

[54] **CONNECTION DEVICE FOR DIPPER OR RIPPER TEETH, PARTICULARLY FOR TWO-PIECE TEETH OF A DIPPER**

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[51] Int. Cl. E02f 9/28, E21c 35/18

[58] Field of Search 37/142, 141, 142 A; 279/97; 175/413; 306/20, 45

[56] **References Cited**

UNITED STATES PATENTS

64,914	5/1867	Selden	37/142 A
475,746	5/1892	Assorati	37/142 R
2,013,962	9/1935	Hutchens	37/142 A X

2,147,163	2/1939	Jimerson	37/142 A X
2,674,816	4/1954	Daniels et al.	37/142 A
2,711,801	6/1955	Super et al.	37/142 A X
2,844,378	7/1958	Whistler et al.	37/142 A X
2,852,874	9/1958	Grubb	37/142 A
2,901,845	9/1959	Whistler	37/142 A
3,400,476	9/1968	Petersen	37/142 A
3,526,049	9/1970	Nichols	37/142 A
3,751,113	8/1973	Proctor	37/142 A
3,751,115	8/1973	Proctor	37/142 A

Primary Examiner—Robert E. Pulfrey

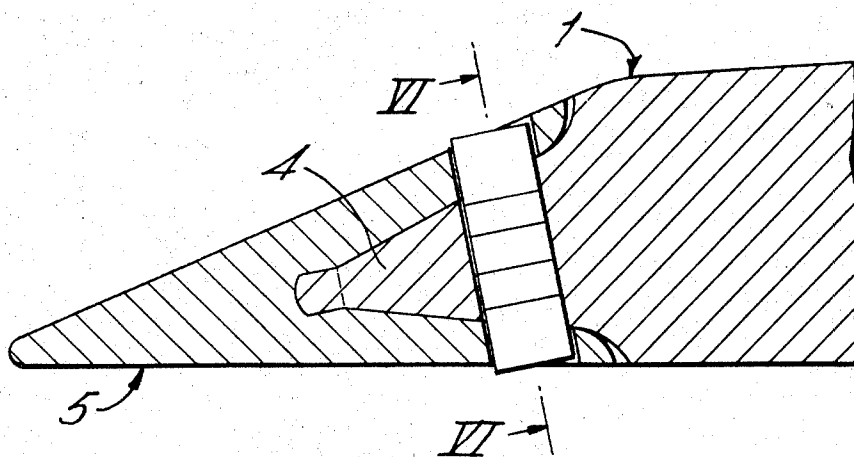
Assistant Examiner—E. H. Eickholt

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[57] **ABSTRACT**

The present invention includes means, in dipper or ripper teeth and particularly in the two-piece teeth of a dipper, for inhibiting the shoe from separating from the tooth, without any need for another element in the connection element for preventing said connection element from falling out. Further, the connection element may operate on casting surfaces and thus no tool treatment is required for the seat of said connection element.

