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**Pechstein et al.**

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(54) **LUBRICATION SYSTEM FOR PORTABLE  
PIPE THREADER**

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CPC ..... **B23G 1/24** (2013.01); **B23G 1/52**  
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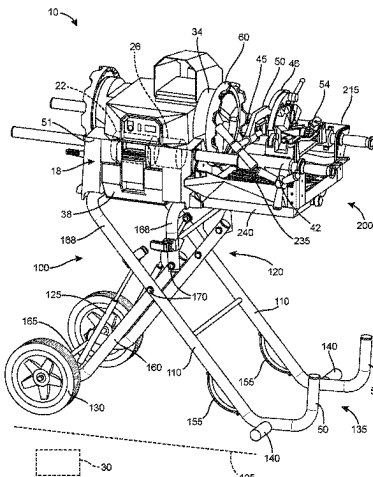
CPC . B23G 1/22; B23G 1/225; B23G 1/24; B23G  
1/44; B23G 1/52; B23G 2240/08;

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(57) **ABSTRACT**

A portable pipe threader includes a housing, a carriage, and at least one pipe threading tool. A drive assembly of the is at least partially positioned within the housing and includes an electric motor operable to provide torque to the pipe. A lubrication system is removably coupled to the housing and includes a reservoir for holding a lubricant and a pump powered by the drive assembly. A stand of the portable pipe threader is adjustable between collapsed and deployed states. When collapsed, a longitudinal axis of the housing is maintained at a first oblique angle relative to a horizontal reference plane parallel with a work surface upon which the stand is supported to funnel lubricant toward the reservoir. When deployed, the longitudinal axis is maintained at a second oblique angle to funnel lubricant away from an end of the pipe on which a working operation is performed.

**17 Claims, 15 Drawing Sheets**



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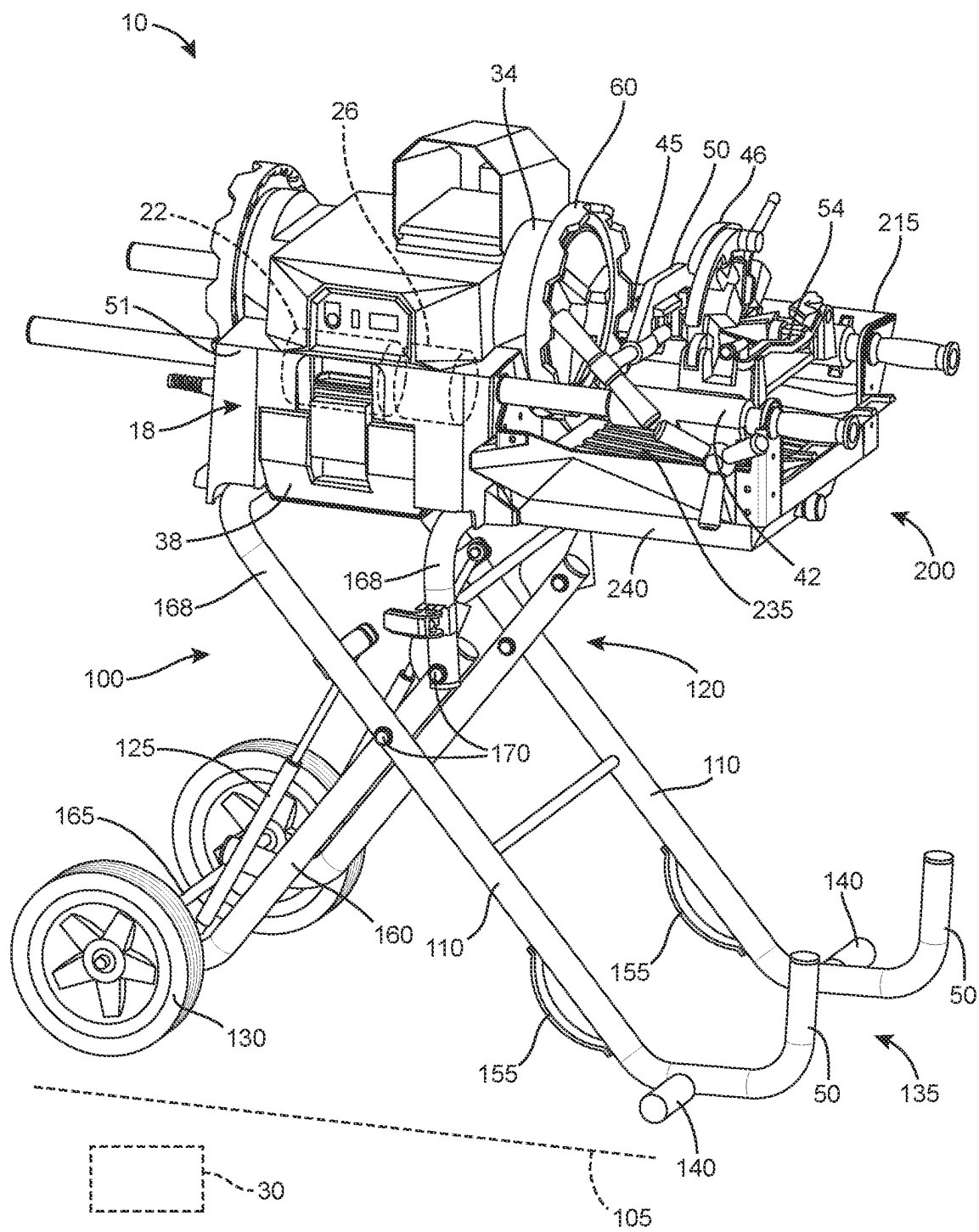


