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(54) **TAMPING TOOL**

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Publication Classification

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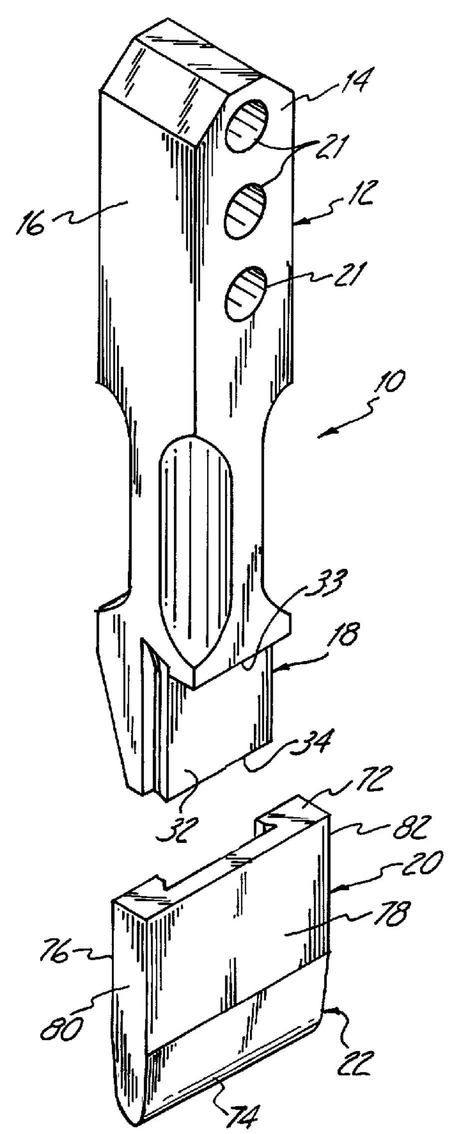
(52) **U.S. Cl.** **404/133.05**

(57) **ABSTRACT**

The present invention includes a tamping tool having a main shaft body with an end portion having a tongue section and a tamping pad having a groove for receiving and engaging the tongue section. The tamping pad preferably includes an abrasive material along a tamping edge. A weld bead is used to secure the tongue section with the groove.



