

DUAL PURPOSE ENTRENCHING TOOL

This application relates to an entrenching tool, which can be deployed as a hoe, as a spade, or as a shovel.

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US 5,054,830 discloses a shovel. The shovel includes an elongated cylindrical shaft and a shovel blade. The cylindrical shaft has a first end and a second end. The second end is opposite to the first end. The shovel blade is removably secured by a pin-and-socket connection to the first end while a first D-shaped handgrip is attached to the second opposite end.

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Furthermore, the shovel also includes a pair of split cylindrical clamping collar and a lateral extension member. The clamping collars are frictionally engaged to the shaft. One end of the lateral extension member is pivotally mounted to the clamping collars while another end of the lateral extension member is attached to a second D-shaped handgrip.

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US 6,560,805B2 shows a spade. The spade includes a shank, a handle, and a blade, wherein the shank is coupled to the handle and to the blade.

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US 1,181,137 discloses a device that includes a combination of a hoe and shovel. The device includes a handle, a socket, a clamping and pivot bolt, as well as a pair of a shovel blade and a hoe blade. The socket includes a fork that has arms. The socket receives one end of the handle. The clamping and pivot bolt engages the shovel blade and the hoe blade to the arms.

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It is an object of the application to provide an improved entrenching tool.

The application provides an entrenching tool that has two configurations. In one configuration, it serves as a spade or as a shovel. The spade serves as a tool for digging. The shovel serves as tool for moving objects, such as soil. In another
5 configuration, it serves as a hoe for removing soil or unwanted plants from the soil.

The entrenching tool comprises a handle, a blade unit, and, a movable retaining pin.

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The handle comprises one or more transversal handle pin through-holes, which are provided on end parts of the handle. A through-hole of an object extends from one surface of the object to another surface of the object. In other words, the
15 hole goes through the object. This is different from a blind hole, which extends from one surface of an object but does not go through the object.

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The blade unit comprises a tube section. The tube section includes a wall or a sidewall that has a major or large surface and a minor surface. The major surface is connected to the minor surface while the minor surface is provided at an end-portion or at a rim of the tube-section.

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The major wall surface comprises a first blade handle through-hole and at least one blade pin through-hole. The first blade handle through-hole is also called a shovel handle through-hole or a spade handle through-hole. In contrast, an end portion of the major wall surface includes or encloses a second
30 blade handle through-hole. The second blade handle through-hole is also called a hoe handle through-hole.

The first blade handle through-hole and the second blade through-hole are provided for receiving one end of the handle. In contrast, the handle pin through-hole and the blade pin through-hole are provided for receiving the retaining pin.

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The retaining pin is movable between an open position and a closed position. The tool is configurable between a first position and a second position.

10 In the first position, the tool is configured as the shovel. In this position, the first blade handle through-hole receives the handle while the handle pin through-hole and the blade pin through-hole receive the retaining pin. The pin here secures the handle to the blade unit such that the handle and the
15 blade unit essentially form a first pre-determined angle that is suitable for shoveling. The first pre-determined angle is often about 180 degrees. Put differently, handle surface and blade surface are essentially parallel. This position allows the tool to be used effectively for shoveling or be used ef-
20 fectively as a spade

In the second position, the tool is then configured as the hoe. In this position, the second blade handle through-hole receives the handle while the handle pin through-hole and the
25 blade pin through-hole receive the retaining pin. The pin here secures the handle to the blade unit such that the handle and the blade unit essentially form a second pre-determined angle that is suitable for digging. The second pre-determined angle is often about 90 degrees. This position allows the tool to be
30 used effectively for digging and for removing soil or removing unwanted plants.

These parts of the entrenching tool allow the entrenching tool to be configured as a spade, as a shovel, or as a hoe in an easy and quick manner.

- 5 Several additional aspects or features of the entrenching tool are also provided.

Referring to the blade unit, the first blade handle through-hole can be placed in a first plane and the second blade handle through-hole can be placed in a second plane in which the first plane is essentially perpendicular to the second plane. This allows the blade unit and the handle to form angles that are suitable to serve as the hoe.

- 15 The tube section is often provided in a butt end of the blade unit. The butt end is placed opposite to a digging end of the blade unit. The digging end is also called an active end. The active end has a sharp edge that allows it to penetrate easily the soil when the blade unit is used for digging. The butt end is often used to receive a force from a foot of a user. This force is then transmitted to the active end.

The blade unit can include a holding means for slidably securing the retaining pin to the tube section while allowing the retaining pin to move between the closed position and the open position. The holding means prevents accidental loss of the retaining pin.