FIG. 1

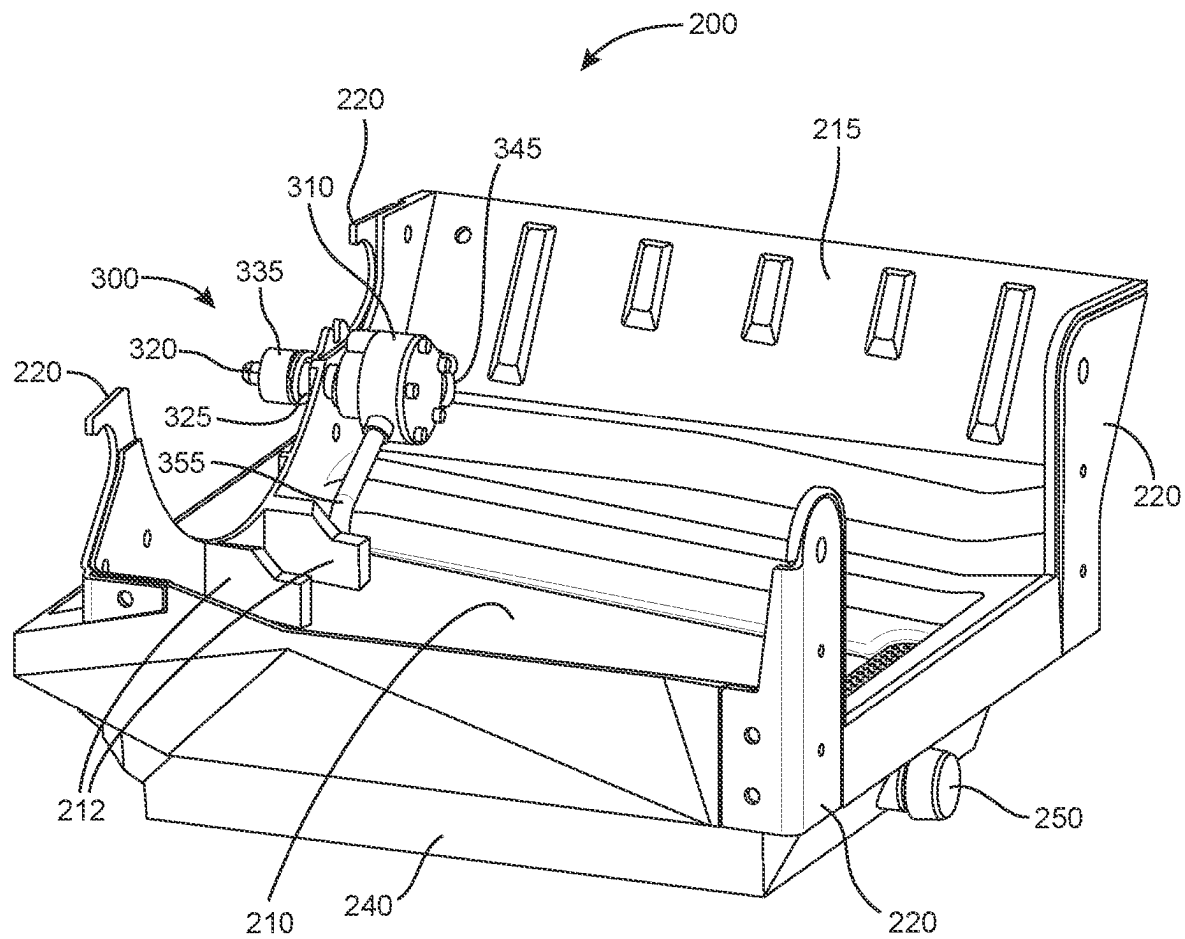


FIG. 2

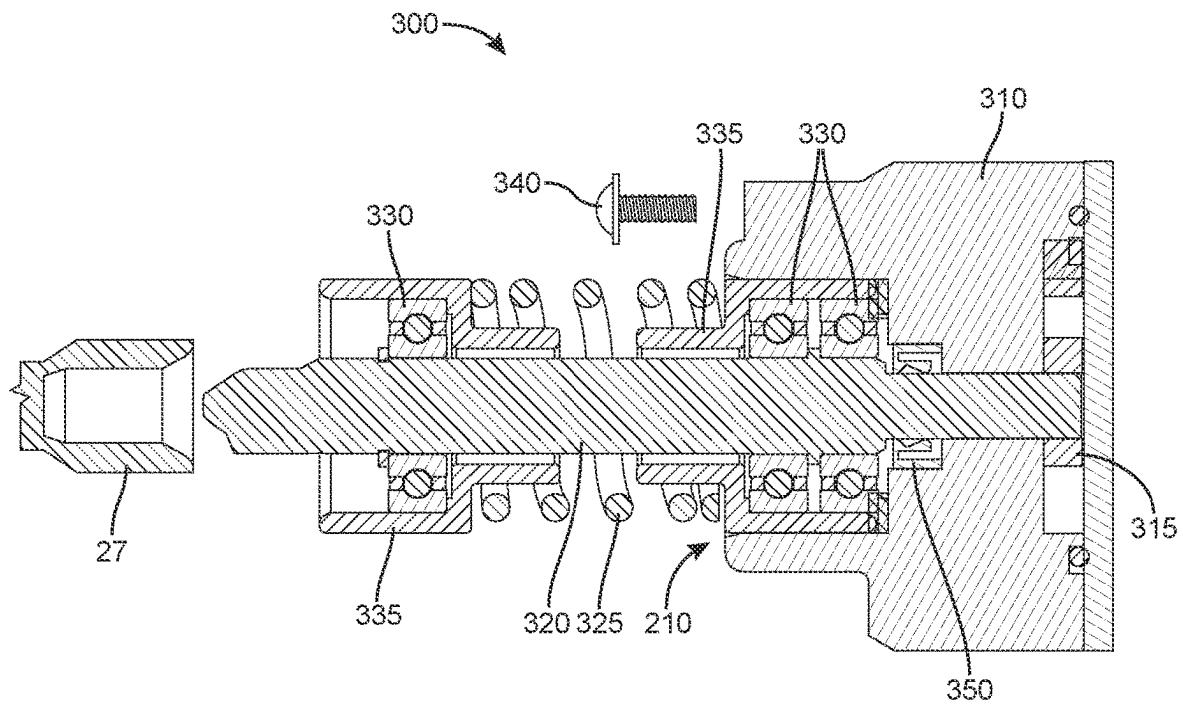


FIG. 3A

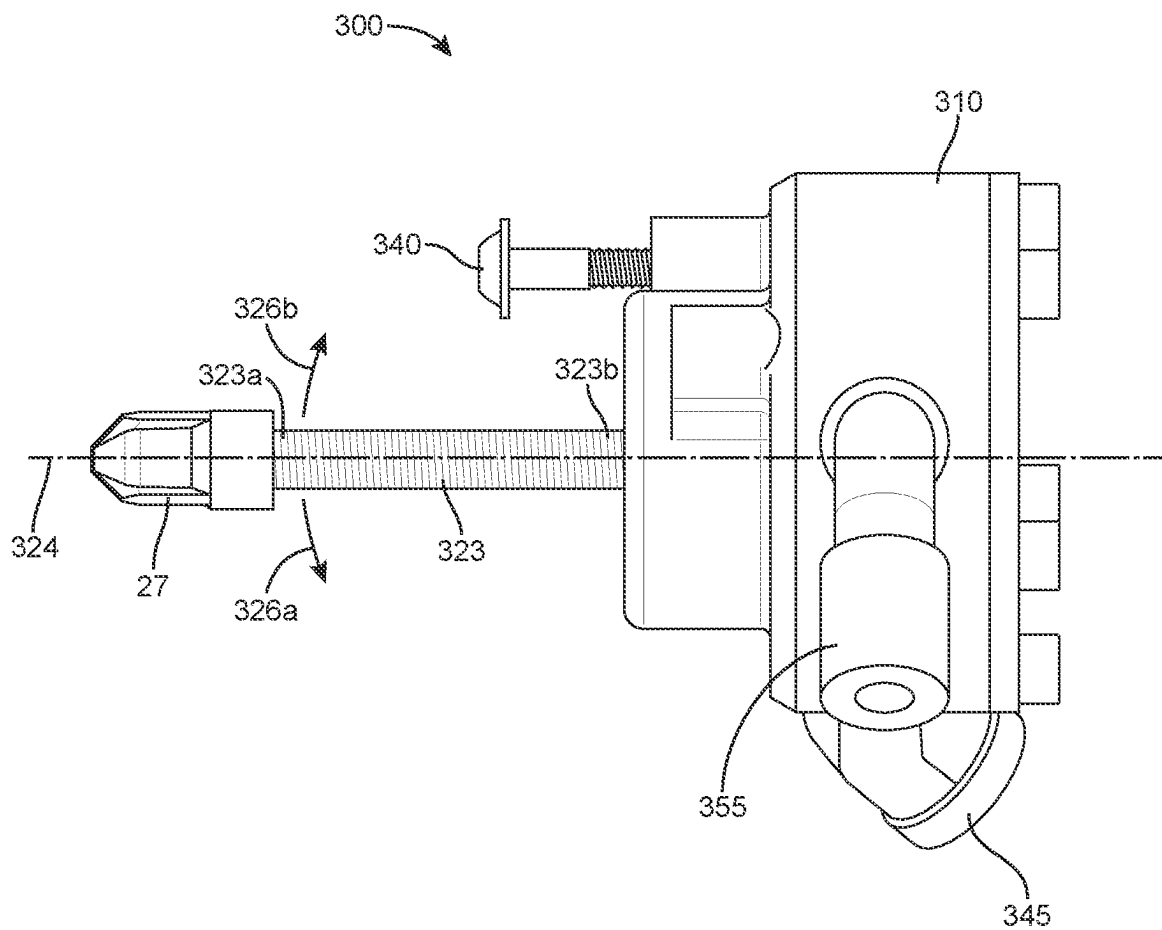


FIG. 3B

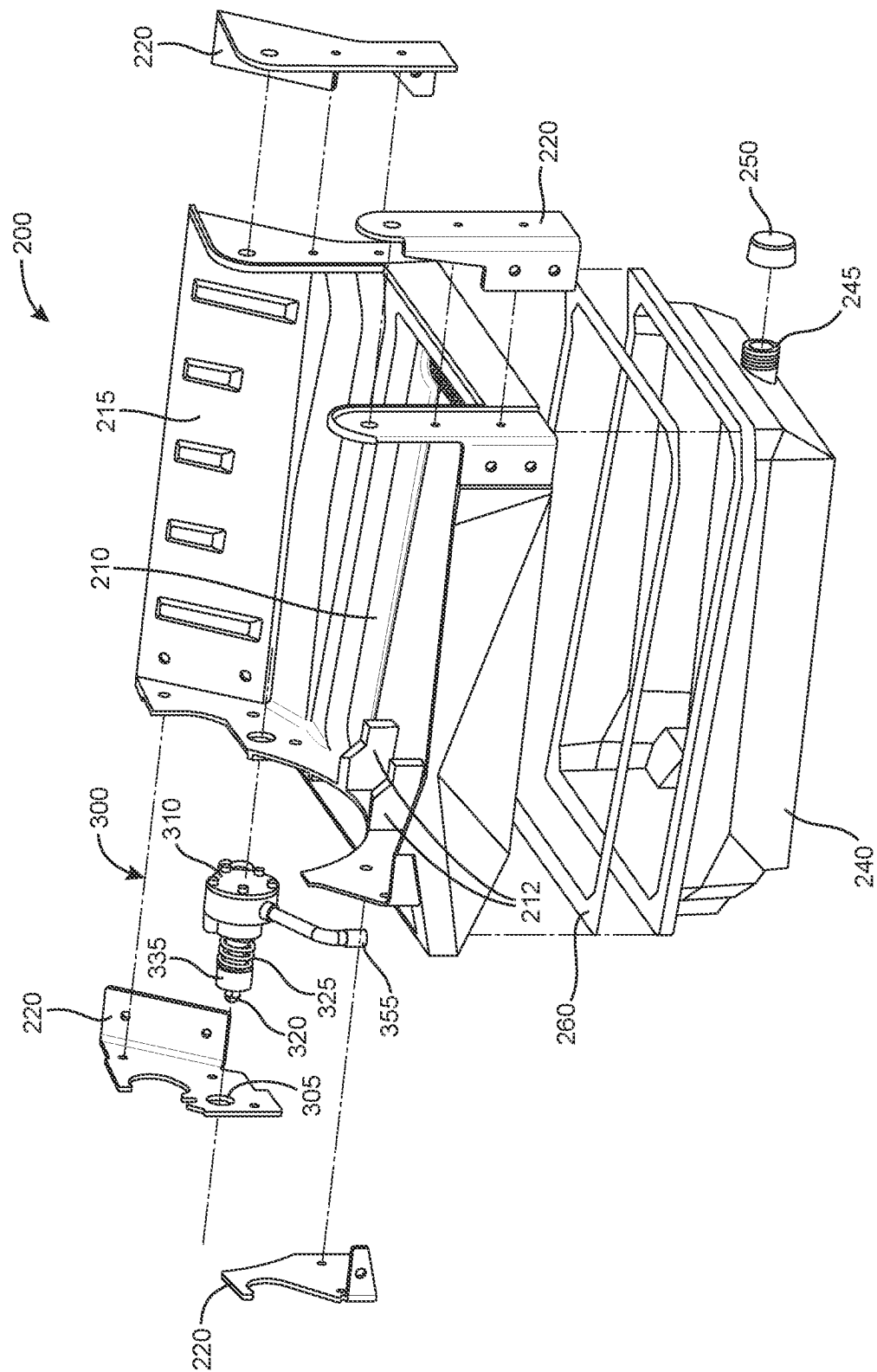
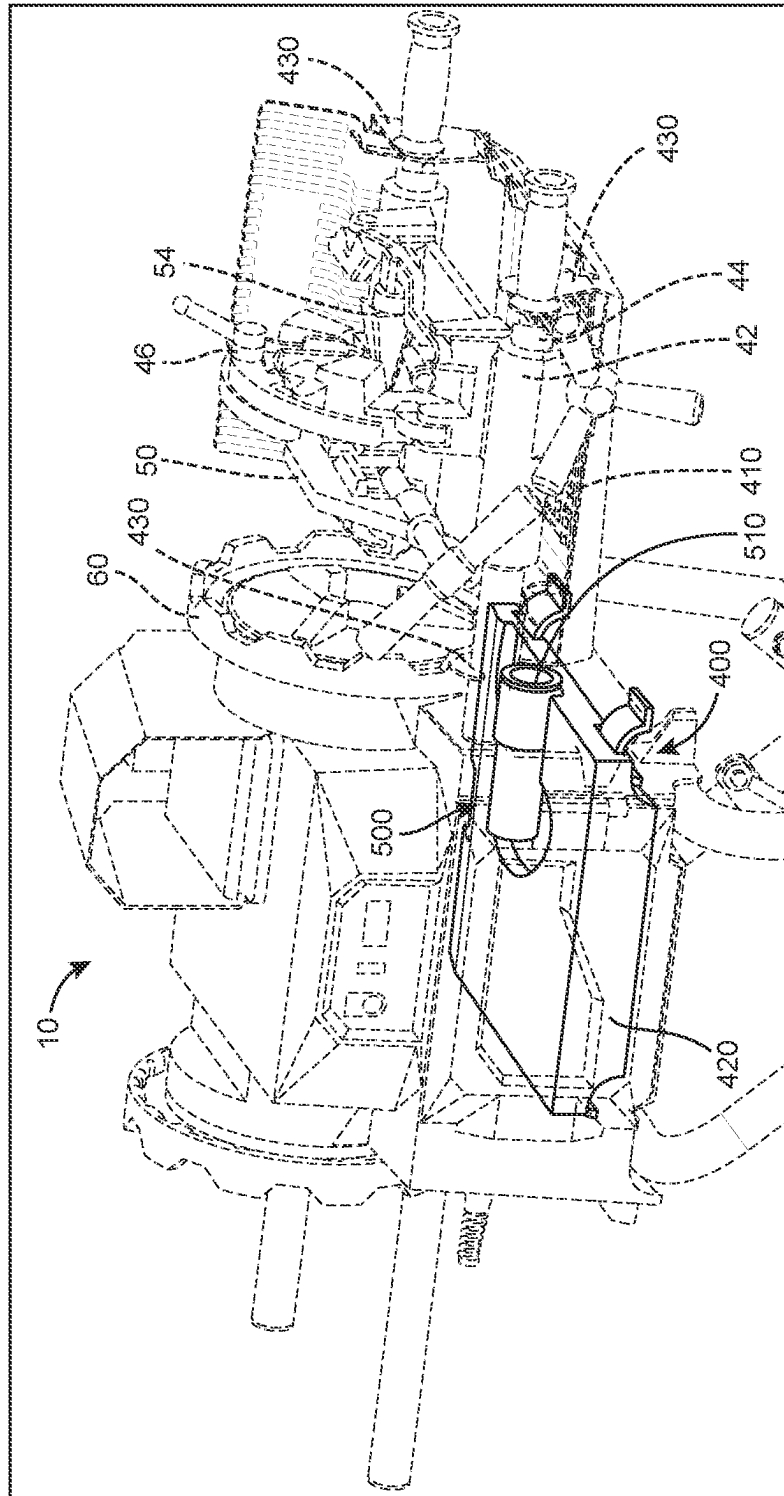


