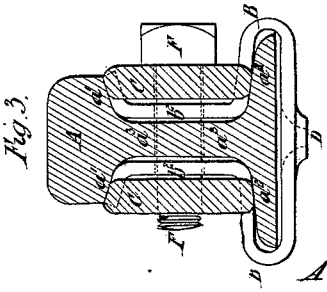


Fig. 10.

Fig. 11.

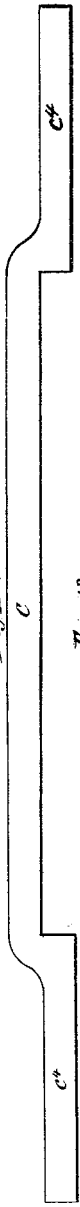
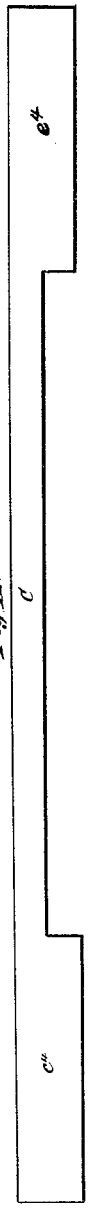


Fig. 12.



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UNITED STATES PATENT OFFICE.

ALFRED B. IBBOTSON, OF FLORENCE, ITALY, AND FREDERICK J. TALBOT, OF SHEFFIELD, ENGLAND.

IMPROVEMENT IN RAILROAD-RAIL JOINTS.

Specification forming part of Letters Patent No. **190,863**, dated May 15, 1877; application filed March 30, 1877.

To all whom it may concern:

Be it known that we, ALFRED BUCKINGHAM IBBOTSON, of Florence, Italy, and FREDERICK JOHN TALBOT, of Sheffield, England, steel-manufacturers, have invented new and useful Improvements in the Construction of Railroad-Rail Joints, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings, and to the letters of reference thereon.

The object of this invention is more effectually and firmly to unite and secure together the ends of railroad-rails at a moderate cost, and in such a manner as to prevent the accumulation of sand or dust between the ends of the said rails.

Figure 1 is a side elevation of a rail-joint made according to our invention. Fig. 2 is a plan or top view of the same. Fig. 3 is a transverse section on the line *t t* in Fig. 1. Fig. 4 is a transverse section on the line *x x* in Fig. 1. Fig. 5 is a side elevation. Fig. 6 is a plan or top view, illustrating a modification of our improved joint. Fig. 7 is a transverse section on the line *z z* in Fig. 5. Figs. 8 and 9 illustrate our improved method of forming and securing the screws or bolts used for our improved joints. Figs. 10, 11, and 12 show longitudinal sectional plan views of various forms of fish-plates, hereinafter described.

Like letters indicate the same parts throughout the drawings.

A A are the rails. B is the clip. C C are the fish-plates. D is a dripping-hole for letting out the sand. E is a countersunk hole for letting out the sand. F F are the bolts or set-screws, and G G are nuts which may be used for securing the bolts or some of them. a^1 a^1 are sloping under surfaces of the heads of the rails. a^2 a^2 are sloping upper surfaces of the flange or base of the rails. a^3 is the web of the rail. b^1 b^1 are portions of the clip which fit against and support the under sloping surface of the heads of the rails. b^2 b^2 are the vertical sides of the clip. c^1 c^1 are the central portions of the fish-plates, which fit against the clip. c^2 c^2 are the upper edges of such fish-plates. c^3 c^3 are the lower edges of such fish-plates. c^4 c^4 are projecting ends of such fish-plates. Other parts shown in the drawing are hereinafter described.

The said invention relates partly to further improvements in the rail-joints for which Letters Patent were granted to the said Alfred Buckingham Ibbotson, dated the 1st day of February, 1876, No. 173,012.

The joints described in the specification of the said former Letters Patent consisted of a steel sheath or clip made to embrace a portion of the ends of two rails to be united by enveloping their bases, their two sides, and the sloping portions immediately underneath their heads, to support and hold the same and keep them together, in combination with external fish-plates, whose length did not in any case exceed, and was not necessarily equal to, that of the clip, and which were attached to the clip and the rails by one or more bolts or set-screws passed through one of such fish-plates, the clip, and the rails, and screwed into the other fish-plate or otherwise, as therein set forth.

It will be readily understood that the clip being by far the most costly part of the aforesaid joint, the cost of the same would be materially increased by any extension in the length of the said sheath or clip, to allow space therein for the efficient use of more than two bolts or set-screws, for increasing the strength of the joint, and for preventing any hinge-motion therein produced by the traffic.