The blade unit can also include a retaining means to keep the retaining pin within a pre-determined maximum distance from the blade unit. The retaining means can be implemented as a string being connected to the retaining pin and to blade unit.

Referring to the handle, it can include one single transversal handle pin through-hole. The handle pin through-hole is provided at one end of the handle.

- 5 The handle can also comprise two transversal handle pin through-holes in which the handle pin through-holes are provided at opposite ends of the handle.

One end of the handle can also comprise a protrusion while the
10 wall surface of the tube section comprises a corresponding support opening or orifice. The support opening can be provided as a through-hole or as a blind hole. The protrusion can have a cylindrical shape.

- 15 In use, the support opening is used for receiving the protrusion. The support opening is often provided opposite to the first blade handle through-hole. The connection between the protrusion and the support opening enables a firm connection between the handle and the blade unit.

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The handle is often provided with a bigger end portion and a smaller end portion, wherein the bigger end portion tapers to the smaller end portion. The bigger end portion allows for easier holding by the user while the smaller end portion al-
25 lows for easier fixing to the blade unit. The second blade handle through-hole serves to block the handle when the handle is inserted into the second blade handle through-hole.

The application provides a blade unit of an entrenching tool
30 that can be configured as a spade, as a shovel, or as a hoe. The blade unit includes a sleeve or tube section.

The tube section includes a wall with a major surface and a minor surface. The major surface is connected to the minor surface. The minor surface is provided at an end portion or at a rim of the tube section.

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The major wall surface comprises a first blade handle through-hole and one or more blade pin through-holes. An end portion of the major wall surface includes or encloses a second blade handle through-hole.

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The first blade handle through-hole and the second blade handle through-hole are provided for receiving one end of a handle. The handle pin through-hole and the blade pin through-hole are provided for receiving a retaining pin.

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Several additional aspects of the blade unit are also provided.

The first blade handle through-hole is often provided in a first plane and the second blade handle through-hole is often provided in a second plane in which the first plane is essentially perpendicular to the second plane. The tube section is often provided in a butt end of the blade unit. The blade unit can comprise a holding means for securing the retaining pin to the tube section such that the retaining pin can slide. The blade unit can also comprise a retaining means to keep the retaining pin within a pre-determined maximum distance from the blade unit.

The application provides a handle of an entrenching tool that can be configured as a spade, as a shovel, or as a hoe. The handle includes one or more transversal handle pin through-holes.

Several additional aspects of the handle are also provided.

The handle can include one single transversal handle pin through-hole that is provided at one end of the handle. Alternatively, the handle can include two transversal handle pin through-holes, wherein the transversal handle pin through-holes are provided at opposite ends of the handle.

One end of the handle can comprise a protrusion or nose. In use, the protrusion is received by a support opening of a tube section of a blade unit. The handle can comprise an end portion that is bigger than another end portion. The bigger end portion tapers to the smaller end portion. In use, the second blade handle through-hole blocks the bigger end portion when the handle is inserted into the second blade handle through-hole.

In summary, the application provides an entrenching tool. The entrenching tool includes a blade, a sliding pin mechanism, and a wooden handle. The sliding pin mechanism includes a sliding retaining pin and a mechanism for preventing accidental loss of the sliding retaining pin. The sliding retaining pin is used for securing the blade to one end of the wooden handle. In a general sense, other cylindrical bodies, such as a bullet, can act as the sliding retaining pin.

The entrenching tool can be adapted to serve as a shovel or as a spade by securing one end of the wooden handle to one part of the blade and be adapted to serve a hoe by securing one end of the wooden handle to another part of the blade.

The application can be applied to other entrenching tool with a simple modification. The modification involves drilling some

holes on a blade bracket as well as attaching of a sliding pin mechanism on the blade bracket.

- Fig. 1 illustrates a top view of parts of an entrenching tool,
5 Fig. 2 illustrates a sleeve and an end-cap of the entrenching tool of Fig. 1,
Fig. 3 illustrates a cross-sectional view of the sleeve and the end-cap of Fig. 2 taken along a section A-A,
10 Fig. 4 illustrates a cross-sectional view of the sleeve and the end-cap of Fig. 2 taken along a section B-B,
Fig. 5 illustrates a sliding pin of the sleeve of Fig. 2,
Fig. 6 illustrates a perspective view of the sleeve and the end-cap of Fig. 2,
15 Fig. 7 illustrates a top view of the sleeve and the end-cap of Fig. 6,
Fig. 8 illustrates the entrenching tool of Fig. 1, wherein the entrenching tool is configured a hoe, and
Fig. 9 illustrates the entrenching tool of Fig. 1, wherein
20 the entrenching tool is configured a shovel or a spade.