FIG. 4





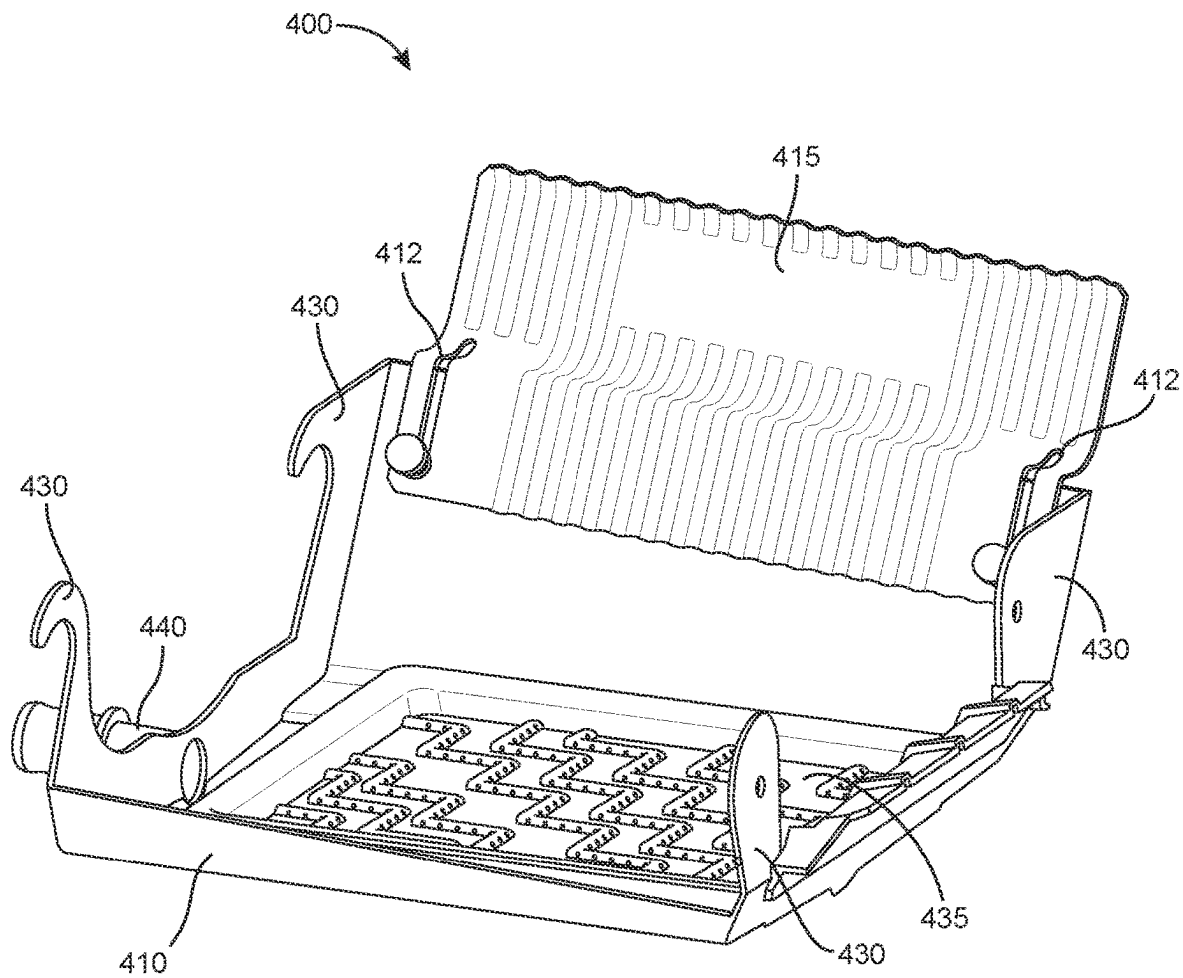


FIG. 6

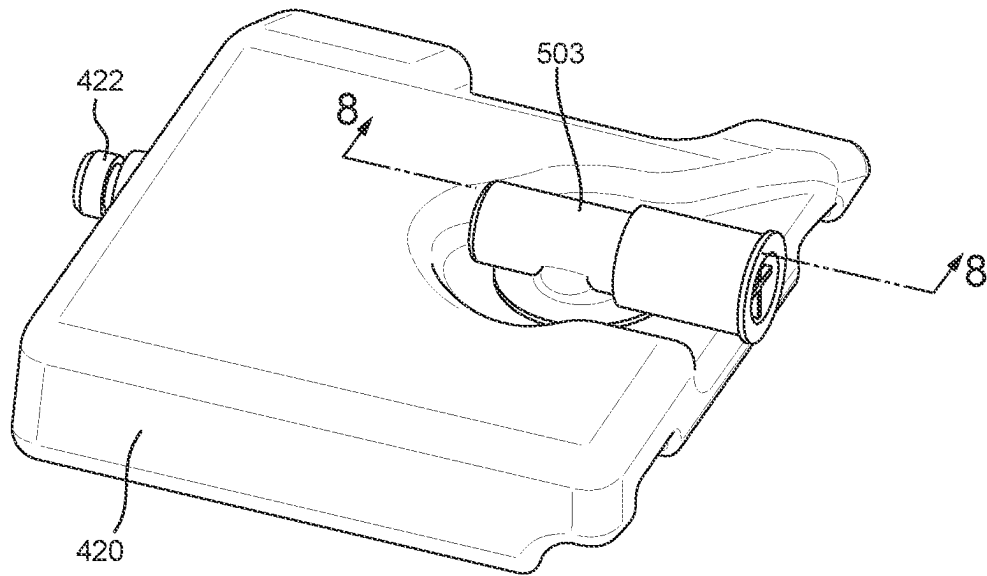


FIG. 7

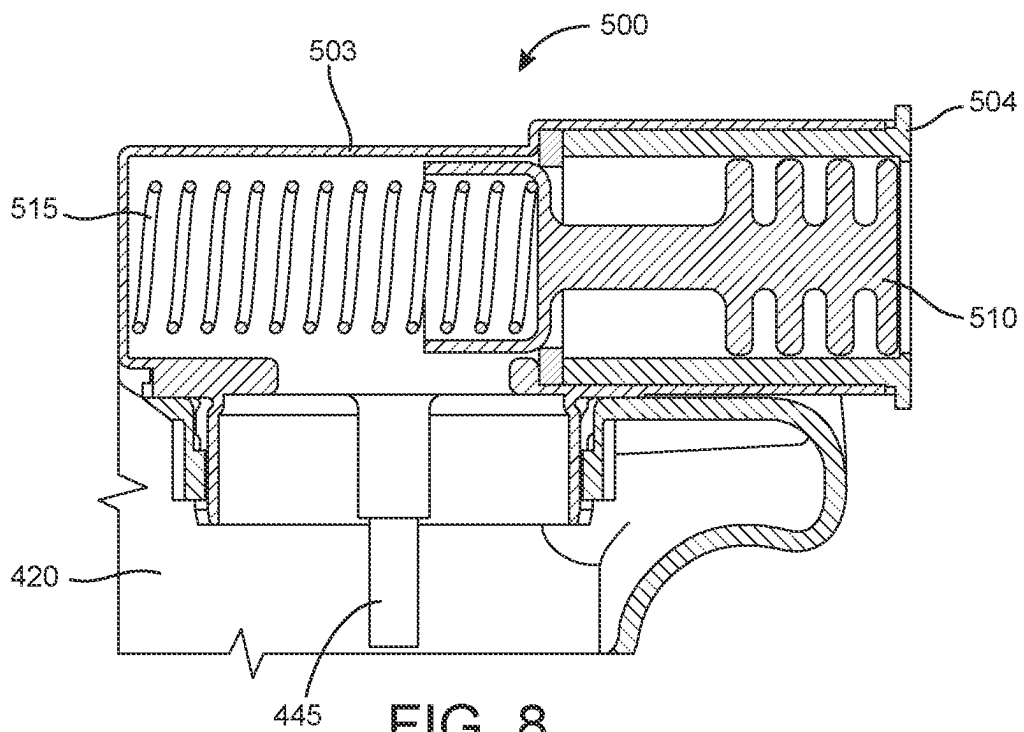
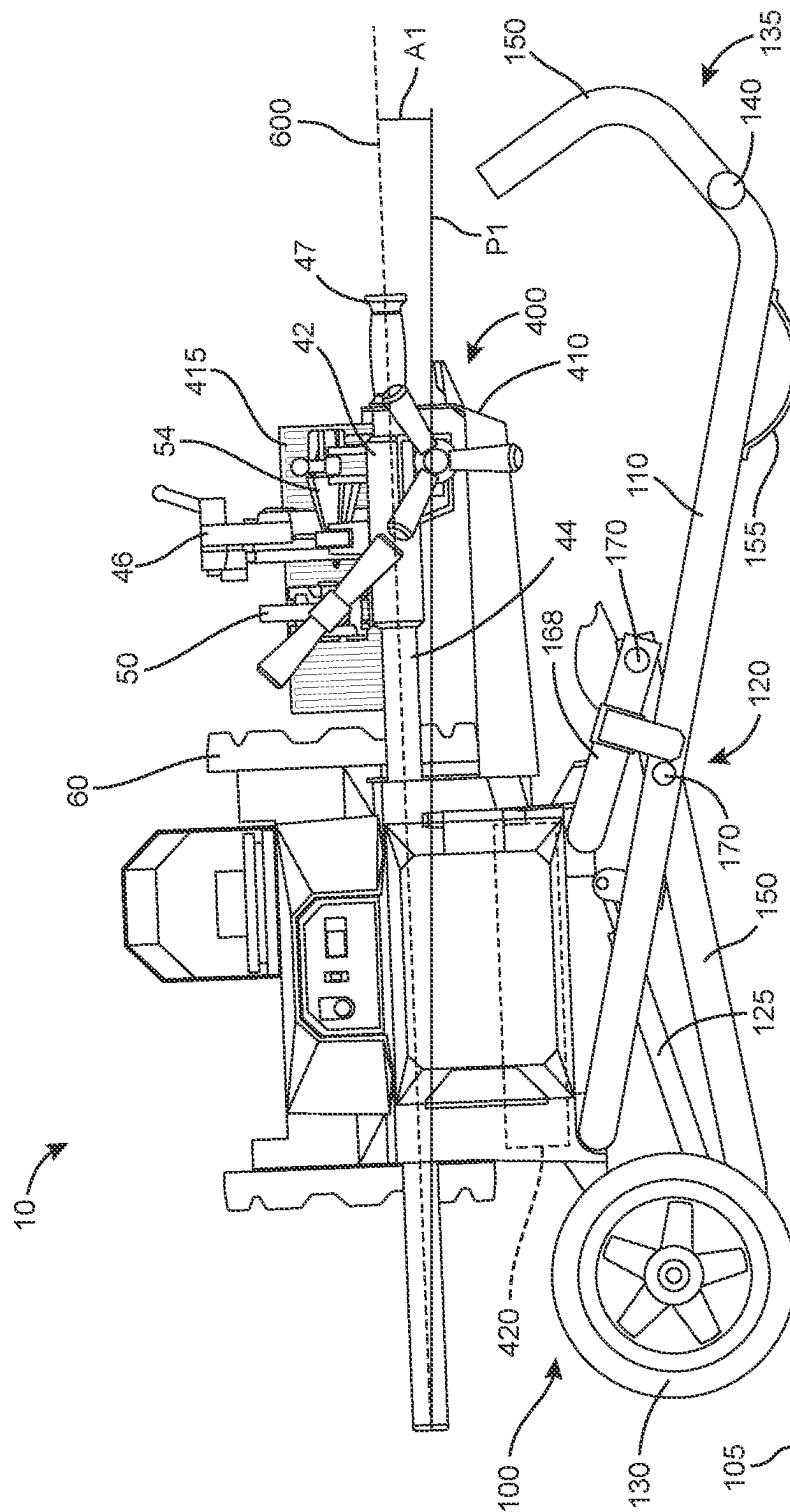