6 Claims, 11 Drawing Figures



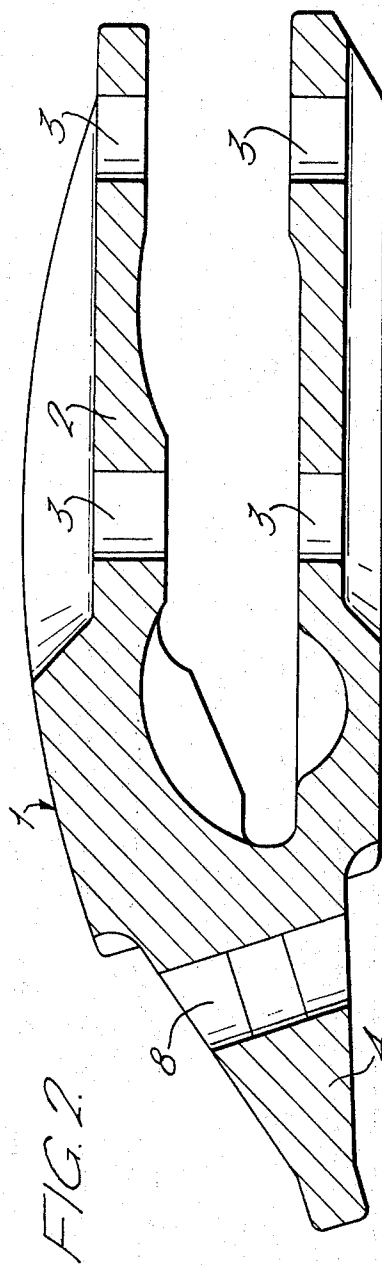
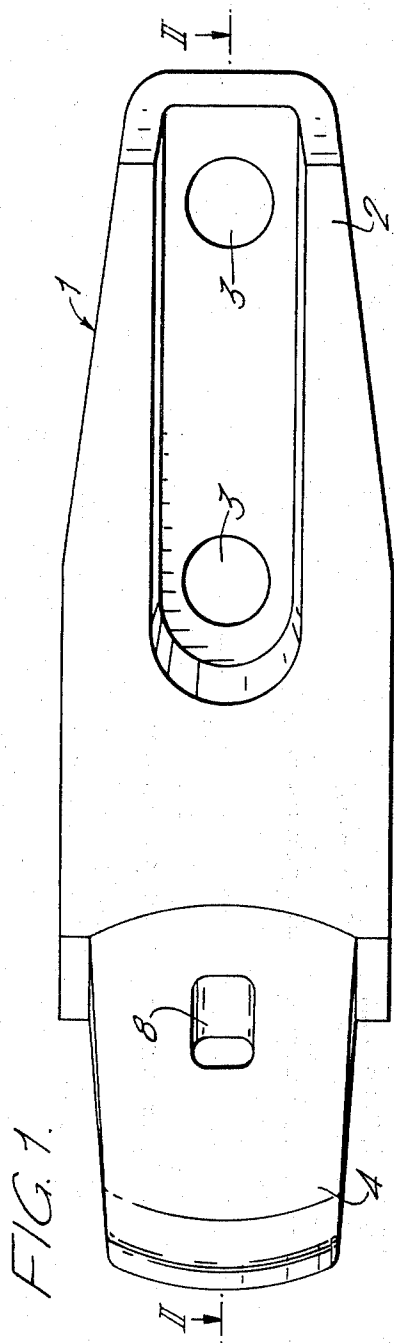


FIG. 3.

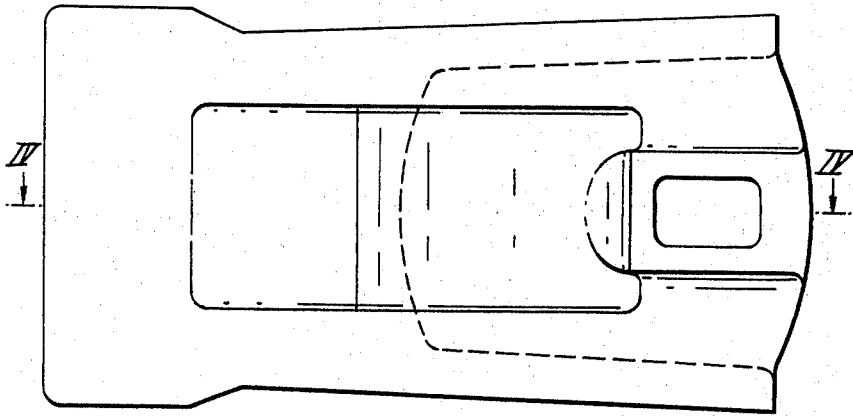


FIG. 4.

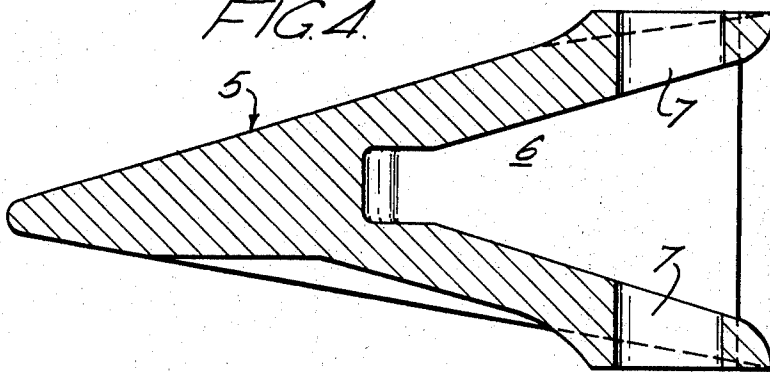


FIG. 5.

