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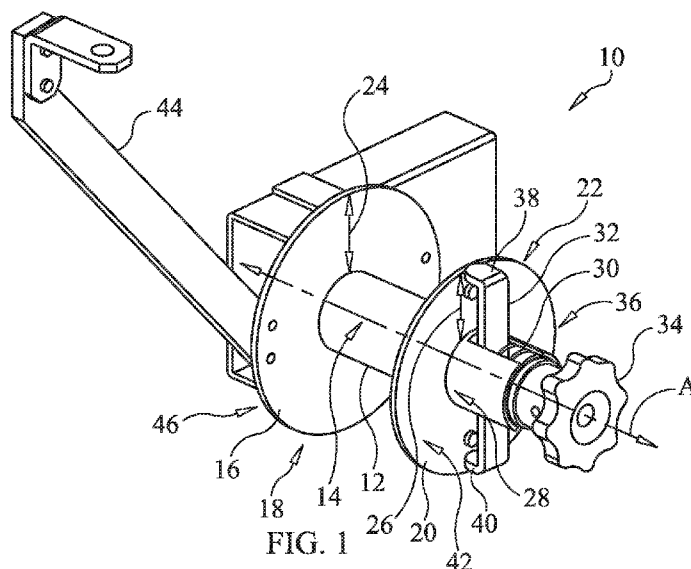
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(54) Title: SPOOL HOLDER AND METHOD OF SUPPORTING SPOOL OF WIRE WITH SPOOL HOLDER



(57) Abstract: A spool holder (10) includes a cylinder (12) defining a longitudinal axis and having an external surface (14) on which a spool of wire (62) may be supported. A first plate (16) is positioned at a first end (18) of the cylinder (12) and a second plate (20) is positioned at a second end (22) of the cylinder (12). Both first and second plates (16, 20) have portions extending radially outward from the external surface (14) of the cylinder (12). The first and second plates (16, 20) both have a perpendicular orientation relative to the longitudinal axis. The first and second plates (16, 20) restrict axial movement of the spool of wire (62) therebetween. The first plate (16) and cylinder (12) are stationary relative to a mounting structure (52), while the second plate (20) is configured to rotate with the spool of wire (62). A mechanism (100) urges the second plate (20) and, thus, the spool of wire (62) toward the first plate (16), thereby regulating rotation of the spool of wire (62).

MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
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-1-

DescriptionSPOOL HOLDER AND METHOD OF SUPPORTING SPOOL OF WIRE
WITH SPOOL HOLDER

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Technical Field

The present disclosure relates generally to a spool holder for supporting a spool of wire and, more particularly, to a spool holder with a mechanism for regulating rotation of the spool of wire.

10 Background

A spool generally consists of a flanged or un-flanged cylinder on which thread, wire, cable or another material is wound for storage or use. The spool, or cylinder, typically includes an axial passage receiving a pin, spindle, or other structure that facilitates rotation of the spool. Material may be wound or
15 unwound relative to the spool during rotation of the spool about the pin, spindle, or other spool holder. With respect to a welding process, for example, welding wire may be provided on a spool, which may be supported on a spool holder, and later unwound during use. Although various welding methods exist, according to some common welding methods welding wire is pulled from the spool, as
20 needed, and is then heated with a base material to join the materials together at a weldment.

U.S. Patent No. 4,534,499 to Cox et al. discloses a wire drive mechanism for advancing material, such as a wire, to a workstation. The wire drive mechanism includes a pair of frusto-conical shaped wheels mounted so as
25 to engage the wire therebetween. At least one of the wheels is driven by drive means to advance the wire as needed. The wire drive mechanism also includes a pair of cone-shaped elements opposingly mounted on a common shaft so that the spool may be rotatably secured therebetween.

As should be appreciated, there is a continuing need to improve the efficiency of all aspects of machining processes, including the storage and use of various materials, while also keeping costs low.

Summary of the Invention

5 In one aspect, a spool holder includes a cylinder defining a longitudinal axis and having an external surface on which a spool of wire may be supported. A first plate is positioned at a first end of the cylinder and a second plate is positioned at a second end of the cylinder. Both first and second plates have portions extending radially outward from the external surface of the
10 cylinder. The first and second plates both have a perpendicular orientation relative to the longitudinal axis, and restrict axial movement of a spool of wire therebetween. The first plate and cylinder are stationary relative to a mounting structure, while the second plate is configured to rotate with the spool of wire. A mechanism urges the second plate and, thus, the spool of wire toward the first
15 plate, thereby regulating rotation of the spool of wire.