FIG. 8



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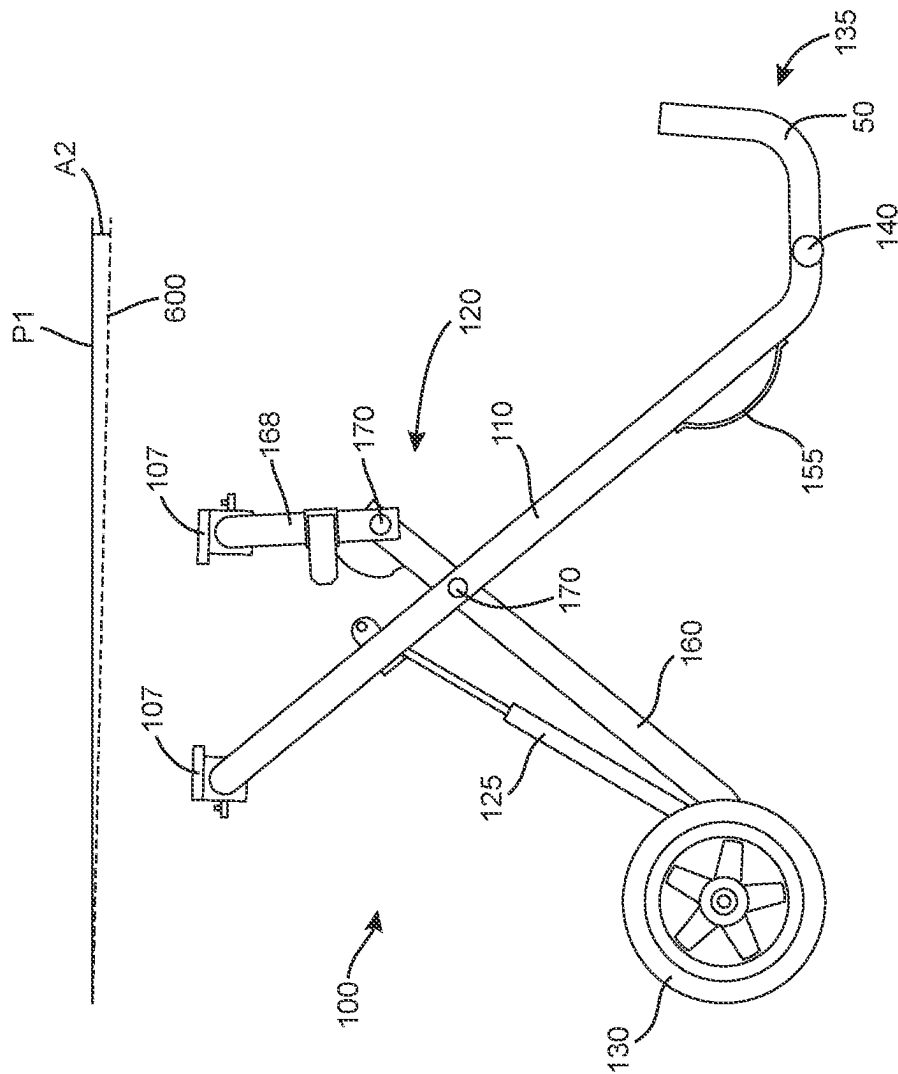


FIG. 10

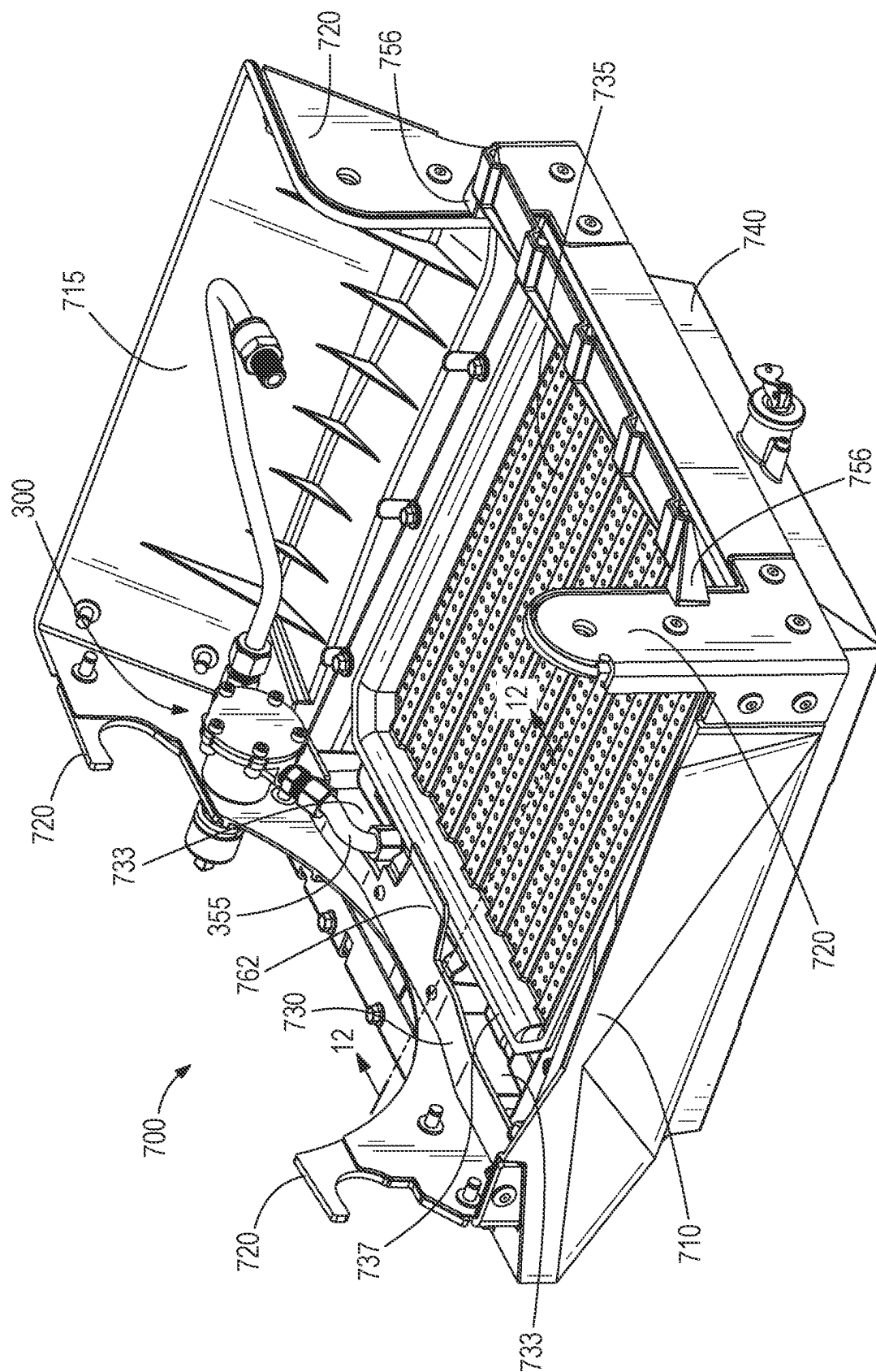
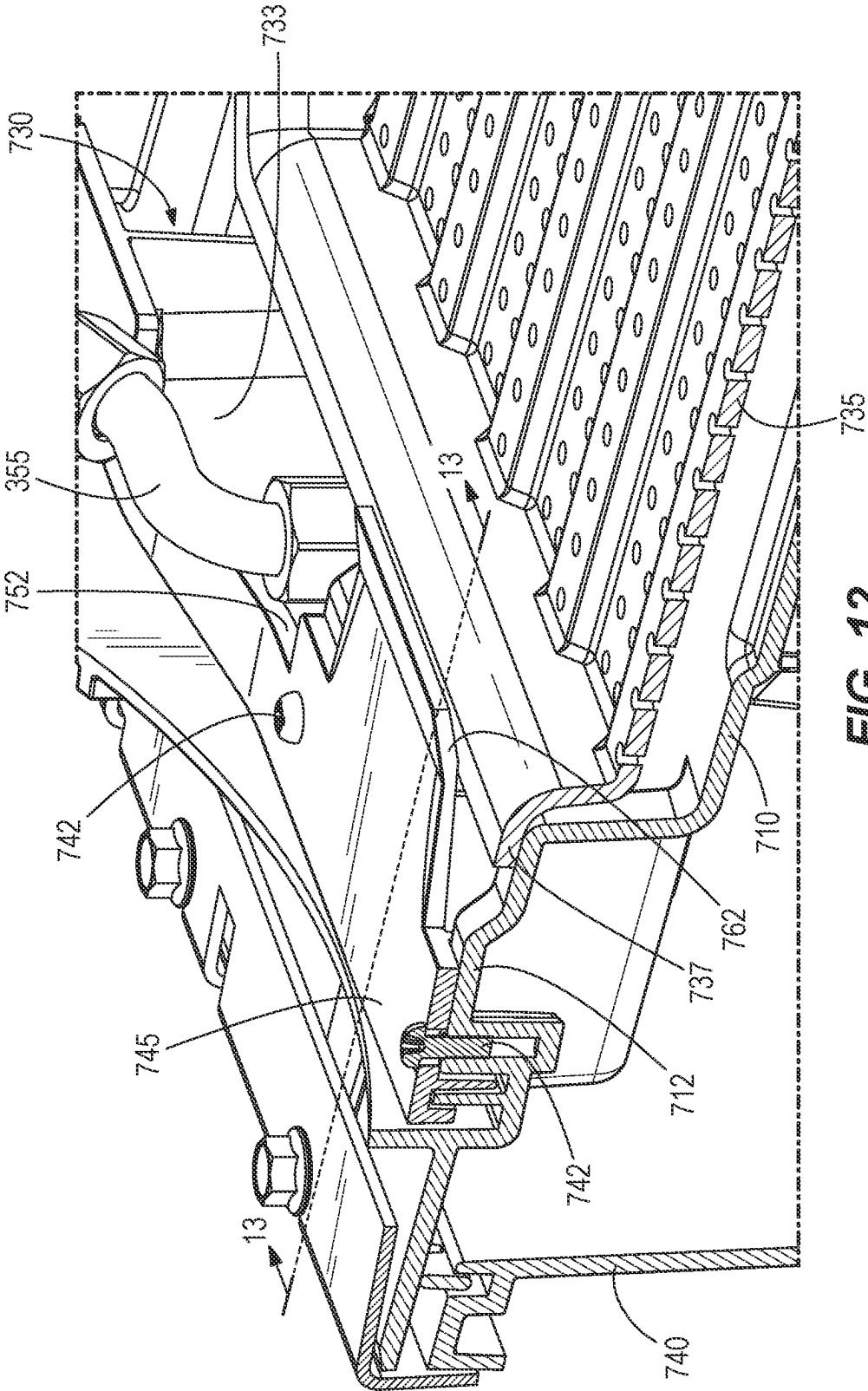