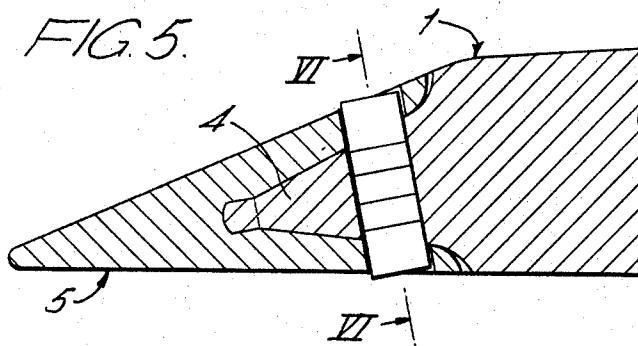


FIG. 6.

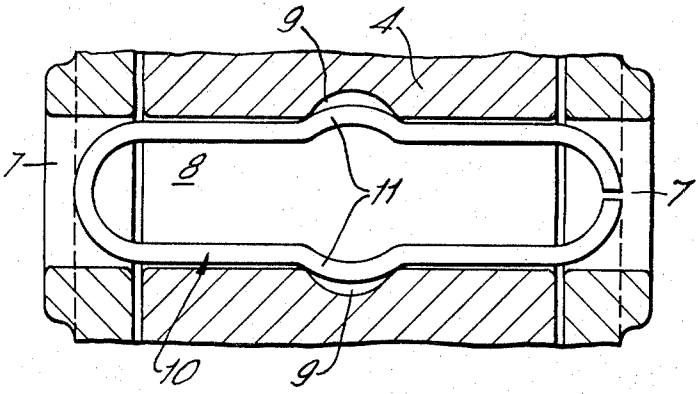


FIG. 7.

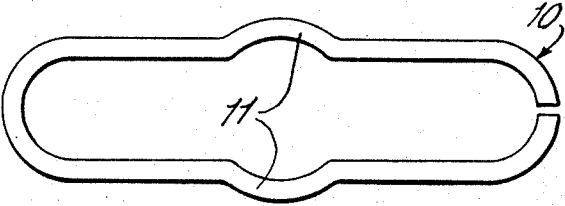


FIG. 8.

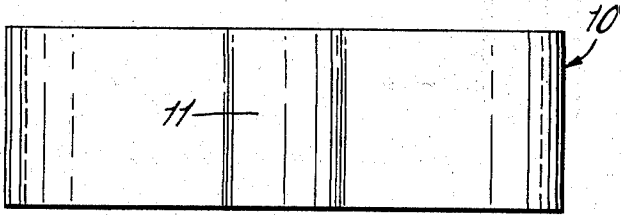


FIG. 9.

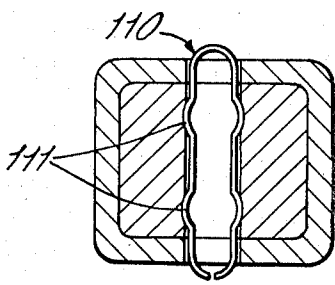


FIG. 10.

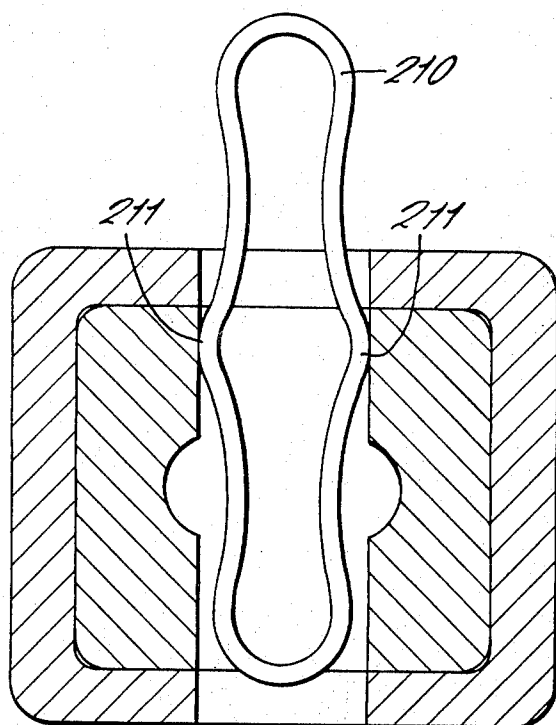
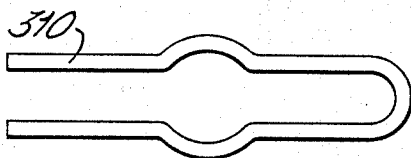


FIG. 11.