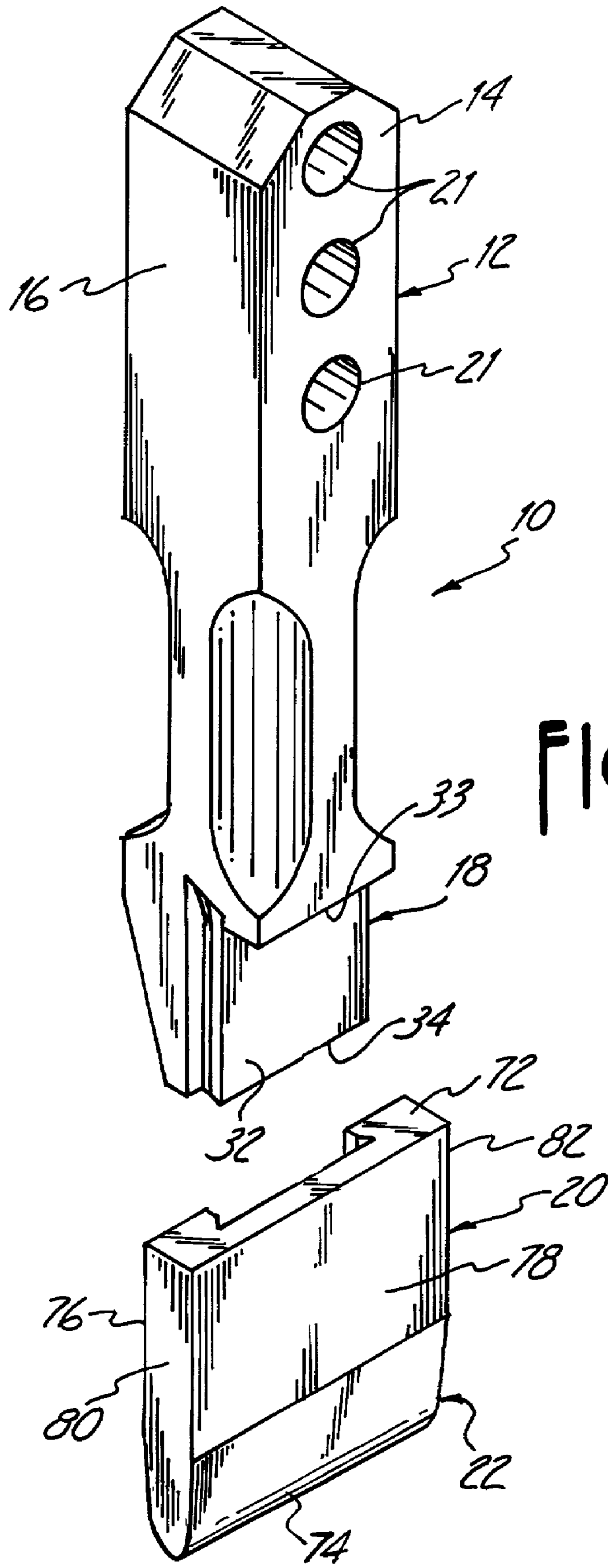
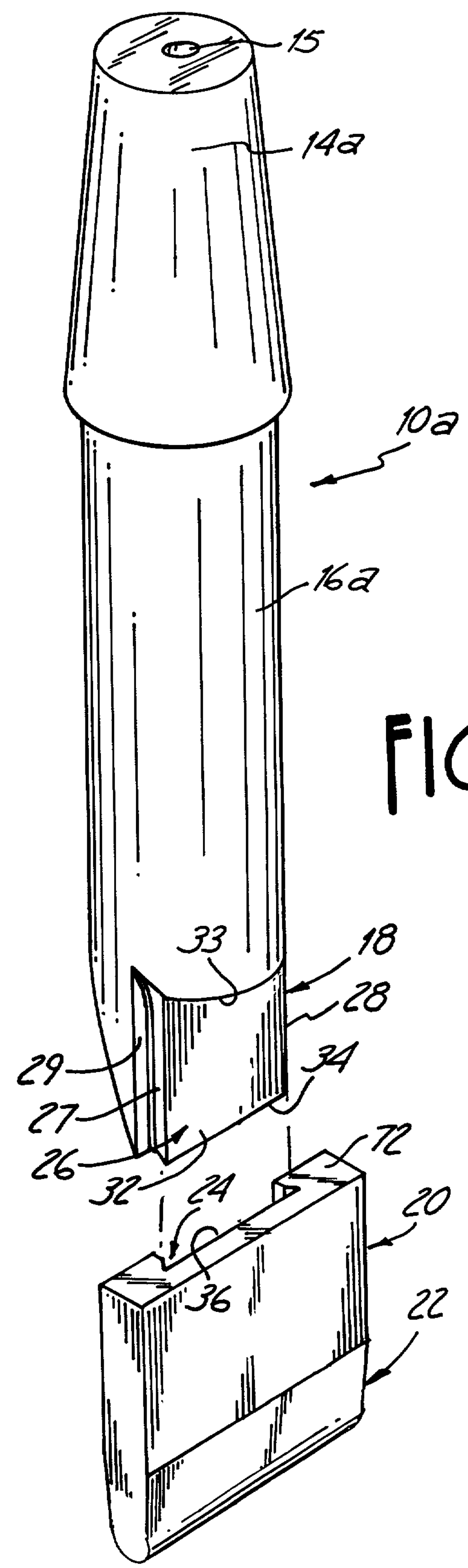


FIG. 1


15
14a
10a
16a
33
18
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34
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72
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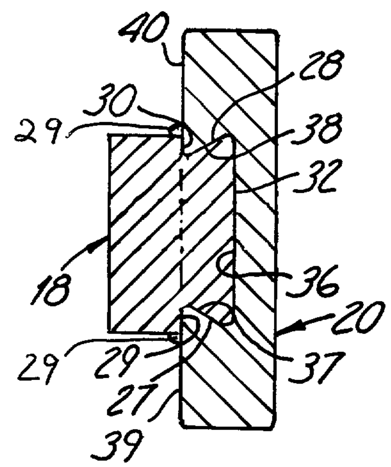
20
36
22

FIG. 2


40
28
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29
38
32
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39