FIG. 11



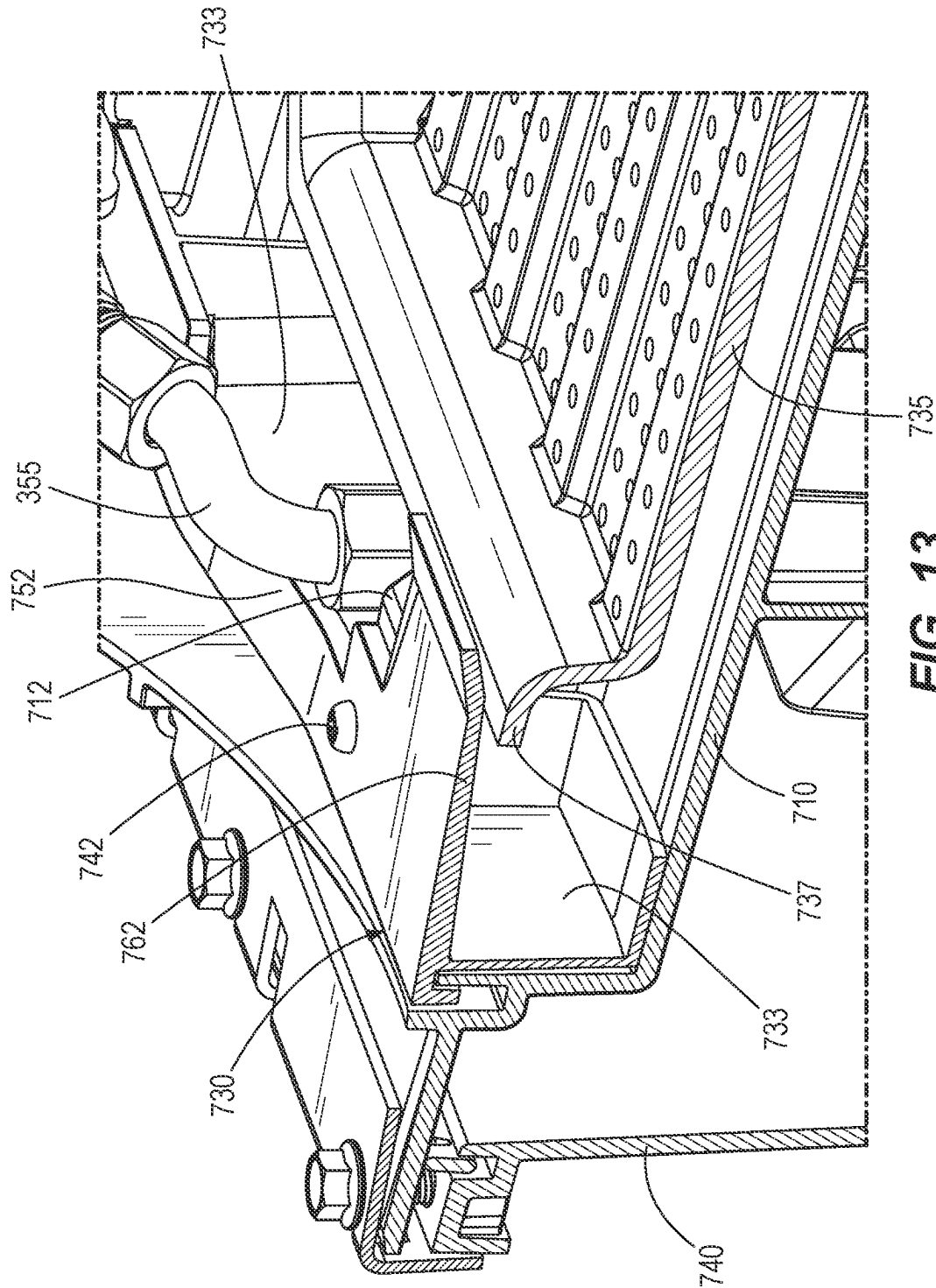
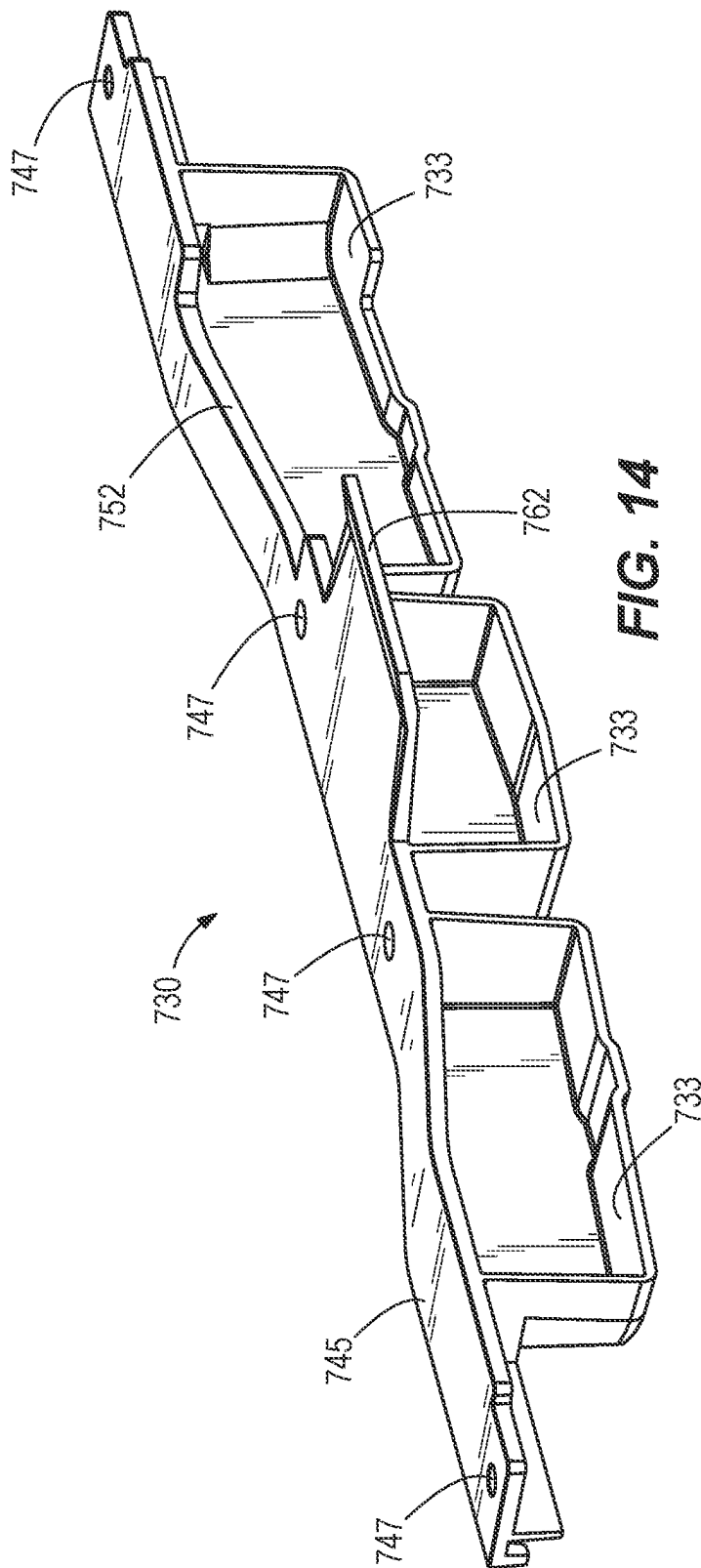
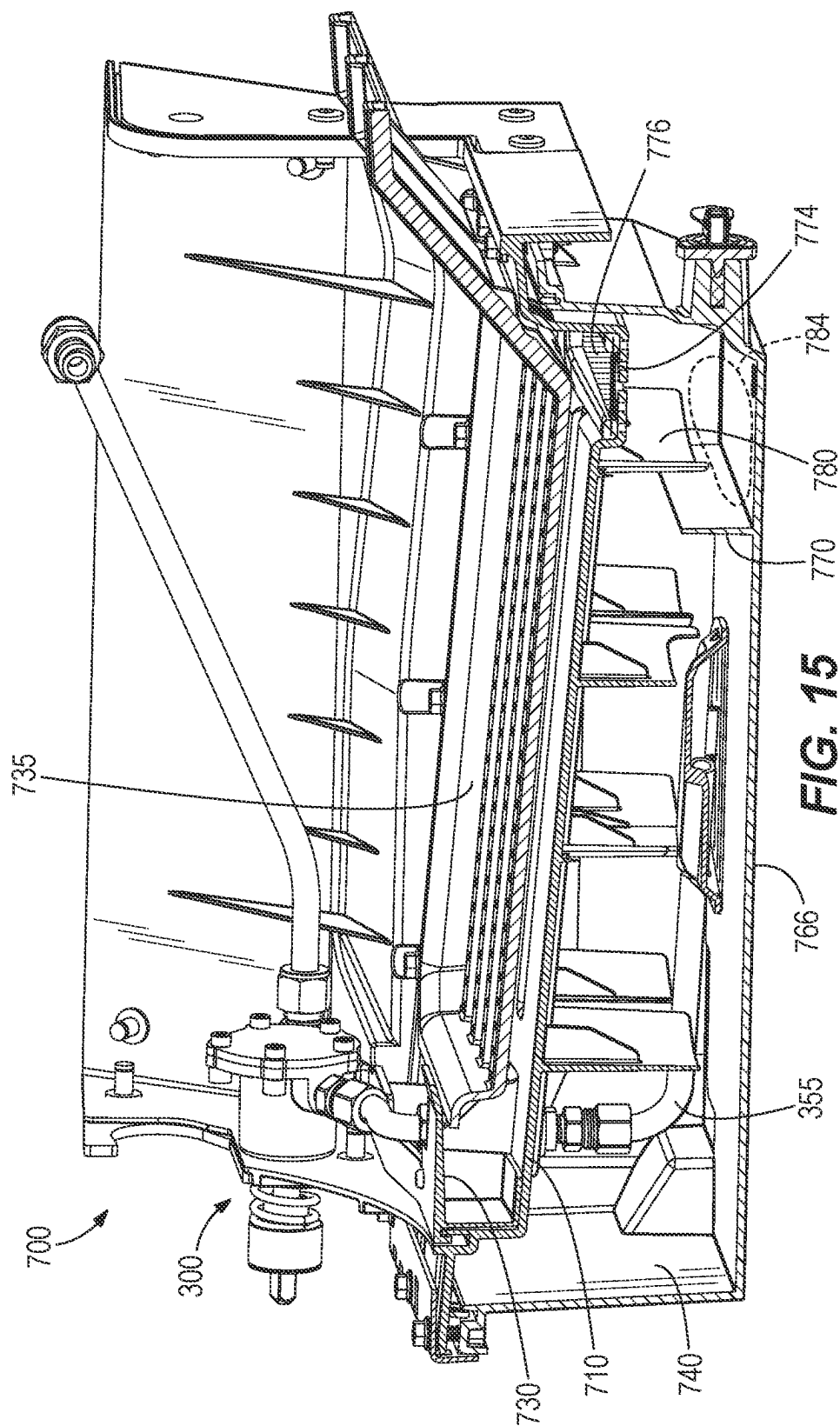