CONNECTION DEVICE FOR DIPPER OR RIPPER TEETH, PARTICULARLY FOR TWO-PIECE TEETH OF A DIPPER

BACKGROUND OF THE INVENTION

The present invention relates to a connection device for dipper or ripper teeth, and particularly for the two-piece teeth of a dipper.

It is known that dippers, rippers and the like comprise two-piece teeth suitably connected, which are usually known as the 'shoe' or 'point' and 'point-carrier' respectively. This allows the replacement of the end portion of the tooth, i.e. the one subject to wearing, instead of the whole assembly thereof. This permits not only a saving of material, but also the saving of time since, while the point-carrier is connected to the relevant support by bolts, the point is connected to the point-carrier by a pin permitting simpler fixing and removing operations.

However, it is to be noted that said pin, which has the purpose of preventing the shoe from separating from the point-carrier, requires an elastic fastening element for preventing said pin from moving out of its seat.

Such an elastic element may consist of a small ring, a rubber block or the like. Further, it is to be noted that usually such a pin must bear against machine-flattened surfaces, thereby increasing the cost of the conventional connections for the teeth concerned.

OBJECT OF THE INVENTION

In view of the foregoing it is the object of the invention to provide means for performing, by a single connection element, the function of preventing the shoe from separating from the tooth, without any need for another element in the connection element for preventing said connection element from falling out. Further, the connection element according to the invention may operate on raw casting surfaces and thus no tool treatment is required for the seat of said connection element.

SUMMARY OF THE INVENTION

The improved connection element for dipper or ripper teeth, and particularly for two-piece teeth of a dipper. One of said pieces is a base member, tooth or point-carrier, embodied as a bored fork for being connected to the edge of the dipper tool. This member comprises a projection on which is inserted the point or shoe of the tooth, the tooth having a corresponding cavity. The tooth and shoe in assembled position have a bore passing therethrough having a cavity on its area inside the point-carrier. Within said bore is inserted an elastically resilient element shaped as a ring or fork. The ring comprises at least a projection suitable for insertion into the cavity provided in said bore. The width of the elastic element corresponding to said projection or projections is larger than the width of said bore.

The above connection device is characterized in that said elastic element is formed of a metal strip, with highly elastic characteristics, shaped as a fork or a flattened ring. On its long sides the ring has a pair of opposite projections; and two corresponding cavities are provided in the bore in the point-carrier.

Said device is further characterized in that on the long sides of said elastic ring are provided more pairs of opposite projections which engage, when the ring is

mounted, in corresponding cavities provided on the walls of the bore through the point-carrier.

The above device is also characterized in that the long sides of the elastic ring have a rectilinear shape, with the exception of said projections.

Said device is further characterized in that the long sides of said elastic ring comprise suitably arranged waves apt to increase the shape elasticity of said elastic ring.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be clearly understood, some embodiments will be now described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 shows a top view of a point-carrier according to the invention;

FIG. 2 is a section along plane II—II OF FIG. 1;

FIG. 3 is a view similar to FIG. 1, referring to the point adapted to co-operate with the point-carrier shown in FIGS. 1 and 2;

FIG. 4 is a section along plane IV—IV of FIG. 3;

FIG. 5 is a section similar to sections of FIGS. 2 and 4, showing the point-carrier and the point in mounted position with the connection element according to the invention in operative position;

FIG. 6 is a section along plane VI—VI of FIG. 5;

FIGS. 7 and 8 are a plan view and a profile respectively of a connection element according to the invention, of the type already shown in FIGS. 5 and 6;

FIG. 9 is a modification of the embodiment shown in FIG. 6;

FIG. 10 is a further modification of an embodiment of the connection element according to the invention, and shows such a connection element during the assembling step thereof;

FIG. 11 shows a third constructive embodiment of the claimed connection element.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With particular reference to FIGS. 1 to 8, the point-carrier 1 comprises in conventional manner a fork root 2 provided with bores 3 for the connection, e.g. by means of bolts, to the edge of the bucket of a dipper or the like. Said point-carrier 1 has at its forward end a truncated-pyramidal projection 4 serving as a support for point 5 of the tooth, said point comprising a complementary back cavity 6. Both point 5 and point-carrier 1 have a substantially rectangular bores 7 and 8 respectively passing therethrough which are aligned when point 5 is mounted on point-carrier 1. As clearly shown in FIG. 6, the bore 8 comprises in an intermediate position two opposite enlargements 9, whose function will be explained later on.