 In another aspect, a method of supporting a spool of wire with a spool holder includes steps of supporting the spool of wire on an external surface of a cylinder, and limiting axial movement of the spool of wire along the external surface of the cylinder between first and second plates. The first and second
20 plates are substantially parallel to one another and perpendicular to a longitudinal axis of the cylinder. Each of the first and second plates includes at least a portion thereof extending radially outward from the external surface of the cylinder. The method also includes steps of fixing a position of the first plate and the cylinder relative to a mounting structure, and rotating the second plate with the spool of
25 wire. The second plate and the spool of wire are urged toward the first plate during the rotating step using a mechanism, thereby regulating rotation of the spool of wire.

 In yet another aspect, a spool holder assembly includes a cylinder having an external surface, a first plate positioned at a first end of the cylinder

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and having at least a portion thereof extending radially outward from the external surface of the cylinder, and a second plate positioned at a second end of the cylinder and having at least a portion thereof extending radially outward from the external surface of the cylinder. A spool of wire is supported on the external
5 surface of the cylinder and is restricted in axial movement between the first and second plates. A mechanism urges the second plate and the spool of wire toward the first plate during rotation of the second plate and the spool of wire, thereby regulating rotation of the spool of wire.

Brief Description of the Drawings

10 FIG. 1 is a perspective view of a spool holder, according to the present disclosure;

FIG. 2 is a partially exploded perspective view of the spool holder of FIG. 1;

15 FIG. 3 is an exploded view of the spool holder of the previous FIGS. and an exemplary spool of wire, according to the present disclosure;

FIG. 4 is a perspective view of a spool holder assembly, including the exemplary spool of wire supported on the spool holder of the present disclosure, with phantom lines depicting parts not readily visible in the current view;

20 FIG. 5 is a partial sectional view cut through a vertical axis of the spool holder assembly; and

FIG. 6 is a flow chart representing a simplified method of supporting the exemplary spool of wire with the spool holder of the present disclosure.

25 Detailed Description

An exemplary spool holder of the present disclosure is shown at 10 in FIG. 1, and generally includes a cylinder 12 having an external surface 14 on which a spool or spool of wire, shown in later FIGS., may be supported. A

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first plate 16 is positioned at a first end 18 of the cylinder 12 and has at least a portion thereof, such as a peripheral portion, extending radially outward and beyond the external surface 14 of the cylinder 12. A second plate 20 is positioned at a second end 22 of the cylinder 12 and has at least a portion thereof
5 extending radially outward and beyond the external surface 14 of the cylinder 12.

In some instances, one or both of the first and second plates 16, 20 may be or may include flanges 24, 26 extending radially outward from the cylinder 12. That is, the flanges 24, 26 may represent peripheral portions of the first and second plates 16, 20 extending radially outward from the external
10 surface of the cylinder 12 and/or may represent the entirety of the plates 16, 20. According to some embodiments, the first and second plates 16, 20 may or may not be integral with the cylinder 12.

As shown in the exemplary embodiment, the second end 22 of the cylinder 12, or a portion thereof, may be received through a central opening 28 of
15 the second plate 20. Clearance between these components may be such that the second plate 20 is rotatable about the cylinder 12, such as being rotatable with a spool of wire and/or movable axially relative to the cylinder 12. The first and second plates 16, 20 may be flat plates having predetermined thicknesses, as shown, and may be substantially parallel to one another and perpendicular to a
20 longitudinal axis *A* of the cylinder 12.

The exemplary spool holder 10 also includes a spring 30, such as a compression spring, and lever 32 secured in relative positions at the second end 22 of the cylinder 12 by a knob star, or other similar component, 34. As shown, the lever 32 may be positioned at least partly within a slot 36 through the cylinder
25 12 and may include inwardly curved ends 38, 40 contacting an outer surface 42 of the second plate 20. The spring 30 may be compressed between the lever 32 and the knob star 34 to provide an inward force against the second plate 20 and toward the first plate 16, as will be discussed in greater detail below.

According to the exemplary embodiment, and relative to the context of welding, a welding wire guide 44, a component known to those skilled in the art, may extend radially outward from, and may be supported in part by, an outer surface 46 of the first plate 16. That is, the first plate 16 may include or
5 may receive fasteners for attaching or coupling the welding wire guide 44 thereto. However, alternative placements of the welding wire guide 44 or other similar components are also contemplated.

