

PATENT SPECIFICATION

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(54) ROCK BIT ASSEMBLY AND WELDING METHOD

(71) We, HUGHES TOOL COMPANY, having a place of business at 5425 Polk Avenue, Houston, Texas 77023, United States of America, a corporation organised and existing under the laws of the State of Delaware, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates in general to improvements in rock bit assembly and welding, and in particular to methods for assembling and holding rock bit sections in preparation for welding.

A common prior art method of assembling rock bit sections in preparation for welding used dowel holes and dowels positioned between the abutting faces of the sections. This technique assured accurate vertical and radial alignment of the sections. If all parts of the pre-assembled rock bit were within dimensional tolerances, the bit diameter would be within tolerance after clamping and welding.

If rock bits were assembled in the above manner and failed to be within bit diameter tolerance, corrective measures were necessitated unless the bit was to be scrapped. One corrective measure involved removal of the dowels, scissoring the section faces relative to one another, then clamping the sections and welding them. United States Patent No. 3,907,191 issued to Dresser Industries, Inc. This patent discloses the use of the non-dowel and scissoring technique for reaching acceptable bit gage diameter. This technique has the disadvantage of allowing loss of dimensional integrity. A rock bit must have dimensional integrity or else its performance may be severely restricted. Unequal loading of the sections and associated cutters results from inaccurate vertical alignment. Excessive scissoring

of the sections causes the centerlines of the cutters to become aligned in a manner outside the original design parameter. Such variations lead to unpredictable performance and are to be avoided to achieve the highest quality and consistent performance.

According to the invention there is provided a method for assembling rock bit sections to ensure alignment of their shank ends and their cutter ends and subsequently welding the sections, said method comprising the steps of: forming dowel holes in the shank ends of the sections to be welded assembling rotatable cutters on the cutter ends of said sections; locating the dowel holes of the shank end of each section on dowels in the base of a fixture, said holes being positioned at equal radii from the predetermined centerline of the bit when assembled, and said sections being lowered through a gage of predetermined dimension positioned symmetrically above the dowels in a fixed position; positioning the cutters of each section against the gage; clamping the sections with the sections and cutters thus positioned; welding said sections while clamped; removing the welded sections from the gage and dowels.

The invention will now be described in greater detail with reference to the drawing, wherein the sole figure is a perspective view of the preferred fixture used to practice the disclosed method.

The numeral 11 of the drawing designates the base of a fixture, with three locator dowels 13 in a circular pattern (i.e., equal radii from the centerline of the assembled bit) and extending upwardly from the base. Sections 15 (three in the most common type rock bit) have dowel holes mating with the dowels 13 as locator means to retain the shank ends 17 of the sections in fixed vertical and radial positions.

A ring gage 19 on equally spaced supports 21 of the base is positioned concentrically

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above the dowels 13. This ring has an interior surface that establishes the selected gage diameter of the bit and is preferably removable from the supports 21 to enable
5 differing sizes of rings to be lodged on shoulders 23 for assembling differing sizes of bits. Each section 15 is lowered through the ring until the dowels 13 and dowel holes are mated. A gage surface 25 of each pre-
10 assembled cutter 27, is positioned against the ring gage. Then equally spaced clamping jaws 29 are urged inwardly by suitable prior art means (not shown) to clamp the sections such that their mutually opposing
15 (120°) faces are forcibly joined. The sections are then welded and the clamping jaws released. The welded sections can then be removed from the fixture.

The invention has significant advantages
20 in that the use of the dowels of the base and dowel holes in the shank ends of the section when coupled with the use of a fixed position concentric ring assures more accurate alignment of the sections. Hence the
25 dimensional relationship between the sections is controlled and slippage minimized. The original design parameters are better maintained. Thus quality and performance of the rock bit will be consistent.

30 WHAT WE CLAIM IS:—

1. A method for assembling rock bit sections to ensure alignment of their shank ends and their cutter ends and subsequently welding the sections, said method comprising the

steps of:

forming dowel holes in the shank ends of the sections to be welded;

assembling rotatable cutters on the cutter ends of said sections;

locating the dowel holes of the shank end
40 of each section on dowels in the base of a fixture, said holes being positioned at equal radii from the predetermined centerline of the bit when assembled, and said sections being lowered through a gage of predeter-
45 mined dimension positioned symmetrically above the dowels in a fixed position;

positioning the cutters of each section against the gage;

clamping the sections with the sections 50 and cutters thus positioned;

welding said sections while clamped;

removing the welded sections from the gage and dowels.

2. A method as claimed in claim 1 where-
55 in the sections are lowered through a ring gage positioned concentrically above said dowels.

3. A method substantially as hereinbefore described with reference to the drawings.

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above the dowels 13. This ring has an interior surface that establishes the selected gage diameter of the bit and is preferably removable from the supports 21 to enable 5 differing sizes of rings to be lodged on shoulders 23 for assembling differing sizes of bits. Each section 15 is lowered through the ring until the dowels 13 and dowel holes are mated. A gage surface 25 of each pre-assembled cutter 27, is positioned against 10 the ring gage. Then equally spaced clamping jaws 29 are urged inwardly by suitable prior art means (not shown) to clamp the sections such that their mutually opposing 15 (120°) faces are forcibly joined. The sections are then welded and the clamping jaws released. The welded sections can then be removed from the fixture.

The invention has significant advantages 20 in that the use of the dowels of the base and dowel holes in the shank ends of the section when coupled with the use of a fixed position concentric ring assures more accurate alignment of the sections. Hence the 25 dimensional relationship between the sections is controlled and slippage minimized. The original design parameters are better maintained. Thus quality and performance of the rock bit will be consistent.

30 WHAT WE CLAIM IS:—

1. A method for assembling rock bit sections to ensure alignment of their shank ends and their cutter ends and subsequently welding the sections, said method comprising the

steps of:

forming dowel holes in the shank ends of 35 the sections to be welded;

assembling rotatable cutters on the cutter ends of said sections;

locating the dowel holes of the shank end 40 of each section on dowels in the base of a fixture, said holes being positioned at equal radii from the predetermined centerline of the bit when assembled, and said sections being lowered through a gage of predetermined 45 dimension positioned symmetrically above the dowels in a fixed position;

positioning the cutters of each section against the gage;

clamping the sections with the sections 50 and cutters thus positioned;

welding said sections while clamped;

removing the welded sections from the 55 gage and dowels.

2. A method as claimed in claim 1 where- 55 in the sections are lowered through a ring gage positioned concentrically above said dowels.

3. A method substantially as hereinbefore 60 described with reference to the drawings.

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