FIG. 13







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## LUBRICATION SYSTEM FOR PORTABLE PIPE THREADER

### CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of co-pending U.S. patent application Ser. No. 17/710,108 filed on Mar. 31, 2022, which claims priority to U.S. Provisional Patent Application No. 63/218,653 filed on Jul. 6, 2021, and U.S. Provisional Patent Application No. 63/168,741 filed on Mar. 31, 2021, the entire contents of all of which are incorporated herein by reference.

### FIELD OF THE INVENTION

The present invention relates to pipe threaders, and more particularly to lubrication systems for portable pipe threaders.

### BACKGROUND OF THE INVENTION

Portable pipe threaders include a stand and a carriage mounted to the stand having multiple pipe threading tools. These tools are usually a die holder including a die, a pipe cutter, and a pipe reamer. Typically, a motor transmits torque to a chuck. A pipe is clamped within the chuck and as the motor rotates the chuck, the pipe rotates with respect to the tools. The motor is an AC motor that receives power from a remote power source (e.g., via a power cord) and is usually controlled using a pedal, which upon actuation, triggers the motor to begin rotating the chuck and the pipe therein to cut the pipe, thread the pipe, etc. During threading operations, the thread-cutting dies, or other pipe threading tools, require lubrication to minimize friction and prevent excessive heat on the pipe and the tool. Some portable pipe threaders have an onboard lubrication system to lubricate the dies as the threads are being cut on the pipe, while others rely upon the operator to manually lubricate the dies with a hand-operated pump.

### SUMMARY OF THE INVENTION

The present invention provides, in one aspect, a portable pipe threader including a housing, a carriage supported by the housing, and at least one pipe threading tool coupled to the carriage and selectively operable to perform work on a pipe. A drive assembly of the portable pipe threader is at least partially positioned within the housing, the drive assembly including an electric motor operable to provide torque to the pipe. A lubrication system of the pipe threader is removably coupled to the housing, the lubrication system including a reservoir for holding a lubricant and a pump powered by the drive assembly. A stand of the portable pipe threader is adjustable between a collapsed state and a deployed state. In the collapsed state, a longitudinal axis of the housing is maintained at a first oblique angle relative to a horizontal reference plane parallel with a work surface upon which the stand is supported to funnel lubricant toward the reservoir. In the deployed state, the longitudinal axis of the housing is maintained at a second oblique angle relative to the horizontal reference plane parallel with the work surface upon which the stand is supported to funnel lubricant away from an end of the pipe on which a working operation is performed.

The present invention provides, in another aspect, a portable pipe threader including a housing, a carriage sup-

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ported by the housing, and at least one pipe threading tool coupled to the carriage and selectively operable to perform work on a pipe. A drive assembly is at least partially positioned within the housing, the drive assembly including an electric motor operable to provide torque to the pipe. A lubrication system includes a catch basin provided on one side of the housing, a reservoir for holding a lubricant, a debris shield positioned to shield the reservoir from debris, a drip catch having one or more pockets that open toward the debris shield, and a pump powered by the drive assembly to establish a flow of lubricant from the reservoir. A stand is adjustable between a collapsed state and a deployed state. With the stand in the collapsed state, the portable pipe threader can be put in a vertically stowed configuration in which a longitudinal axis of the housing is substantially vertical with respect to a floor or ground surface. In the vertically stowed configuration, the debris shield is oriented substantially vertically above the drip catch so that the drip catch pockets can catch and retain lubricant dripped from a proximal edge of the debris shield.

The present invention provides, in yet another aspect, a portable pipe threader including a housing, a carriage supported by the housing, and at least one pipe threading tool coupled to the carriage and selectively operable to perform work on a pipe. A drive assembly is at least partially positioned within the housing, the drive assembly including an electric motor operable to provide torque to the pipe. A lubrication system includes a catch basin provided on one side of the housing, a reservoir for holding a lubricant, a return port provided in the catch basin for passing lubricant into the reservoir, and a pump powered by the drive assembly to establish a flow of lubricant from the reservoir. A first baffle wall extends upwardly from a bottom wall of the reservoir, and a downwardly-depending second baffle wall extends from a bottom side of the catch basin at a position between the first baffle wall and the return port. The first and second baffle walls overlap vertically such that lubricant passing from the return port to an intake of the pump must pass below the second baffle wall and change directions, vertically upward along the first baffle wall in order to pass the first baffle wall, thereby forming a particle collection zone at the bottom of the first baffle wall.

Other features and aspects of the invention will become apparent by consideration of the following detailed description and accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a portable pipe threader in accordance with an embodiment of the invention.

FIG. 2 is a perspective view of an embodiment of a lubrication system for use with the portable pipe threader of FIG. 1.

FIG. 3A is a cross-sectional view of a pump assembly for use with the lubrication system of FIG. 2.

FIG. 3B is a side view of a pump assembly for use with the lubrication system of FIG. 2 in accordance with another embodiment of the invention.

FIG. 4 is an exploded view of the lubrication system of FIG. 2.

FIG. 5 is a perspective, partial cutaway view of another embodiment of a lubrication system for use with the portable pipe threader of FIG. 1.

FIG. 6 is a perspective view of a portion of the lubrication system of FIG. 5.

FIG. 7 is a perspective view of a portion of the lubrication system of FIG. 5.

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FIG. 8 is a cross-sectional view of a sealing mechanism for use with the lubrication system of FIGS. 5-7.

FIG. 9 is a side view of the portable pipe threader of FIG. 1 with a stand in a collapsed state.

FIG. 10 is a side view of the stand of FIG. 9 in a deployed state.

FIG. 11 is a perspective view of a lubrication system in accordance with another embodiment of the invention.

FIG. 12 is a cross-section of a portion of the lubrication system taken along line 12-12 of FIG. 11.

FIG. 13 is a cross-section of a portion of the lubrication system taken along line 13-13 of FIG. 12.

FIG. 14 is a perspective view of a drip catch of the lubrication system of FIGS. 11-13.

FIG. 15 is a cross-section of the lubrication system taken along line 13-13 of

FIG. 12.

Before any embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

#### DETAILED DESCRIPTION

With reference to FIG. 1, a portable pipe threader 10 includes a stand 100 and a main housing 51 supported on the stand 100, and a carriage 42 supported on the main housing 51 having a plurality of pipe threading tools 46, 50, 54 supported by the carriage 42. The pipe further includes a drive assembly 18 housed within the main housing 51 and mounted to the stand 100 having a motor 22 (e.g., a brushless direct current electric motor), a gear box 26 coupled to the motor 22 having an output gear (not shown), an electronic speed selection switch, such as a pedal 30, that selectively controls the drive assembly 18, and a plurality of guide rails 45 configured to support the carriage 42. The drive assembly 18 is powered by a battery pack 38 supported by the stand 100 in selective electrical communication with the motor 22 to provide electrical power to the motor 22. In some constructions, the battery pack 38 and the motor 22 can be configured as an 18 Volt high power battery pack and motor, such as the 18 Volt high power system disclosed in U.S. patent application Ser. No. 16/045,513 filed on Jul. 25, 2018 (now U.S. Patent Application Publication No. 2019/0044110), the entirety of which is incorporated herein by reference. In other constructions, the battery pack 38 and the motor 22 can be configured as an 80 Volt high power battery pack and motor, such as the 80 Volt battery pack and motor disclosed in U.S. patent application Ser. No. 16/025,491 filed on Jul. 2, 2018 (now U.S. Patent Application Publication No. 2019/0006980), the entirety of which is incorporated herein by reference. In such a battery pack 38, the battery cells within the battery pack 38 have a nominal voltage of up to about 80 V. Further, in another embodiment, the battery cells within the battery pack 38 have a nominal voltage of up to about 120 V. In some embodiments, the battery pack 38 has a weight of up to about 6 lb. In some embodiments, each of the battery cells has a diameter of up to 21 mm and a length of up to about 71 mm. In some

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embodiments, the battery pack 38 includes up to twenty battery cells. In other embodiments, the battery pack 38 includes up to thirty battery cells, up to forty battery cells, up to forty-five battery cells, or greater. In some embodiments, the battery cells are disposed in a single pack. In other embodiments, the battery cells are disposed in multiple packs, i.e., two packs, three packs, four packs, etc. In some embodiments, the battery cells are connected in series. In some embodiments, the battery cells are operable to output a sustained operating discharge current of between about 20 A and about 140 A, for example, about 40 A and about 60 A. In some embodiments, each of the battery cells has a capacity of between about 1.7 Ah and about 15.0 Ah. And, in some embodiments of the motor 22 when used with the 80 Volt battery pack 38, the motor 22 has a power output of at least about 2760 W and a nominal outer diameter (measured at the stator) of up to about 80 mm, up to about 100 mm, up to about 120 mm, up to about 140 mm, or greater.

With reference to FIG. 1, the drive assembly 18 further includes a drive element 34 (e.g., a drive tube) coupled to the gear box 26 and powered by the motor 22. The motor 22 is configured to supply torque to the output gear of the gear box 26 and rotatably drive the drive element 34 to rotate a pipe (not shown) or a selected one of the plurality of pipe threading tools. The pedal 30 is operable to activate the motor 22 and control a relative speed at which the pipe rotates. In other embodiments, the relative speed at which the pipe rotates can be selected using an electronic speed selection switch other than the pedal 30 (e.g., dial, keypad, button, etc.; not shown).