In the following description, details are provided to describe an embodiment of the application. It shall be apparent
25 to one skilled in the art, however, that the embodiment may be practiced without such details.

Some parts of the embodiment, which are shown in the Figures below, have similar parts. The similar parts have the same
30 names or similar part numbers. The description of one similar part also applies by reference to another similar part, where appropriate, thereby reducing repetition of text without limiting the disclosure.

Fig. 1 shows an entrenching tool 10. The entrenching tool 10 includes an elongated handle 12 and a blade unit 13. The blade unit 13 includes a socket 15 for receiving the elongated handle 12. The socket 15 is also called a sleeve.

Referring to the handle 12, it includes a wooden stick 17 and a metal cylinder 18. The metal cylinder 18 is also known as an end-cap. The metal cylinder 18 is attached to the wooden stick 17 such that the metal cylinder 18 and the wooden stick 17 are positioned generally along a same longitudinal axis 20.

The wooden stick 17 has a first end portion 22 and a second end portion 23 in which the first end portion 22 is bigger than the second end portion 23. The bigger end portion 22 tapers toward the smaller end portion 23. The smaller end portion 23 is attached to one end of the metal cylinder 18. The bigger end portion 22 has a transversal through-hole 25 for receiving a pin. The through-hole 25 extends from one surface of the wooden stick 17 to another surface of the wooden stick 17. The through-hole 25 also goes through the wooden stick 17.

The metal cylinder 18 has a first end portion 27 and a second end portion 28. The first end portion 27 is attached to the smaller end portion 23 of the wooden stick 12 while the second end portion 27 has a transversal through-hole 30 and a nose 32 on a flat surface 34 of the second end portion 28. The hole 30 does through the second end portion 27. The nose 32 is called a protrusion.

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Referring to the blade unit 13, it includes a metal blade 40 and a sliding pin mechanism 42, wherein the sliding pin mecha-

nism 42 is attached to the metal blade 40 by screw and thread connections.

5 The metal blade 40 includes an active end portion 44 and a butt end portion 45. The butt end portion 45 includes the sleeve 15 that includes a sidewall 47.

10 The sidewall 47 has a major or large surface and a minor surface. The major surface is connected to the minor surface. The minor surface is provided at an end portion or outer edge of the sidewall 47. The minor surface is also called a rim surface.

15 The major surface of the sidewall 47 includes a first mounting through-hole 49 while the end portion of the sidewall 47 encloses or surrounds a second mounting through-hole 50. In other words, an end portion of the major surface encloses the second mounting through-hole 50. The through-hole 49 goes through the sidewall 47 and it extends from one surface of the sidewall 47 to another surface of the sidewall 47. In contrast, 20 the through-hole 50 goes through the sleeve 15 and it extends from one end portion of the sidewall 47 to another end portion of the sidewall 47.

25 The first mounting through-hole 49 is called an end-cap through-hole while the second mounting through-hole 50 is called a wooden stick through-hole.

30 The first mounting through-hole 49 is provided in a first plane while the second mounting through-hole 50 is provided in a second plane, wherein the first plane is essentially perpendicular to the second plane.

As better seen in Figs. 2, 3, and 4, the major surface of the sidewall 47 also includes a nose opening 55 that is positioned opposite to the end-cap through-hole 49. The nose opening 55 is also called a support opening. The nose opening 55 can be provided as a through-hole or as a blind hole.

In addition, the sidewall 47 includes a pair of pin through-holes 57 and 58. The pin through-holes 57 and 58 are placed opposite to each other and they are placed in an axis that is essentially perpendicular to an axis that extends from the nose opening 55 to the end-cap through-hole 49. The through-holes 57 and 58 extend from one surface of the sidewall 47 to another surface of the sidewall 47. Put differently, the through-holes 57 and 58 go through the sidewall 47.

The sliding pin mechanism 42 comprises a sliding pin 52 and two brackets 53. The brackets 53 surround a portion of the sliding pin 52.

Referring to Figs. 2 and 5, they show the sliding pin 52 with a generally elongated cylindrical body comprising a long flat surface 60 that is placed between two blocking end parts 62 and 63. As seen in Fig. 5, the flat surface 60 includes two indents 65 and 66, which are placed on opposite ends of the flat surface 60.