FIG. 3

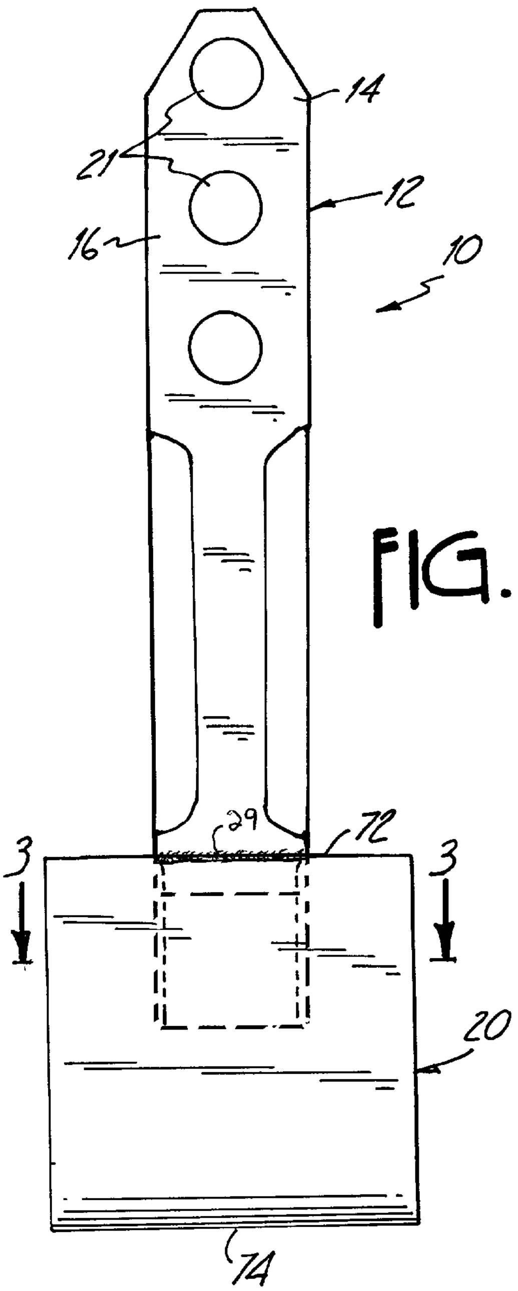

FIG. 5

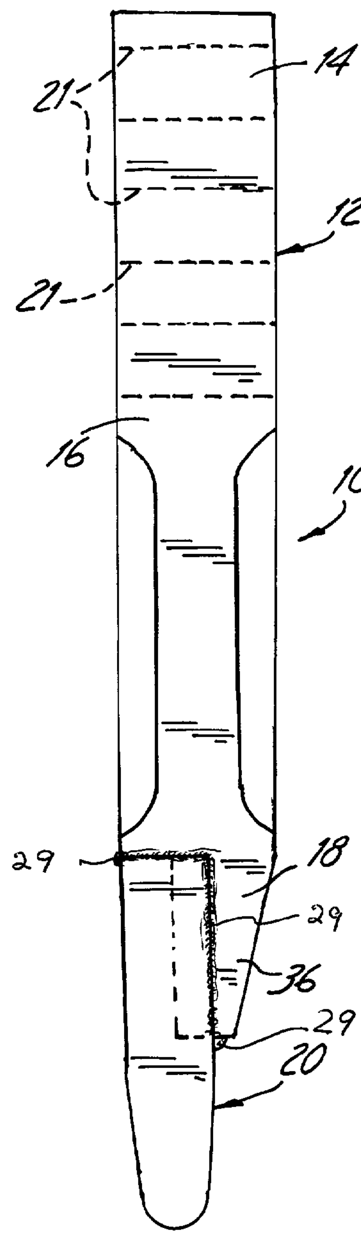

FIG. 4

TAMPING TOOL

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] The present application claims priority from Application Serial No. 60/231,385 filed on Sep. 8, 2000, entitled "TAMPING TOOL".

BACKGROUND OF THE INVENTION

[0002] The present invention generally relates to ballast tamping equipment. More specifically, the present invention relates to a tamping tool for mounting onto a ballast tamping apparatus for tamping ballast on railway lines, crushing minerals, or for other similar purposes.