Referring also to FIG. 2, the first plate 16 may further include or be configured to receive or support fasteners 48, 50 for fastening or securing the
10 first plate 16 to a welding machine arm 52, or other support structure, such that the first plate 16 and the cylinder 12 are stationary relative to the welding machine arm 52. The welding machine arm 52 may be constructed with steel tubing and may be bolted, or otherwise secured, to a floor or other suitable worksite structure. "Fasteners," as the term is used herein, broadly includes a
15 variety of threaded or unthreaded fasteners, such as, for example, bolts, clamps, clips, nails, pins, rings, screws, staples, straps, and the like.

Turning now to FIG. 3, a spool holder assembly 60, including components of the spool holder 10 discussed above with reference to FIGS. 1 and 2, is depicted in exploded fashion. FIG. 3 also includes a depiction of a spool of
20 wire 62, which may be supported on the spool holder 10. The spool of wire 62 generally includes a cylinder 64 with ends 66, 68 on which thread, wire, cable or another material may be wound, and may be of various sizes and weights. The spool of wire 62 also includes an axial passage 70, which may receive the cylinder 12 of the spool holder 10.

25 As shown, the first plate 16 may be fastened to the welding machine arm 52 using fasteners 48, 50. In particular, and according to the exemplary embodiment, a socket head screw, or other mechanical fastening device, 48 may be received through openings 72 of the welding machine arm 52. A lock washer and hex nut set 50 may be fastened to a threaded end 74 of the

socket head screw 48 to secure a stationary position of the first plate 16 and cylinder 12 relative to the welding machine arm 52 and, according to some embodiments, the worksite floor. Of course, other fastening means may be used instead. A guide 76 may extend outwardly from the outer surface 46 of the first plate 16 and may rest on a top surface 78 of the welding machine arm 52, for support and/or orientation of the assembly components.

The cylinder 12 may be attached to or coupled with the first plate 16, such that the cylinder 12 is stationary relative to the first plate 16. According to some embodiments, the first plate 16 and cylinder 12 may be a unity structure, including, for example, a structure including components that have been welded, or otherwise secured, together. The welding wire guide 44 may attach to the outer surface 46 of the first plate 16 in a known fashion, such as by using fastener openings 80 provided through the first plate 16, and may also have a relatively stationary position, such as relative to the worksite floor. The spool of wire 62 may include the axial passage 70 through which the cylinder 12 may be received. The cylinder 12, which may or may not be hollow, may thereafter support the spool of wire 62 on the external surface 14 thereof.

The second plate 20 may be attached or coupled to the spool of wire 62 using any known attachment means. For example, round bars 82 may be provided on the second plate 20 for frictional engagement with openings 84 of the end 68 of the spool of wire 62. With the second plate 20 attached to the spool of wire 62 and the spool of wire 62 supported on the cylinder 12, the second end 22 of the cylinder 12, including the slot 36, may be exposed through the end 68 of the spool of wire 62 and through the second plate 20 for receipt of the lever 32, spring 30 and a washer 86. The knob star 34, which may include a pin 88 securing attachment of a bar 90 thereto, may secure the lever 32 and spring 30 in place. In particular, a threaded end 92 of the bar 90 may pass through the washer 86, spring 30, and an opening 94 of the lever 32, and ultimately engage internal

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threads of a component supported within the cylinder 12 to compress the spring 30 to provide a desired force.

FIG. 4 depicts the spool holder assembly 60 in an assembled configuration, with components or lines not readily visible in this view shown in phantom. FIG. 5 depicts a sectioned view of the spool holder assembly 60 through a vertical axis. With reference to both FIGS., it should be clear that the first and second plates 16, 20 limit axial movement of the spool of wire 62. Rotation of the first plate 16 and cylinder 12 is inhibited, while the spool of wire 62 and second plate 20 rotate together. A mechanism 100, described above and generally including the lever 32, spring 30 and knob star 34, urges the second plate 20, and thus the spool of wire 62, toward the first plate 16. In other words, and referring particularly to FIG. 5, the spring 30 applies an inward force F on the lever 32, the outer surface 42 of the second plate 20, and the spool of wire 62.