The connection element, according to a preferred embodiment of the invention, consists of a steel strip 10, with highly elastic characteristics, bent as a ring and then flattened, so that its outline appears as formed by two circle arcs connected by rectilinear sections; however, such sections have, at their centers, two outward extending projections 11.

The elastic ring 10 has a size such that its length is just smaller than the length of the shaped bore formed by the bores 7 and 8 in aligned position, as shown in FIG. 6; and for preventing said ring from projecting

from the sides of the tooth, since otherwise it would wear out in a short time.

The length of the ring 10 must be greater than the length of bore 8; in the contrary case, said element 10 would not meet its function of connection element between the point and the point-carrier.

The thickness of ring 10, as appears in FIG. 8, is about equal, preferably slightly smaller, than the transverse size of bores 7 and 8 measured perpendicularly to the projection plane of FIG. 6; the third dimension of ring 10, i.e. the one perpendicular to the first two, is slightly smaller than the width of bores 7 and 8; however, the width of ring 10 correspondingly to the projections 11, is larger than the width of bores 8 and 7, though the width of bore 8 will be still larger than said measure correspondingly to the opposite cavities 9.

In order to allow the passage of projections 11 in bores 7 and 8, ring 10 must shrink transversally in an elastic manner, for assuming again its original position after that projections 11 have reached cavities 9. Any possibility of removal of the elastic ring 10 for accidental reasons will then be avoided.

In FIG. 9 the elastic ring 110 comprises two pairs of projections 111, obviously with two corresponding pairs of opposite cavities in the transversal bore passing through the point-carrier.

According to the embodiment of FIG. 10, ring 210 comprises projections 211 which connect smoothly to the long sides of said ring; in fact, said long sides are bent with the convexity towards the inside of the ring instead of having a rectilinear shape.

Finally, the embodiment shown in FIG. 11 comprises a ring 310 which is open with a fork-like shape instead of having a closed shape; the operation thereof is obviously similar to the preceding ones, however this embodiment has the disadvantage that outer pieces may enter bores 7 and 8 thus reducing the relevant elasticity and consequently the relevant efficiency.

It is to be noted that elastic rings 10, 110, and 210 comprise a closed ring, but are obtained from a shaped strip whose ends are not welded to each other, but are separated by a varying clearance depending on the required elasticity.

It is to be understood that the invention is not limited to the examples shown. It is intended to cover all modifications and equivalents within the scope of the ap-

pended claims.

What we claim is:

1. A dipper tooth assembly comprising a base member, a tooth member, and a resilient connecting element, said base member having a support projection, said tooth member having a cavity of a shape complementary to said projection, with said cavity being mounted on said projection for support thereby, a substantially rectangular bore extending transversely of said tooth member through said base member and tooth member and having a pair of sides parallel to the longitudinal direction of said tooth member, said resilient element comprising a resilient metal strip having a pair of substantially parallel sides in planes substantially parallel to said pair of sides of said bore and joined by at least one end section shorter than said sides, the sides of said metal strip having opposed outwardly extending projections, the portion of the bore in said base member having a pair of opposed cavities on said pair of sides thereof, said element being positioned within said bore with the projections thereof extending into said opposed cavities whereby said element is retained in said bore substantially solely by said base member.

2. The dipper tooth of claim 1, wherein said end section is semi-circular.

3. The dipper tooth assembly of claim 1, wherein said resilient element has a second end section joining the other ends of said parallel sides, whereby the ends of said metal strip are positioned in said second section and are unattached, said second end section being substantially semi-circular.

4. The dipper tooth assembly of claim 1, wherein said sides of said metal strip have second outwardly extending projections separated from said first mentioned projections, and said portion of the bore in said base member has a second pair of opposed cavities positioned to receive said second projections.

5. The dipper tooth assembly of claim 1, wherein said sides of said metal strip are substantially straight in the region thereof away from said projections.

6. The dipper tooth assembly of claim 1, wherein said projections on the sides of said metal strip are smoothly joined to the remainder of said sides.

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