[0003] A tamping apparatus is typically used to repair and correct a ballast of a roadbed around and beneath one or more railroad ties so that the road bed can uniformly support the passage of a railroad train. The tamping apparatus may be designed to move along the road bed and at each tie to force at least one tamping tool that is included as part of the tamping machine into the ballast. The tamping tool is generally attached to a reciprocatory and vibratory drive of the tamping apparatus, and then immersed into the ballast bend. The tamping tool is then vibrated and moved toward the tie in unison to compact the ballast under the tie and provide a firm foundation around and beneath the tie. As a result of tamping the ballast, the rail road bed is capable of providing a solid foundation for a train passing over the rail road bed.

[0004] Nevertheless, the use of one or more tamping tools as part of a ballast tamping apparatus still poses several challenges. For example, ballast materials like sand, slag, gravel or cinders, are highly abrasive and typically wear down a leading edge of the tamping tool during tamping operations. As a result, the leading edge of the tamping tool or the entire tamping tool must be repaired, replaced and/or rebuilt after a certain operating time.

[0005] Unfortunately, tamping tools are often manufactured from heavy metals that make removal of the tamping tools cumbersome and time-consuming. In addition, the tamping apparatus may contain 8 to 16 tamping tools, which further adds to the degree of complexity when replacing tamping tools. Furthermore, a lack of facility to quickly replace the worn tamping tool may also be a problem when attempting to repair the tamping tool since the tamping tool must typically be removed from the tamping apparatus.

[0006] As an alternative, the tamping tool may include a detachable tamping blade that may be removed when worn. Nonetheless, mere removal of the detachable tamping blade is not simple, since the tamping blade may have been bolted or otherwise attached to the tamping tool, and may require cutting the detachable tamping blade off of the tamping tool. Cutting the detachable tamping blade off of the tamping tool typically involves special equipment and time that can affect efficient operation of the tamping apparatus. In addition, the detachable tamping blade may have been irregularly worn during operation which could negatively impact other parts of the tamping tool and therefore, necessitate replacement of the entire tamping tool.

[0007] Tamping tools may also be manufactured with detachable tamping blades that include one or more inserts along a leading edge of the tamping blade to increase the life of the tamping blades. Such inserts may be formed from high chromium-steel braze or a tungsten carbide insert. However, the inserts may also undergo abrasion and/or undercutting such that the inserts fall out. Consequently, frequent replacement of the inserts may be required which results in loss of time or the use of special equipment. If the tamping blades include inserts that do not extend across an entire leading edge of the tamping blade insufficient protection of the tamping blade during lateral movement of the tamping tool through the ballast may irregularly wear out the leading edge, and require replacement of the entire tamping blade or tamping tool. Therefore, an urgent need currently exists to manufacture a tamping tool that includes a tamping blade, such that the tamping blade has a prolonged useful life. Furthermore, there exists an urgent need to manufacture a tamping tool that includes a tamping blade, such that the tamping blade may be easily removed in a minimal amount of time using minimal equipment.

BRIEF SUMMARY OF THE INVENTION

[0008] The present invention includes a tamping tool having a main shaft with an end portion with a tongue section. A tamping pad is attached to the end portion and has a groove for receiving and engaging the tongue section. The tamping pad includes an abrasive material along a tamping edge. A weld bead is used to secure the tamping pad to the main body shaft along with the engagement of the tongue section and groove.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] **FIG. 1** is an exploded perspective view of the present invention **FIG. 2** is an exploded perspective view of another embodiment of the present invention.

[0010] **FIG. 3** is a sectional view taken along the line **3-3** in **FIG. 5**.

[0011] **FIG. 4** is a side elevational view of the embodiment of **FIG. 1**.

[0012] **FIG. 5** is a front elevational view of the embodiment of **FIG. 1**.

DETAILED DESCRIPTION

[0013] A tamping tool having a generally rectangular shaped cross-sectional configuration is generally depicted at **10** in **FIG. 1**. Alternatively, the tamping tool as generally shown at **10*a*** in **FIG. 2** includes a cylindrical mid portion **16*a*** a frusto-conical upper portion **14*a*** and the tamping pad **20**. While specific tamping tools **10** and **10*a*** are generally depicted in **FIGS. 1 and 2**, respectively, it will be understood that the tamping tools having cross sectional configuration of any form are within the present invention. Like reference characters will be used to indicate like elements throughout the Figures.