The two brackets 53 accommodate or enclose a spring loaded ball plunger in which the ball plunger is compressed such that and the ball plunger pushes against the flat surface 60 of the sliding pin 52. The ball plunger is not shown for simplicity.

The end-cap through-hole 49 and the end-cap 18 are dimensioned such that they have matching shapes such that they fit togeth-

er. When the end-cap 18 is inserted into the end-cap through-hole 49, the gap between the end-cap through-hole 49 and the end-cap 18 is small.

5 Similarly, the sliding pin 52 together with the pin through-holes 57 and 58 are also dimensioned such that the fit together. The nose 32 and the nose opening 55 are also dimensioned such that they fit together. These dimensions allow the entrenching tool 10 to function well as a shovel or as a spade.

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The wooden stick through-hole 50 and the bigger end portion 22 of the wooden stick 17 are dimensioned such that the wooden stick through-hole 50 is smaller than the bigger end portion 22. These dimensions allow the entrenching tool 10 to function well as a hoe.

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In a general sense, the entrenching tool 10 can function without the pin through-hole 58 although the pin through-hole 58 does provide additional support.

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Figs. 6 and 7 show perspective or isometric views of the sleeve 15 and the end-cap 18.

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In use, the entrenching tool 10 can be configured in two positions. In one position, it acts as a spade or as a shovel, as shown in Fig. 9. In another position, it acts as a hoe, as shown in Fig. 8.

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The spade serves as a tool for digging while the shovel serves as tool for moving objects, such as soil. The hoe serves to remove soil or unwanted plants from the soil.

As one example, the entrenching tool 10 is used by military personal for filling sandbags and for shaping of trenches.

5 The active end portion 44 serves as edge for cutting or for digging. The butt end portion 45 is intended for receiving a force or a thrust from a foot of a user. The force is transmitted from the butt end portion 45 to the active end portion 44.

10 The sliding pin 52 is movable between an open position and a closed position and it is used for fixing the blade unit 13 to the handle 12.

15 The handle 12 and the sleeve 15 is used for forming a plug and socket connection with the handle 12 serving as the plug and with the sleeve 15 serving as the socket.

In the spade or the shovel configuration of the entrenching tool 10, the end-cap 18 of the handle 12 is inserted into the end-cap through-hole 49 of the sleeve 15 while the protrusion 20 32 of the end-cap 18 is inserted into the nose opening 55 of the sleeve 15. The sliding pin 52 is positioned in the closed position through the pin through-hole 57, through the through-hole 30 of the end-cap 18, and through the pin through-hole 58. 25 In this position, the sliding pin 52 serves to fix the end-cap 18 to the sleeve 15. The blade unit 13 and the handle 12 essentially lie in the same plane. The blade unit 13 forms essentially a 180 degrees angle with the handle 12 to form the spade or the shovel.

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In a generic sense, the shovel configuration can also function without the connection between the nose 32 and the nose opening 55.

In the hoe configuration of the entrenching tool 10, the wooden stick 17 is inserted into the wooden stick through-hole 50 of the sleeve 15 such that the wooden stick through-hole 50 blocks the bigger end portion 22 of the wooden stick 17. The sliding pin 52 is positioned in the closed position through the pin through-hole 57, through the through-hole 25 of the bigger end portion 22, and through the pin through-hole 58. In this position, the sliding pin 52 serves to fix the bigger end portion 22 to the sleeve 15. The blade unit 13 forms essentially a 90 degrees angle with the handle 12 to form the hoe.

The two indents 65 and 66 together with the ball plunger provide a means of locating the open position or the closed position of the sliding pin 52. The brackets 53 with the blocking end parts 62 and 63 prevent the sliding pin 52 from being removed accidentally from the brackets 53.

In a generic sense, the angle between the blade unit 13 and the handle 12, when the entrenching tool 10 is configured as a hoe, can be different from the 90 degrees angle. Similarly, the angle between the blade unit 13 and the handle 12, when the entrenching tool 10 is configured as a shovel or a spade, can be different from the 180 degrees angle.

The two through-holes 30 and 25 of the handle 12 can be integrated into one through-hole, instead of two through-holes. The pin 52 may take the form of a threaded fastener, a snap pin, or a cotter pin. The positions of the socket and the plug may be reversed.

This embodiment provides a simple means to provide the different configurations of the entrenching tool 10.