Tension in the spring 30 may be regulated, or adjusted, by the knob star 34. That is, according to the exemplary embodiment, the threaded end 92 of the bar 90 may be received within an internally threaded receiving nut 102. The knob star 34 may be rotated clockwise, for example, to increase the spring force or rotated counterclockwise to decrease the spring force applied by the spring 30. The spring force may regulate, or control, rotation of the spool of wire 62, such as by compressing the components axially and controlling the rotation through frictional engagement. As the amount of material supported on the spool of wire 62 decreases, it may be desirable to increase the amount of spring force.

Industrial Applicability

The present disclosure relates generally to a spool holder for a spool of wire. More specifically, the present disclosure relates to a mechanism for regulating, or controlling, rotation of the spool of wire during use. Although the concepts disclosed herein are described with reference to a spool of wire, the concepts are believed to have broader applicability, including applicability to a wide range of holders for supporting a range of different materials.

Referring to FIGS. 1-5 and also to FIG. 6, a method of supporting the spool of wire 62 with the spool holder 10 is discussed with reference to a basic flow diagram 110. At a first step, at box 112, the spool of wire 62 may be supported on the external surface 14 of the cylinder 12. At a second step, at box 5 114, axial movement of the spool of wire 62 along the external surface 14 of the cylinder 12 is limited, or restricted, using the first and second plates 16, 20. Rotation of the first plate 16 and the cylinder 12 is inhibited, at box 116, while the spool of wire 62 and second plate 20 rotate together, at box 118, about the cylinder 12. At box 120, rotation of the spool of wire 62 is regulated, or 10 controlled, using a mechanism 100 that urges the second plate 20 toward the first plate 16.

The spool holder assembly 60 of the present disclosure may provide a supported and controlled rotation of a spool of wire 62. The controlled rotation may increase efficiency in processes requiring unspooling, or even 15 spooling, of the spool of wire 62. In particular, for example, controlled rotation of the spool of wire 62 may reduce occasions where the spool of wire 62 may be slipped from the spool holder, spin uncontrollably, and/or a material from the spool of wire 62 may come off uncontrollably. The spool holder assembly 60 of the present disclosure may be a cost effective means of regulating rotation of the 20 spool of wire 62.

It should be understood that the above description is intended for illustrative purposes only, and is not intended to limit the scope of the present disclosure in any way. Thus, those skilled in the art will appreciate that other aspects of the disclosure can be obtained from a study of the drawings, the 25 disclosure and the appended claims.

Claims

1. A spool holder (10), including:
 - a cylinder (12) defining a longitudinal axis and having an external
 - 5 surface (14) on which a spool of wire (62) may be supported;
 - a first plate (16) positioned at a first end (18) of the cylinder (12)
 - and having a perpendicular orientation relative to the longitudinal axis, wherein a
 - portion of the first plate (16) extends radially outward from the external surface
 - (14) of the cylinder (12);
 - 10 a second plate (20) positioned at a second end (22) of the cylinder
 - (12) and also having a perpendicular orientation relative to the longitudinal axis,
 - wherein a portion of the second plate (20) extends radially outward from the
 - external surface (14) of the cylinder (12);
 - wherein, when the spool of wire (62) is supported on the cylinder
 - 15 (12), the first and second plates (16, 20) restrict axial movement of the spool of
 - wire (62) therebetween;
 - wherein the first plate (16) and cylinder (12) are stationary relative
 - to a mounting structure (52), and the second plate (20) and spool of wire (62)
 - rotate together; and
 - 20 a mechanism (100) urging the second plate (20) and, thus, the
 - spool of wire (62) toward the first plate (16), thereby regulating rotation of the
 - spool of wire (62).
2. The spool holder (10) of claim 1, wherein the second end
- 25 (22) of the cylinder (12) is received through a central opening (28) of the second
- plate (20).
3. The spool holder (10) of claim 2, further including a lever
- (32) positioned at least partly within a slot (36) through the cylinder (12) at the

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second end (22) thereof, the lever (32) having inwardly curved ends (38, 40) contacting an outer surface (42) of the second plate (20).

4. The spool holder (10) of claim 3, further including a spring
5 (30) applying an inward force on the lever (32) and, thus, the outer surface (42) of the second plate (20) and the spool of wire (62).