According to one part of our present invention, we may employ a larger number than two bolts or set-screws, for increasing the strength of the joint, and for preventing any hinge or turning motion of the rails therein, without necessitating any increase in the length of the sheath or clip, and we may, if required, reduce the cost of the joint by decreasing the length of the sheath employed. We accomplish these objects by the use of long and peculiarly-formed external fish-plates C, in combination with the sheaths or clips B, or in combination with a modified form of such clips, and with or without the peculiar bolts, set-screws, or nuts, all as hereinafter fully set forth.

The aforesaid peculiar external fish-plates C are formed to project beyond both ends of the clip B. They are secured to the rails at their central portion by bolts passing through them and the clip, and are as much longer than the said clip as will allow sufficient space in their projecting ends c^4 for additional bolts or set-screws to be passed through them and the rails without passing through the clip.

One mode of constructing these long fish-plates is to form them straight, and of the same thickness throughout their entire length as is required to fit them against the external sides of the clip, as shown in Fig. 10, the said plates being beveled on their edges, as shown in Figs. 3, 4, and 7, and of the requisite breadth to cause them to fit closely throughout their entire length against the sloping upper sides of the bases of the rails, and against the under sides of the heads of the rails in the position in which they will afterward be held by the clip to be inclosed by them. We shear or punch out the central portions of both their upper and lower edges, and bevel the said edges to fit at those parts as closely against the external sides of the clip as their projecting ends will fit against the rails themselves at and beyond both ends of the clip, as shown in Figs. 1 to 4.

Or, these long external fish-plates C may have their central portion formed to fit against the external sides of the clip B, and their projecting ends c^4 of greater breadth, or of greater breadth and thickness, to fit against the rails. This increased breadth or breadth and thickness may be produced by reducing the central portion of a solid piece, or by welding additional metal on the said projecting ends, or by bending or setting the projecting ends over the ends of the clip, or otherwise forming the said plates to fit equally well against the external sides of the clip B at their central portion, and against the rails at their projecting ends beyond the ends of the clip. These modified forms of the fish-plates are shown in Figs. 11 and 12.

In Figs. 5, 6, and 7 we have shown a modification in the form of both the clips B and the long external fish-plates C, to be used in combination therewith, whereby the total cost of the joint may be somewhat reduced, and the said long fish-plates will be rendered stronger in their central portions. We accomplish these objects in the following manner, namely: We form the clip B with its sides or vertical parts of diminished height—that is to say, these sides are of sufficient height to allow the screws or bolts to pass through them, the fish-plates, and the rails; and we form the whole of the upper edges of the fish-plates C at c^2 straight from end to end, and properly beveled to fit directly against the under side of the heads of the rails throughout the entire length of such fish-plates. With this construction of our joint the lower edge only of the fish-plates will require to be cut away to form an aperture or space for the clip. Therefore the upper portion of the central part of these fish-plates will remain intact, and the strength of the plate will be proportionately greater.

Although the clips B and the elongated fish-plates C above described may be formed of any kind of metal, we prefer to use steel for this purpose.

Any suitable bolts and nuts may be used in connection with the above-described clips and fish-plates; but we prefer to dispense with the use of nuts as much as possible, and to form screw-threads in the bolt-holes in one of the fish-plates, so that bolts or set-screws may be passed through one fish-plate, the clip, (where it extends between the fish-plates and the rails,) and be screwed into the tapped bolt-holes in the other fish-plate, as in Fig. 2, as bolts so secured are less liable to become loose through vibration than when nuts are used; or one or more of the bolt-holes in one fish-plate, and one or more of those in the other plate, may tapped or threaded, so that some of the bolts may be screwed in from one side and some from the other side of the joint, as shown in Fig. 6; or we may use the steel nuts with iron bolts, or the steel bolts with iron nuts, or otherwise, hereinafter described, in combination with the whole or a portion of the bolt-holes in these joints.

In the form of our improved railroad-rail joints, Figs. 5, 6, and 7, the clip B is exceedingly short, and, while made to embrace the web of the rails tightly, only rises high enough on its sides to receive through the central portion and the rails one bolt. The elongated external fish-plates C fit directly against the under sloping side of the heads of the rails, and support the same throughout the entire length from end to end of the upper edges of the said fish-plates, and where the lower edges of such fish-plates are not only made to inclose and fit against and upon the clip, but upon the sloping upper edges of the base of the rails beyond the ends of the clip B, and wherein one of the bolts is screwed into one of the fish-plates, two of them into the other fish-plate, and the two external bolts are secured by nuts.