[0014] The tamping tool **10** of **FIG. 1** includes a shaft **12** having an upper portion **14**, a middle portion **16**, a lower portion **8** and a tamping pad **20**. The upper portion **14** of the shaft **12** further includes transversely disposed mounting apertures **21**. The mounting apertures **21** facilitate connecting the tamping tool **10** to a tamping apparatus such as a Jackson tamping apparatus (not shown).

[**0015**] The tamping tool **10***a* of **FIG. 2** has a threaded longitudinal mounting aperture **15** that is used to attach the tamping tool **10***a* to a tamping apparatus (not shown), such as a Camron tamping apparatus. A bolt (not shown) is used to attach the tool **10***a* to the tamping apparatus (not shown) by engaging the aperture **15**.

[**0016**] The tamping pad **20** has a wear resistant tamping edge portion **22** and is detachably attached to the lower portion **18**. The pad **20** is attached in a manner that withstands continuous impacts that the tamping tools **10** and **10***a* receive during use. For attachment to either the shaft **10** or **10***a*, the tamping tool **20** includes a groove **24** that engages a tongue section **26** of the lower portion **18**. The tongue section **28** includes a front face surface **32** that starts at an upper shoulder **33** and ends at a lower edge **34**. The tongue section **26** is further defined by inwardly projecting side edges **27** and **28** that form an acute angle with the face surface **32**, as best illustrated in **FIG. 3**. Shoulders **29** and **30** are disposed parallel to the face edge **32** and conjoin with side edges **27** and **28**, respectively. The groove **24** of the tamping portion **20** includes a groove face surface **36** for engaging the face surface **32** of the tongue section. Sidewalls **37** and **38** of the groove **24** face and are disposed at an incline to engage the side edges **27** and **28** of the tongue section **28**, respectively. The shoulders **29** and **30** are engaged by wall portions **39** and **40** of the tamping portion **20**. In essence, the engagement between the lower portion **18** of the shaft **12** and the tamping pad **20** is a dovetail interlocking engagement. It is preferred that the groove has sides that incline toward each other so that when the tongue is slid within the groove, the tongue is retained against lateral forces that are created during the tamping operation. Of course, the tamping pad abuts against the shoulder **34** so that the tongue section does not move any further along the groove due to vertical forces that are created during the tamping operation.

[**0017**] The lower portion **18** further includes a brace section **36** as best illustrated in **FIG. 4** that provides support to the tongue section when attached to the tamping pad **20**.

[**0018**] The shaft **12** of the tamping tool **10** or **10***a* may be formed from carbon steel of suitable hardness, for example, AISI/1010 through 1045 carbon steel or an alloy steel like AISI/8620 or AISI/4140. As an example, the shaft **12** may be formed from an AISI 4140 alloy steel which is a superior material of suitable hardness that significantly enhances and prolongs the useful life of the tamping tool **10** or **10***a*. In another example, the shaft **12** may be formed from an AISI 1045 carbon steel that also enhances and prolongs the useful life of the tamping tool **12**.

[**0019**] When the shaft is made from AISI 4140 alloy steel, the shaft **12** is typically derived from a cold-rolled, air machined, 3-inch thick section of AISI 4140 steel. In addition, AISI 4140 alloy steel may be characterized as a medium wear-resistant, high tensile strength, high-carbon alloy.

[**0020**] The tamping pad **20** includes a body of hard wear-resistant material having an upper surface **72** and a lower surface **74**, respectively. The upper surface **72** of the tamping pad **20** abuts the shoulder **34** of the shaft **12**. The tamping pad **20** further includes first and second major opposed surfaces **76** and **78**, respectively. The distance between first and second major opposed surfaces **76** and **78** is preferably at least about 1-inch in thickness. Prior art pads are significantly thinner. In addition, the approximate distance between upper surface **72** and lower surface **74** is at least about 4 inches. The tamping pad **20** also includes opposed outside surfaces **80** and **82**. Preferably, the approximate distance between opposed outside surfaces **80** and **82** is at least 4 inches in length.