5. The spool holder (10) of claim 4, wherein the spring (30) is
compressed between the lever (32) and a knob star (34).

10

6. A method of supporting a spool of wire (62) with a spool
holder (10), the method including steps of:

supporting the spool of wire (62) on an external surface (14) of a
cylinder (12);

15 limiting axial movement of the spool of wire (62) along the
external surface (14) of the cylinder (12) between first and second plates (16, 20),
wherein the first and second plates (16, 20) are substantially parallel to one
another and perpendicular to a longitudinal axis of the cylinder (12), wherein
each of the first and second plates (16, 20) includes at least a portion thereof
20 extending radially outward from the external surface (14) of the cylinder (12);

fixing a position of the first plate (16) and the cylinder (12)
relative to a mounting structure (52);

rotating the second plate (20) with the spool of wire (62); and

25 urging the second plate (20) and spool of wire (62) toward the first
plate (16) during the rotating step using a mechanism (100), thereby regulating
rotation of the spool of wire (62).

7. The method of claim 6, further including coupling the first
plate (16) with a welding machine arm (52).

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8. The method of claim 6, further including positioning a lever (32) at least partly within a slot (36) through the cylinder (12) at the second end (22) thereof, the lever (32) having inwardly curved ends (38, 40) contacting
5 an outer surface (42) of the second plate (20).

9. The method of claim 8, further including applying an inward force on the lever (32), outer surface (42) of the second plate (20), and the spool of wire (62) using a spring (30).