With continued reference to FIG. 1, the portable pipe threader 10 further includes a spindle 60 in which the pipe is clamped. The drive element 34 interconnects the spindle 60 and the output gear of the gear box 26. Thus, torque from the motor 22 is transferred to the spindle 60, causing it and the pipe to rotate, via the gear box 26 and the drive element 34. With reference to FIG. 1, the plurality of pipe threading tools 46, 50, 54 includes a die holder 46 having a plurality of dies (not shown) to cut threads on the pipe, a pipe cutter 50 to trim excess pipe, and a pipe reamer 54 to deburr, or otherwise smooth, an inner edge of a cut end of a pipe. The plurality of pipe threading tools 46, 50, 54 remain stationary on the carriage 42 while the pipe is rotated by the spindle 60. The portable pipe threader 10 also includes a lubrication system 200 (FIG. 2) configured to provide lubricant to the pipe during a threading operation using the die holder 46 and a particular die (not shown) installed therein.

With continued reference to FIG. 1, the stand 100 includes an upright portion 168 configured to support the threader 10 and a stand locking mechanism 120 for selectively locking the stand 100 in a deployed state (FIG. 1) and a collapsed state (FIG. 9). The stand 100 further includes a plurality of first and second support legs 110, 160 pivotably coupled via rotatable joints 170 (e.g., bolts, screws, etc.), an axle 165 pivotably coupled to the second support legs 160 having a plurality of wheels 130, a plurality of list-assist springs 125 for aiding the stand 100 from moving from the collapsed state to the deployed state, and a handle assembly 135 integrated with the first support legs 110 having foot portions 140 to support the threader 10 in the deployed state where the threader 10 is elevated from a work surface 105 during use. The handle assembly 135 further includes grip portions 150 for the user to grasp the stand 100 during transport of the threader 10 and loading skis 155 coupled to the first support

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legs 110 for allowing the stand 100 to travel more easily over difficult surfaces when it is being transported (e.g., being pulled up stairs).

FIG. 2 illustrates the lubrication system 200 for use with the threader 10. The lubrication system 200 is removably couple to, or engaged with, the housing 51 of the threader 10. As shown, the system 200 includes a catch basin 210 having a shroud 215 for collecting the lubricant that is sprayed from the pipe as it is undergoing work from one of the pipe threading tools 46, 50, 54, a plurality of brackets 220 for selectively mounting the system 200 to the guide rails 44, and a debris shield 235 (FIG. 1) for allowing lubricant to pass into the basin 210 while preventing larger debris (i.e., metal chips) from passing through. As shown in FIG. 4, the catch basin 210 includes one or more raised ledges 212 for supporting a first edge of the debris shield 235. The raised ledges 212 are provided on a first or proximal end of the catch basin 210 that is positioned adjacent the housing 51 and the drive assembly 18. An opposite end of the catch basin 210 includes one or more lubricant openings to pass lubricant into a reservoir 240 positioned underneath the basin 210 for collecting lubricant. The lubrication system 200 further includes a pump assembly 300 mounted to the basin 210 via a mounting aperture 305 in one of the brackets 220 (FIG. 4), a drain 245 having a drain cap 250 positioned at lower portion of the reservoir 240, and a seal 260 positioned between the basin 210 and the reservoir 240 to seal the basin 210 and the reservoir 240 to prevent leakage. During use of the system 200, the basin 210 is configured to be slightly inclined downward along the guide rails 44 and away from the main housing 51 in order to direct the lubricant away from the pipe and into the reservoir 240.

With reference to FIGS. 2-4, the pump assembly 300 includes a pump housing 310, a pump drive shaft 320 extending from the housing 310, a positioning spring 325 surrounding the drive shaft 320 for guiding the alignment of the shaft 320, a plurality of bearings 330 for supporting the drive shaft 320, and a plurality of bearing cups 335 for housing each of the respective bearings 330. The pump assembly 300 further includes a lip seal 350 positioned between the drive shaft 320 and the housing 310 for sealing the drive shaft 320 with respect to the pump housing 310, a pump intake 355 for drawing lubricant from the reservoir 240, a pump outlet 345 (FIG. 2) for fluidly coupling a hand-held oiling system or an onboard oiling system integrated with the pipe threader 10, and a fastener 340 for limiting the travel freedom of the housing 310 to the basin 210 (via the bracket 220).

When the lubrication system 200 is mounted to the guide rails 44, the positioning spring 325 is configured to facilitate the alignment of the pump drive shaft 320 with a gearbox output 27 for rotatably driving the pump 315. The gearbox output 27 is configured to be selectively rotatably driven by the gearbox 26 in order to let the user cycle between powering just the pump assembly 300, just the threader 10, or both the pump assembly 300 and the threader 10 simultaneously. To further aid in the alignment of the drive shaft 320 with the gearbox output 27, the positioning spring 325 allows the assembly 300 to rotate in any direction within the mounting aperture 305. Furthermore, sufficient clearance exists (e.g., 2 mm) between the mounting aperture 305 and the bearing cup 335 to permit the pump housing 310 to translate in one or more directions relative to the bracket 220 to easily pilot the drive shaft 320 into the gearbox output 27.

FIG. 3B illustrates a flexible guide shaft 323 that can replace the rigid drive shaft 320 in some embodiments of the

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pump assembly 300. The flexible drive shaft 323 is configured to ensure proper alignment with the gearbox output 27 when the system 300 is mounted to the guide rails 44. Additionally, the flexible drive shaft 323 can reduce the stresses that could be transmitted from the shaft 323 to the pump assembly 300 due to poor alignment with the gearbox output 27. The flexible drive shaft 323 is formed from a wire wound into a helix and this configuration allows the flexible drive shaft 323 to be bendable in all directions, as indicated by arrows 326a, 326b relative to a center axis 324 of the flexible drive shaft 323 in its relaxed, straight configuration. For example, the free end 323a of the flexible drive shaft 323 is bendable up to and including ninety degrees (90°) relative to the fixed end 323b of the flexible drive shaft 323 in any direction from the center axis 324.

With continued reference to FIGS. 2-4, the lubrication system 200 is configured to be completely modular, meaning that the entire system 200 is selectively mountable to the guide rails 44 such that when the system 200 is removed, the system 200 becomes a closed system, effectively sealing off both the pump assembly 300 and the gearbox output 27, thereby preventing any oil leak paths from the system 200 or to the gear box 26. Since the system 200 is removable, this gives the user the option to remove the system 200 when the application of lubricant to the pipe is unnecessary. Also, this allows the user to selectively reduce the weight of the threader 10 during transport or when the user is adjusting the threader 10 between the collapsed and deployed states. Additionally, the lubrication system 200 is only operable while the system 200 is mounted to the threader 10 and the drive shaft 320 receives torque from the gearbox output 27, which reduces unnecessary wear on the pump 315 and the gearbox 26.

FIGS. 5-8 illustrate a lubrication system 400 for use with another embodiment of the threader 10. The lubrication system 400 is configured as an integrated system being partially housed within the housing 51 of the threader 10. The system 400 includes a basin 410 having a plurality of mounting brackets 430 for mounting the basin 410 to the guide rails 44, a shroud portion 415 movable relative to the basin 410 along guide grooves 412 for collecting the lubricant that is sprayed from the pipe as it is undergoing work from one of the pipe threading tools 46, 50, 54, and a debris shield 435 (FIG. 6) for collecting larger debris (i.e., metal chips) and preventing such debris from flowing into a drain 440 located at a lower portion of the basin 410.

The lubrication system 400 further includes a valve assembly 500 for fluidly coupling the drain 440 to a reservoir 420 housed within the housing 51 of the threader 10. The valve assembly 500 is also configured to seal the reservoir 420 when the reservoir 420 is removed, or otherwise disengaged, from the basin 410 and removed from the threader 10. The valve assembly 500 includes a housing 503, a valve 510 located within the housing 503, a compression spring 515 for biasing the valve 510 toward a seat defining an inlet 504 to the reservoir 420, and a tube 445 extending into the reservoir 420 for depositing the lubricant flowing from the basin 410 into the reservoir 420. To couple the basin 410 to the reservoir 420, the user mounts the basin 410 onto the guide rails 44 and inserts the drain 440 into the inlet 504, which biases the valve 510 rearward against the bias of the spring 515, thereby allowing lubricant to flow freely between the basin 410 and the reservoir 420. If the user wishes to empty the reservoir 420, the reservoir 420 has an end cap 422 that can be removed to drain the lubricant.

FIG. 9 illustrates an embodiment of the threader 10 using the integrated lubrication system 400 in the collapsed state

where the stand **100** and threader **10** are oriented adjacent the work surface **105**. In this state, the threader **10** is supported on the stand **100** via a plurality of brackets **107** (FIG. **10**) located on the upright **168** configured to incline the main housing **51** slightly rearward along a spindle axis **600** at a first oblique angle **A1** with respect to a reference plane **P1**, with the pipe threading tools **46**, **50**, **54** being at a higher elevation than the spindle **60**, to promote drainage of the lubricant from the basin **410** into the reservoir **420**. In some embodiments, the first oblique angle **A1** is between, and including one to two degrees ( $1^{\circ}$ - $2^{\circ}$ ) above a horizontal line. Alternatively, in the deployed state (FIG. **10**), the main housing **51** is angled slightly forward along the spindle axis **600** at a second angle **A2** with respect to the reference plane **P1**, with the pipe threading tools **46**, **50**, **54** being at a lower elevation than the spindle **60**, to permit lubricant to flow away from the pipe as work is being performed—also preventing lubricant from collecting in and/or flowing through the pipe. In some embodiments, the second oblique angle **A2** is between, and including, one to two degrees ( $1^{\circ}$ - $2^{\circ}$ ) below the horizontal reference plane **P1**. Although the stand **100** providing the first and second angles **A1**, **A2** is illustrated with the integrated lubrication system **400**, it may also be incorporated with other lubrication systems disclosed herein, and variations thereof.

FIGS. **11-15** illustrate another lubrication system **700** that is similar in most respects to the lubrication system **200** of FIGS. **1**, **2** and **4** in that it includes a catch basin **710** positioned directly over a lubricant reservoir **740**. The catch basin **710** includes a shroud **715** and a plurality of mounting brackets **720**. As with the lubrication system **200**, the reservoir **740** is positioned outside of the housing **51** of the threader **10**. A debris shield **735** is situated within the catch basin **710** and provided with small lubricant apertures such that the debris shield **735** passes lubricant from its upper side to its lower side and into the reservoir **740** while blocking or catching debris at the upper side to prevent its passage into the reservoir **740**. The lubrication system **700** further includes a drip catch **730** mounted in the catch basin **710** at the proximal end (i.e., the end extending along the housing **51**) of the catch basin **710**. As shown in FIG. **14**, the drip catch **730** includes one or more pockets or cups **733** that open toward the debris shield **735** and toward a center of the catch basin **710**. In other words, the drip catch pockets **733** are open in a horizontal direction when the pipe threader **10** is in either of the positions of FIGS. **1** and **9**.