Another part of this invention relates to the means adopted for the prevention of any accumulation between the ends of the rails inclosed by the said clips of sand or dust, which might interfere with the expansion of the rails in hot weather. We accomplish this object by forming a hole or holes of a peculiar shape through the base of the clip B, preferably in the center of the said base, so that when the clip B is fixed upon the rails to be joined thereby the said hole or holes will be immediately underneath the space between the ends of such rails. In making this hole a small boss or nipple projecting downward is formed thereby, as shown at D, Figs. 1, 2, 3, and 4, or with the upper side inside the clip countersunk or funnel-shaped, as shown at E, Fig. 7, to conduct the sand or dust through such hole, and

thereby prevent any accumulation thereof between the ends of the rails.

The countersunk or downward depression on the surface all around the said hole receives the sand or dust which may fall into the center of the joint between the ends of the rails, and which will be, by its own weight and the vibration of the traffic, collected in such hollow or depression, and will be conducted into and through the said hole to the ground below.

By forcing the edges of the hole downward below the under side of the base of the clip B, as shown in Figs. 1, 3, and 4, the vertical depth of the base of the said clip around such hole will be so increased as to impart sufficient extra strength to compensate for the weakening effect of the hole therein that would otherwise be caused. This peculiar formation of the hole may not only be advantageously used in the clips above described, but in any other form of clip or sheath-joint, for the purpose set forth.

Another part of this invention relates to the bolts or set-screws employed in combination with the above clips and fish-plates, or of the tapped or threaded holes in such fish-plates, into which the screws or bolts are screwed, or in the nuts for the said bolts, the object of this part of our invention being to render such bolts more permanently and reliably tight; and the same is carried into practice in the following manner—that is to say:

When the fish-plate, in which we form tapped or threaded bolt-holes, is made of steel, we use bolts or set-screws made of softer metal, by preference of iron, and cut their screw-threads upon only a portion of the length that will be required to enter the tapped hole or nut, as shown by the full lines f^1, Fig. 8, so that when such bolts are being screwed into the said steel fish-plate, the thread in the latter, being formed of harder metal than the said bolts, will, during the last few turns of the wrench or other implement, act like a screw-plate, and will cut the remainder of the screw-thread on the said bolts or screws, as shown by the dotted lines f^2.

Moreover, when the said fish-plates are made of softer metal than steel, we may case-harden or otherwise harden the threads in their tapped bolt-holes, to enable them to accomplish the same object while such partially-screwed bolts or set-screws are being forcibly screwed into them.

On the other hand, when the tapped fish-plates are formed of iron, or other metal softer than steel, the threads of their tapped holes may be only partially cut, and the bolts or screws have their threads fully cut upon them, the said bolts or screws being made of steel, or having their threads case-hardened, or otherwise made harder than the thread of the said holes, so that when said bolts or screws are screwed into such bolt-holes with the necessary force, their hard threads will cut or form the remainder of the thread in the said bolt-holes.

Or, instead of tapping the bolt-holes or all of them in the fish-plates, steel nuts with properly-cut threads, or nuts with such threads hardened, may be used for the tightening of the partially-cut bolts or screws F, and for cutting the remainder of the thread on them; or nuts G, of softer metal than steel, having their threads partially cut, as shown in Fig. 9, may be used in connection with steel bolts that have their threads properly and fully cut, or with bolts or set-screws that have such properly-cut threads hardened for the purpose of cutting the remainder of the partially-cut threads in the said nuts G in the act of being forcibly screwed into the same.

This part of our invention, by which a hard and completely-cut thread is made to complete the cutting of the thread of a partially-screwed surface, is not only applicable for use in combination with the above-described joints, but to all other railroad-rail joints where bolts or screws are used, and will insure the tightness of such joints for an extremely long period.

We do not here make any claim to the peculiar manner of securing the fastening-bolts in place, as such will form the subject of a separate application for Letters Patent.

We claim as our invention—

1. The combination, with the rails A and clip B, embracing said rails, of the elongated fish-plates C, having the projecting ends c^4, constructed to be connected with the rails beyond the ends of the clip B, and, bearing against the rails at such places, support the same in position, substantially as and for the purpose described.

2. The clips B, constructed at their base portions with one or more openings, for discharging sand or dust collecting between the ends of the rails, substantially as and for the purpose described.

3. The fish-plates C C, constructed with the ends c^4 of a greater width than the central portion of such fish-plates, in combination with the rails A and clip B, substantially as and for the purpose specified.

ALFRED BUCKINGHAM IBBOTSON.
FREDERICK JOHN TALBOT.

Witnesses to the signature of the said Alfred Buckingham Ibbotson:

GEORGE HARVEY, *Clerk, Florence.*
PRESTON POWERS, *Sculptor, Florence.*

Witnesses to the signature of the said Frederick John Talbot:

A. F. STONE, *Clerk, Sheffield.*
JOHN BANKS, *Clerk, Sheffield.*