10

10. The method of claim 9, further including compressing the spring (30) between the lever (32) and a knob star (34).

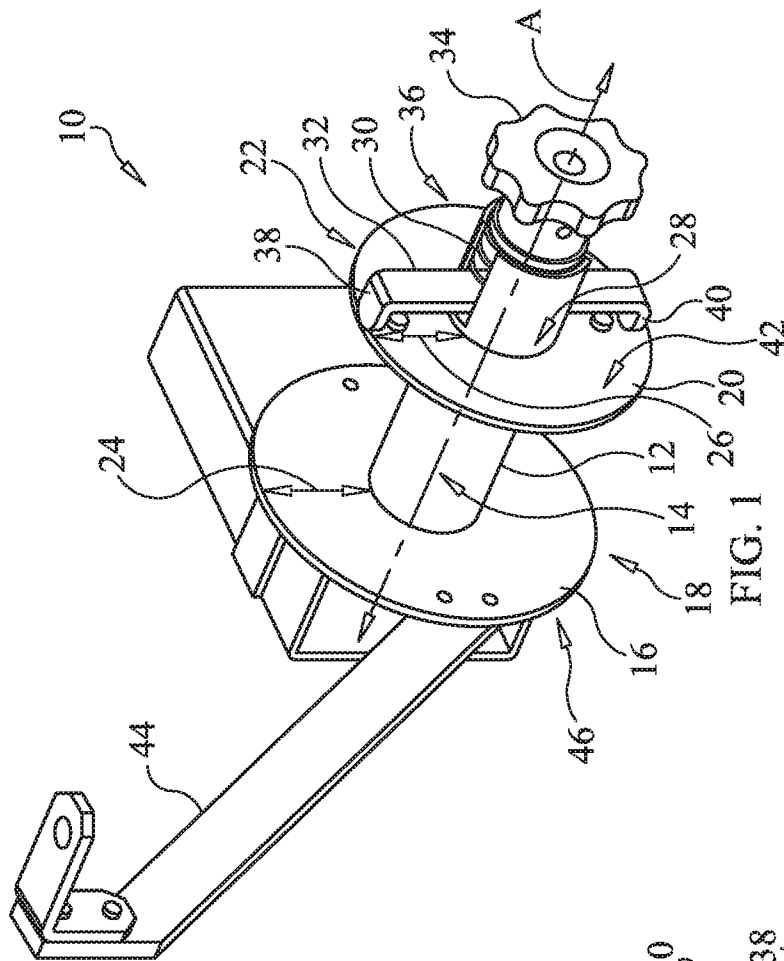


FIG. 1

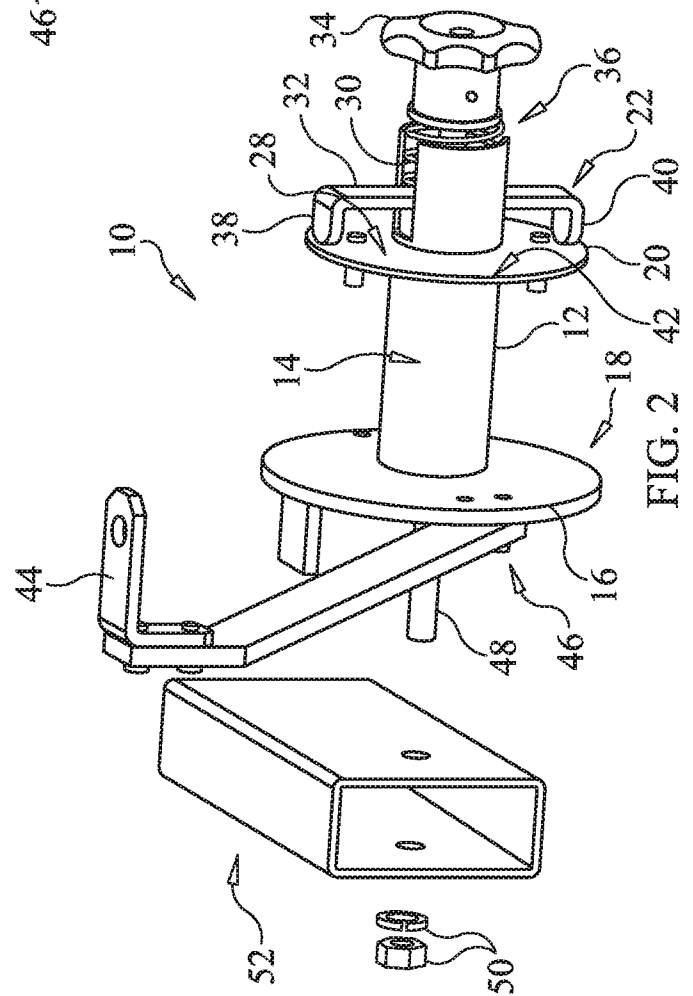


FIG. 2

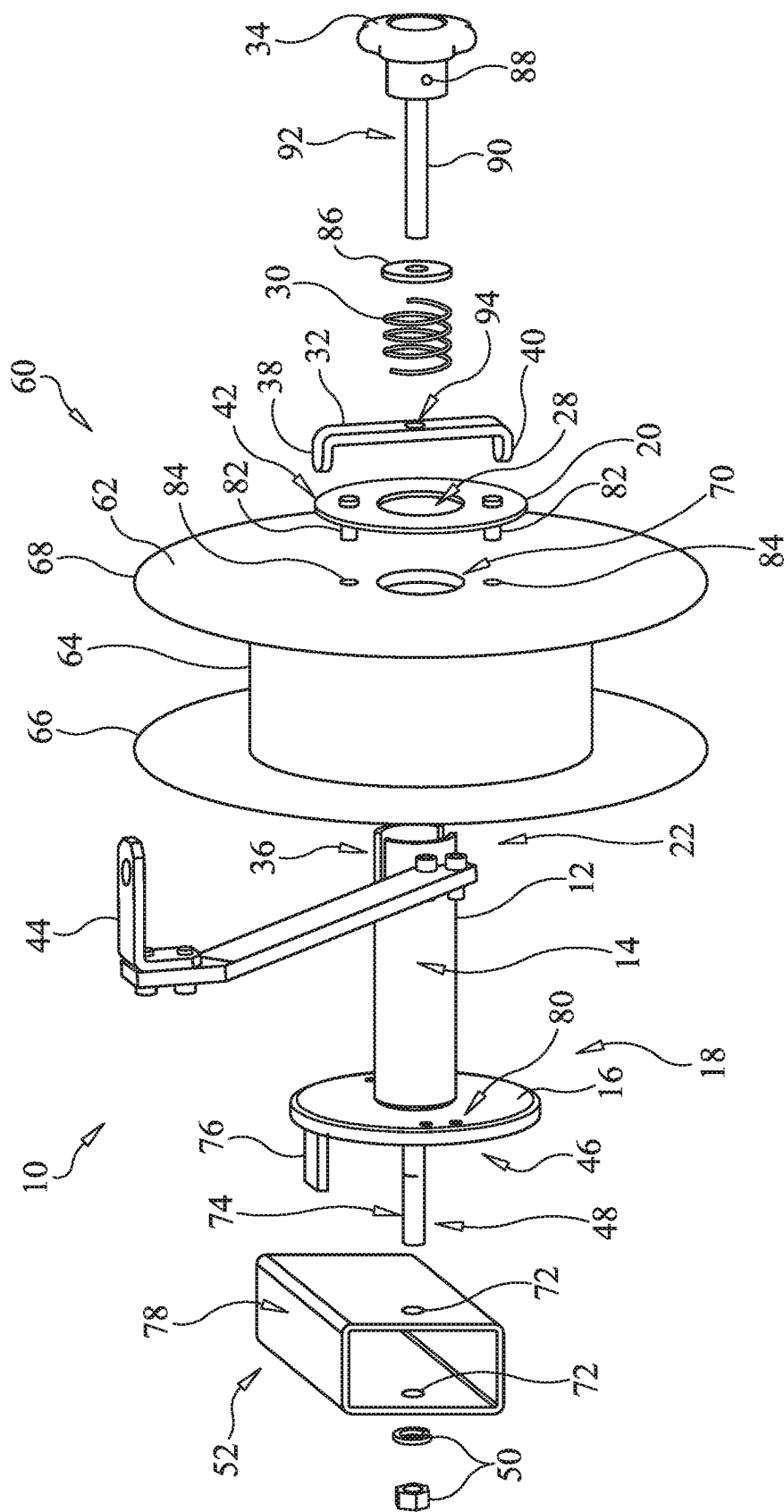


FIG. 3

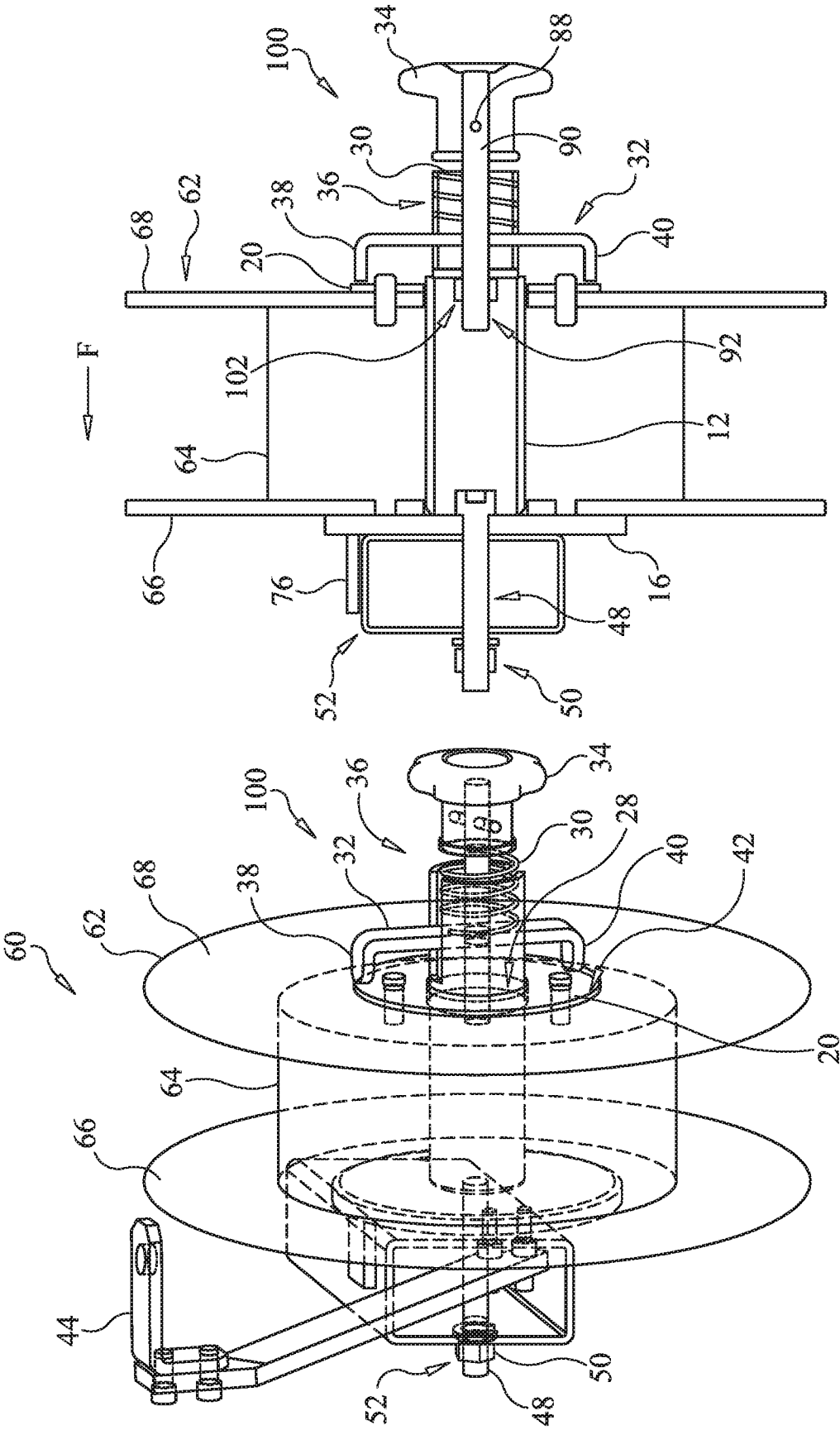


FIG. 4

FIG. 5

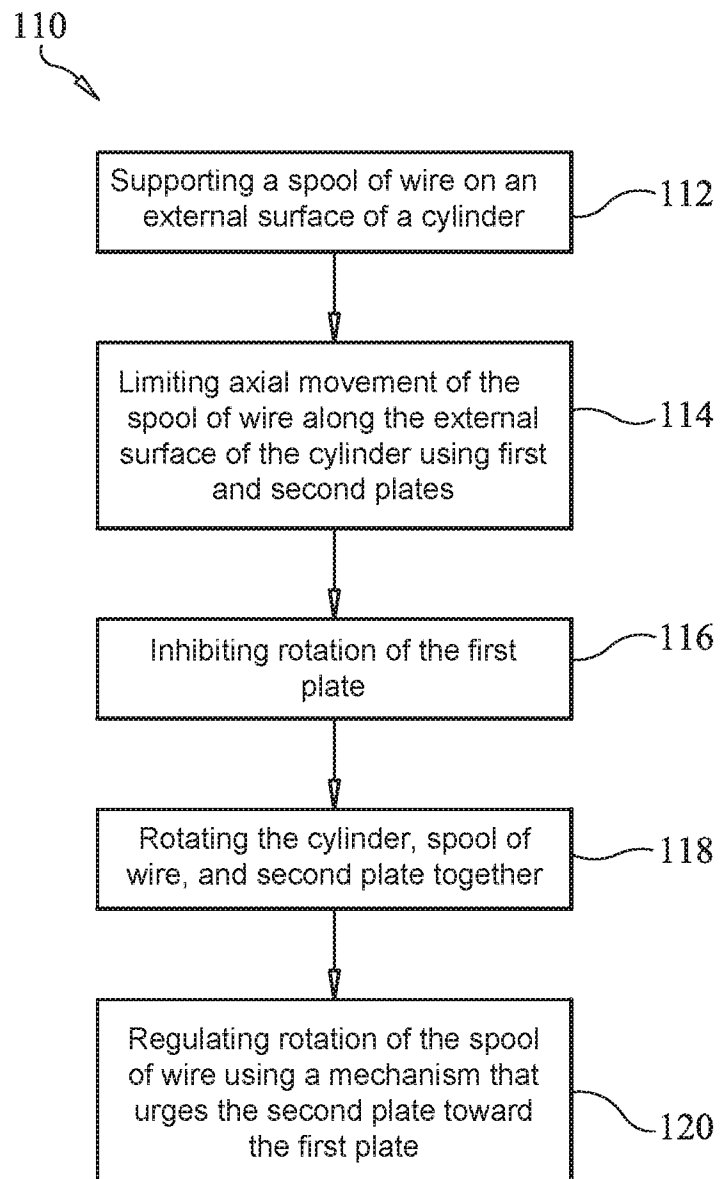


FIG. 6

A. CLASSIFICATION OF SUBJECT MATTER**B65H 75/44(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65H 75/44; B23K 37/02; B65H 59/04; B65H 49/26; B65H 75/24; A01K 89/01; B65H 75/30; B23K 9/028; B65H 54/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: spool holder, cylinder, first plate, second plate, mechanism, rotate, regulate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A		3-5, 8-10
Y	US 8602341 B2 (LAND, JAMES T.) 10 December 2013 See column 7, line 4 - column 9, line 67; and figures 7A-7B, 8-11.	1-2, 6-7
A	US 5551647 A (BROWNING, THOMAS D.) 03 September 1996 See column 1, line 6 - column 2, line 55; and figures 1-5.	1-10
A	US 2008-0302899 A1 (CHANG et al.) 11 December 2008 See paragraphs [0003]-[0024]; and figures 1-4, 6-10, 14.	1-10
A	WO 2015-036534 A1 (SPA PIPE WELDING SOLUTIONS GMBH & CO. KG) 19 March 2015 See page 1, line 2 - page 6, line 26; and figures 4-5, 6a-6b.	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2017/052464

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