When the stand **100** is collapsed, the threader **10** can be stowed in a horizontal stowed position as shown in FIG. **9**, or alternately a vertically stowed position in which the grip portions **150** are positioned vertically above the wheels **130** (i.e., the threader **10** rotated counter-clockwise approximately **90** degrees from the orientation of FIG. **9**). The vertically stowed position can enable the user to prop the threader **10** up against a wall, for example. In the vertically stowed position, ends of the guide rails **44** may be in contact with the ground, while the handle assembly **135** with its grip portions **150** is vertically above. Thus, the debris shield **735** is also oriented substantially vertically, as opposed to its substantially horizontal operational position. In the vertically stowed position, following use of the threader **10** involving lubricant supply, remnant lubricant will flow along the debris shield **735** toward the proximal edge **737** of the debris shield **735**. The drip catch **730** is oriented such that the pockets **733** are open vertically upward in the vertically stowed position, and directly below the proximal edge **737**. As such, lubricant can drip from the debris shield **735** into the pockets **733** of the drip catch **730**. As long as

the threader **10** remains in the vertically stowed position, the lubricant can be retained in the pockets **733** and prevented from spilling out of the catch basin **710**. In the illustrated embodiment, there are three pockets **733** in the drip catch **730**, and the three pockets **733** are arranged in a row along the proximal end of the catch basin **710**. The central pocket **733** is situated between the ledges **712** of the catch basin **710** that support the debris shield's proximal edge **737**. The two outboard pockets **733** extend outward from the respective ledges **712** to cover the remainder of the proximal edge **737** of the debris shield **735**. Thus, with the exception of the area occupied by the ledges **712**, the drip catch **730** covers the entire length of the proximal edge **737** for catching and retaining lubricant dripped from the debris shield **735**.

As shown in FIGS. **12** and **13**, the drip catch **730** is coupled to the catch basin **710** with a plurality of fasteners **742** through a flange or mounting portion **745** of the drip catch **730**. As such, the mounting portion **745** includes a corresponding plurality of fastener holes **747** as shown in FIG. **14**. In the illustrated embodiment, there are four fasteners **742**—two of which are provided in a central or inboard portion of the drip catch **730** to engage with (e.g., thread into) the ledges **712**. As shown in FIG. **12**, each ledge **712** can have multiple adjacent steps or lands for supporting the debris shield **735** and the drip catch **730**. FIGS. **12** and **13** also illustrate a reduced-width portion or cutout **752** along the mounting portion **745** to accommodate the pump intake **355**. In the normal use orientation, the debris shield **735** is held in the catch basin **710** by gravity, although horizontal positioning can be set by one or more registration tabs **756** of the debris shield **735** that engage the outside of the bracket(s) **720** at the distal side, opposite the proximal edge **737**. In order to maintain the operational position of the debris shield **735** in the catch basin **710** in a vertically stowed position, the drip catch **730** further includes a retainer tab **762**.

The retainer tab **762** can be formed in a central part of the mounting portion **745**, as an extension projecting transverse to a primary elongation direction of the drip catch **730**. The retainer tab **762** can extend over the proximal edge **737** of the debris shield **735** such that the proximal edge **737** is sandwiched (with or without direct contact) between the one or more ledges **712** of the catch basin **710** and the retainer tab **762**. A small clearance (e.g., 3 mm or less) may be provided between the retainer tab **762** and the debris shield **735** to block the proximal edge **737** of the debris shield **735** from substantial movement away from the catch basin **710**. In other constructions, the retainer tab **762** can be elastically deflected by contact with the proximal edge **737** in the normal assembly condition. In any case, the retainer tab **762**, which may be the only retainer tab or one of a plurality, prevents the accidental disassembly of the debris shield **735** from the catch basin **710**. The retainer tab **762** also ensures that the proximal edge **737** remains in a position to drip lubricant directly into the pockets **733** in a vertically stowed position of the threader **10**.

In the lubricant reservoir volume below the catch basin **710** and above a bottom wall **766** of the reservoir **740**, the lubrication system **700** includes one or more structures configured to change the lubricant flow direction and velocity in order to inhibit the passage of solid particles (e.g., dirt, metal, etc.) toward the pump intake **355**. In particular, FIG. **15** illustrates that the reservoir **740** includes a baffle wall **770** extending up from the bottom wall **766**. The baffle wall **770** can be integrally formed with the bottom wall **766** or separate and affixed thereto. The baffle wall **770** can extend across the entire reservoir **740**, between two opposite side-

walls so that lubricant returning to the reservoir **740** from a return port **774** of the catch basin **710** (e.g., with a filter **776**) must traverse over the baffle wall **770** to reach a terminal end of the pump intake **355**. The baffle wall **770** extends up to a height that is in some constructions at least **30** percent, or at least **40** percent of a distance between the bottom wall **766** and the bottom of the catch basin **710** at the location of the baffle wall **770**. In some constructions, the baffle wall **770** has a height of at least **15** mm, or at least **20** mm. In addition to the baffle wall **770** of the reservoir **740**, a downwardly depending second baffle wall **780** extends from the catch basin **710** at a position between the baffle wall **770** and the return port **774**. The second baffle wall **780** extends down to an extent that is below the upper terminal edge of the baffle wall **770** (e.g., at least **5** mm below, or at least **8** mm below). In other words, lubricant passing from the return port **774** to the pump intake **355** must pass below the second baffle wall **780** and change directions, vertically upward, in order to pass the baffle wall **770**. The baffle wall **770** and the second baffle wall **780** are also placed in relatively close proximity to each other so that lubricant flow velocity is accelerated on the passage between the walls **770**, **780**. A minimum gap between the walls **770**, **780** can be less than **12** mm, or less than **9** mm. Particles entrained with the lubricant have a higher mass and are carried by momentum into the baffle wall **770** rather than freely up and over toward the pump intake **355**. From there, these particles fall by gravity to the bottom of the baffle wall **770** on the side proximate the return port **774** and opposite the pump intake **355**, thus forming a particle collection zone **784**.

Although the invention has been described in detail with reference to certain preferred embodiments, variations and modifications exist within the scope and spirit of one or more independent aspects of the invention as described.

Various features of the invention are set forth in the following claims.

What is claimed is:

1. A portable pipe threader comprising:

- a housing;
- a carriage supported by the housing;
- at least one pipe threading tool coupled to the carriage and selectively operable to perform work on a pipe;
- a drive assembly at least partially positioned within the housing, the drive assembly including an electric motor operable to provide torque to rotate the pipe; and
- a lubrication system including:
  - a catch basin provided on one side of the housing,
  - a reservoir for holding a lubricant,
  - a debris shield positioned to shield the reservoir from debris formed during the work on the pipe,
  - a drip catch having one or more pockets that open toward the debris shield, and
  - a pump powered by the drive assembly to establish a flow of lubricant from the reservoir; and
- a stand adjustable between a collapsed state and a deployed state,

wherein, with the stand in the collapsed state, the portable pipe threader can be put in a vertically stowed configuration in which a longitudinal axis of the housing is substantially vertical with respect to a floor or ground surface, and

wherein, in the vertically stowed configuration, the debris shield is oriented substantially vertically above the drip catch so that the one or more pockets of the drip catch can catch and retain lubricant dripped from a proximal edge of the debris shield.

2. The portable pipe threader of claim **1**, further comprising:

a battery pack configured to provide electrical power to the motor and/or to the lubrication system.

3. The portable pipe threader of claim **1**, wherein the electric motor is a brushless direct current electric motor.

4. The portable pipe threader of claim **1**, wherein the drip catch includes a reduced-width portion that accommodates an intake of the pump.

5. The portable pipe threader of claim **1**, wherein the one or more pockets are a plurality of pockets in the drip catch.

6. The portable pipe threader of claim **1**, wherein the drip catch is engaged with the debris shield to retain the debris shield with respect to the catch basin in the vertically stowed configuration.

7. The portable pipe threader of claim **1**, wherein the drip catch is coupled to the catch basin with a plurality of fasteners that pass through a mounting portion of the drip catch.

8. The portable pipe threader of claim **7**, wherein a retainer tab of the drip catch extends from the mounting portion to extend over the proximal edge of the debris shield such that the proximal edge is sandwiched between one or more ledges of the catch basin and the retainer tab.

9. The portable pipe threader of claim **8**, wherein the retainer tab is provided centrally along the drip catch.

10. The portable pipe threader of claim **1**, wherein the at least one pipe threading tool is a die holder having a particular die, wherein the work performed on the pipe by the at least one pipe threading tool comprises cutting threads into the pipe while the pipe is rotated by a spindle, and wherein the torque from the electric motor is transferred to the spindle.

11. The portable pipe threader of claim **10**, further comprising:

- a pipe cutter to trim excess pipe; and
- a pipe reamer to deburr an inner edge of a cut end of the pipe.

12. A portable pipe threader comprising:

- a housing;
- a carriage supported by the housing;
- at least one pipe threading tool coupled to the carriage and selectively operable to perform work on a pipe;
- a drive assembly at least partially positioned within the housing, the drive assembly including an electric motor operable to provide torque to rotate the pipe; and
- a lubrication system including:
  - a catch basin provided on one side of the housing,
  - a reservoir for holding a lubricant,
  - a return port provided in the catch basin for passing lubricant into the reservoir, and
  - a pump powered by the drive assembly to establish a flow of lubricant from the reservoir, and the pump having an intake,

wherein a first baffle wall extends upwardly from a bottom wall of the reservoir, and a second baffle wall extends vertically downward from a bottom side of the catch basin and the second baffle wall is disposed at a position between the first baffle wall and the return port, and

wherein the first and second baffle walls overlap vertically such that lubricant passing from the return port to the intake of the pump must pass below the second baffle wall and change directions so as to flow vertically upward along the first baffle wall in order to pass over

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the first baffle wall, thereby forming a particle collection zone at a bottom of the first baffle wall.

**13.** The portable pipe threader of claim **12**, wherein the lubrication system includes:

a debris shield positioned over the catch basin to prevent ingress of debris formed during the work on the pipe into the reservoir,

a drip catch having one or more pockets that open toward the debris shield, and

a stand adjustable between a collapsed state and a deployed state,

wherein, with the stand in the collapsed state, the portable pipe threader can be put in a vertically stowed configuration in which a longitudinal axis of the housing is substantially vertical with respect to a floor or ground surface, and

wherein, in the vertically stowed configuration, the debris shield is oriented substantially vertically above the drip catch so that the one or more pockets of the drip catch can catch and retain lubricant dripped from a proximal edge of the debris shield.

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**14.** The portable pipe threader of claim **13**, wherein the drip catch is engaged with the debris shield to retain the debris shield with respect to the catch basin in the vertically stowed configuration.

**15.** The portable pipe threader of claim **13**, wherein the drip catch is coupled to the catch basin with a plurality of fasteners that pass through a mounting portion of the drip catch.

**16.** The portable pipe threader of claim **12**, wherein the at least one pipe threading tool is a die holder having a particular die,

wherein the work performed on the pipe by the at least one pipe threading tool comprises cutting threads into the pipe while the pipe is rotated by a spindle, and

wherein the torque from the electric motor is transferred to the spindle.

**17.** The portable pipe threader of claim **16**, further comprising:

a pipe cutter to trim excess pipe; and

a pipe reamer to deburr an inner edge of a cut end of the pipe.

\* \* \* \* \*