Although the above description contains much specificity, this should not be construed as limiting the scope of the embodiments but merely providing illustration of the foreseeable em-
5 bodiments. The above stated advantages of the embodiments should not be construed especially as limiting the scope of the embodiments but merely to explain possible achievements if the described embodiments are put into practice. Thus, the scope of the embodiments should be determined by the claims
10 and their equivalents, rather than by the examples given.

REFERENCE NUMBER

	10	entrenching tool
	12	handle
	13	blade unit
5	15	socket
	17	wooden stick
	18	metal cylinder
	20	longitudinal axis
	22	end portion
10	23	end portion
	25	through-hole
	27	end portion
	28	end portion
	30	through-hole
15	32	nose
	34	flat surface
	40	metal blade
	42	sliding pin mechanism
	44	active end portion
20	45	butt end portion
	47	sidewall
	49	mounting through-hole
	50	mounting through-hole
	52	sliding pin
25	53	bracket
	55	nose opening
	57	pin through-hole
	58	pin through-hole
	60	surface 60
30	62	blocking end part
	63	blocking end part
	65	indent
	66	indent

CLAIMS

1. An entrenching tool comprising

a handle that comprises at least one transversal

5 handle pin through-hole,

a blade unit that comprises a tube section, and

a pin,

wherein a wall surface of the tube section comprises

- a first blade handle through-hole and

10 - at least one blade pin through-hole,

wherein an end portion of the wall surface comprises a
second blade handle through-hole,

wherein

- the first blade handle through-hole and the second
15 blade handle through-hole are provided for receiving
the handle and

- the handle pin through-hole and the at least one
blade pin through-hole are provided for receiving
the pin,

20 wherein

- the pin is movable between an open position and a
closed position,

- the tool is configurable between a first position
and a second position,

25 - in the first position,
the first blade handle through-hole receives
the handle while the handle pin through-hole
and the at least one blade pin through-hole
receive the pin,

30 - in the second position,
the second blade handle through-hole receives
the handle while the handle pin through-hole

and the at least one blade pin through-hole receive the pin.

2. The entrenching tool according to claim 1, wherein
5 the first blade handle through-hole is provided in a first plane and the second blade handle through-hole is provided in a second plane in which the first plane is essentially perpendicular to the second plane.
- 10 3. The entrenching tool according to claim 1 or to claim 2, wherein
the tube section is provided in a butt end of the blade unit.
- 15 4. The entrenching tool according to one of claims 1 to 3 further comprises
a holding means for slidably securing the pin to the tube section.
- 20 5. The entrenching tool according to one of claims 1 to 4 further comprises
a retaining means to keep the pin within a pre-determined distance from the blade unit.
- 25 6. The entrenching tool according to one of claims 1 to 5, wherein
the handle comprises one transversal handle pin through-hole.
- 30 7. The entrenching tool according to one of claims 1 to 5, wherein
the handle comprises two transversal handle pin through-holes.

8. The entrenching tool according to one of claims 1 to 7,
wherein

- the handle further comprises a protrusion and
- 5 - the wall surface of the tube section further comprises a support opening for receiving the protrusion.

10 9. The entrenching tool according to one of claims 1 to 8,
wherein
the handle comprises a bigger end portion and a smaller
end portion and
the bigger end portion tapers to the smaller end portion.

15 10. A blade unit of an entrenching tool comprising
a tube section,
wherein
- a wall surface of the tube section comprises
- a first blade handle through-hole and
20 - at least one blade pin through-hole, and
wherein
- an end portion of the wall surface encloses a
second blade handle through-hole.

25 11. The blade unit according to claim 10, wherein
the first blade handle through-hole is provided in a
first plane and the second blade handle through-hole is
provided in a second plane in which the first plane is
essentially perpendicular to the second plane.

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12. The blade unit according to claim 10 or to claim 11,
wherein

the tube section is provided in a butt end of the blade unit.

13. The blade unit according to one of claims 10 to 12 further comprises
5 a holding means for slidably securing a pin to the tube section.
14. The blade unit according to one of claims 10 to 13 further comprises
10 a retaining means to keep the pin within a pre-determined distance from the blade unit.
15. A handle of an entrenching tool comprising at least one
15 transversal handle pin through-hole.
16. The handle according to claim 15 further comprising one transversal handle pin through-hole.
- 20 17. The handle according to claim 16 further comprising two transversal handle pin through-holes.
18. The handle according to one of claims 15 to 17 further comprises
25 a protrusion for receiving by a support opening of a blade unit.
19. The handle according to one of claims 15 to 18 further comprises
30 a bigger end portion and a smaller end portion, wherein the bigger end portion tapers to the smaller end portion.