[**0021**] The tamping pad **20** is generally formed from a hard wear-resistant material, such as hardened steel or a metal carbide, such as tungsten carbide, titanium carbide, chrome carbide or some other hard material that is preferably both wear-resistant and abrasion resistant. In addition, the tamping pad **20** may include one or more additional layers of hard wear-resistant material. The additional layers may cover a partial or entire surface of the tamping pad when practicing the present invention. As an example, an additional layer of the hard wear-resistant material may merely cover the lower surface **74** of the tamping pad **20** for further protection since the lower surface **74** comes into contact with the ballast, gravel or other hard material that is being compacted. As an another example, the additional layer of the hard wear resistant material may cover the entire surface of the tamping pad, including the lower surface **74**.

[**0022**] When the lower surface **74** of the tamping pad **20** is covered with an additional layer of hardened material, the additional layer (not shown) may be also be formed from hardened steel or from a metal carbide, such as tungsten carbide, titanium carbide, tantalum carbide or some other hard material that is wear-resistant and abrasion resistant.

[**0023**] Preferably, the tamping pad **20** is formed from a nickel chromium alloy that has excellent abrasion resistance. As an example, Type I or Type IV regular ASTM A 532 I-A nickel chromium alloy may be used to form the tamping pad **20** of the present invention. An example of a chemical composition for Type I regular ASTM A 532 I-A nickel chromium alloy is listed in Table 1 below:

TABLE 1

CHEMICAL	WEIGHT PERCENT*
Total Carbon	3.0–3.6
Silicon	0.8 maximum
Manganese	1.3 maximum
Sulfur	0.15 maximum
Phosphorous	0.30 maximum
Nickel	3.3–5.0
Chromium	1.4–4.0

*based on a total weight of the nickel chromium alloy

[**0024**] Thus, the present invention also includes a method of attaching the tamping pad **20** to the shaft **12**. The method of attaching the tamping pad **20** includes inserting the tongue section **28** into the groove **24**, as shown in FIGS. **1** and 2 until the tamping pad is attached to the shaft 12 as shown in **FIGS. 4 and 5**. It should be noted that the tamping pad **20** abuts the lower horizontal shoulder **34** of the shaft **12** which stops the tamping pad's **20** travel along the tongue section **28** of the shaft **12**.

[**0025**] The tamping pad is retained in place by providing a weld bead **29** of **312** type alloy to secure the tamping pad **20** to the end of the shaft **12**, in conjunction with the engagement of the tongue section with the groove **24**. The weld bead **29** is preferably placed along the edges of all outer surfaces of the pad **20** and the end portion **18** that meet. Alternatively, a bolt (not shown) may be used to retain the connection.

[**0026**] To remove the tamping pad **20** from the shaft **12**, the shaft **12** and the tamping pad **20** may be heated to remove the weld. Once the weld has been removed, the tamping pad **20** can be simply slid off of the tongue section **28** and disconnected from the shaft **12**. Therefore, the method of attaching the tamping pad **20** to the shaft **12** of the tamping tool **10** using a dovetail interlocking mechanism permits quick and easy attachment and detachment of the tamping pad **20** to and from the tamping tool **10**. In addition, the dovetail interlocking mechanism permits simple and rapid attachment and detachment of tamping pads to tamping tools when the tamping pads are formed from materials that are unable to withstand welding temperatures.

[**0027**] Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

1. A tamping tool comprising:

an integrally formed main shaft having at one end a tongue section; and

a tamping pad having a groove configured to receive and engage the tongue section, the tamping pad having a lower tamping edge and wherein at least the lower tamping edge is made of an abrasive material.

2. The tamping tool of claim 1 wherein the tongue section is of a dovetail configuration and the groove is of a configuration to receive the dovetail configured tongue section.

3. The tamping tool of claim 1 wherein the abrasive material is a nickel chromium alloy.

4. The tamping tool of claim 1 wherein the abrasive material comprises tungsten carbide, chrome carbide or tantalum carbide.

5. The tamping tool of claim 1 wherein the tongue section is retained within the groove by a weld.

6. The tamping tool of claim 5 wherein the weld is a 312 alloy.

7. A method of attaching a tamping pad to a tamping tool comprising:

providing a shaft having at one end a tongue section;

providing a tamping pad having a groove configured to receive and engage the tongue section;

engaging the groove by sliding the tongue section within the groove; and

retaining the tongue section within the groove.

8. The method of claim 8 and further including providing a weld bead.

9. The method of claim 8 and wherein the weld is a 312 alloy.

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