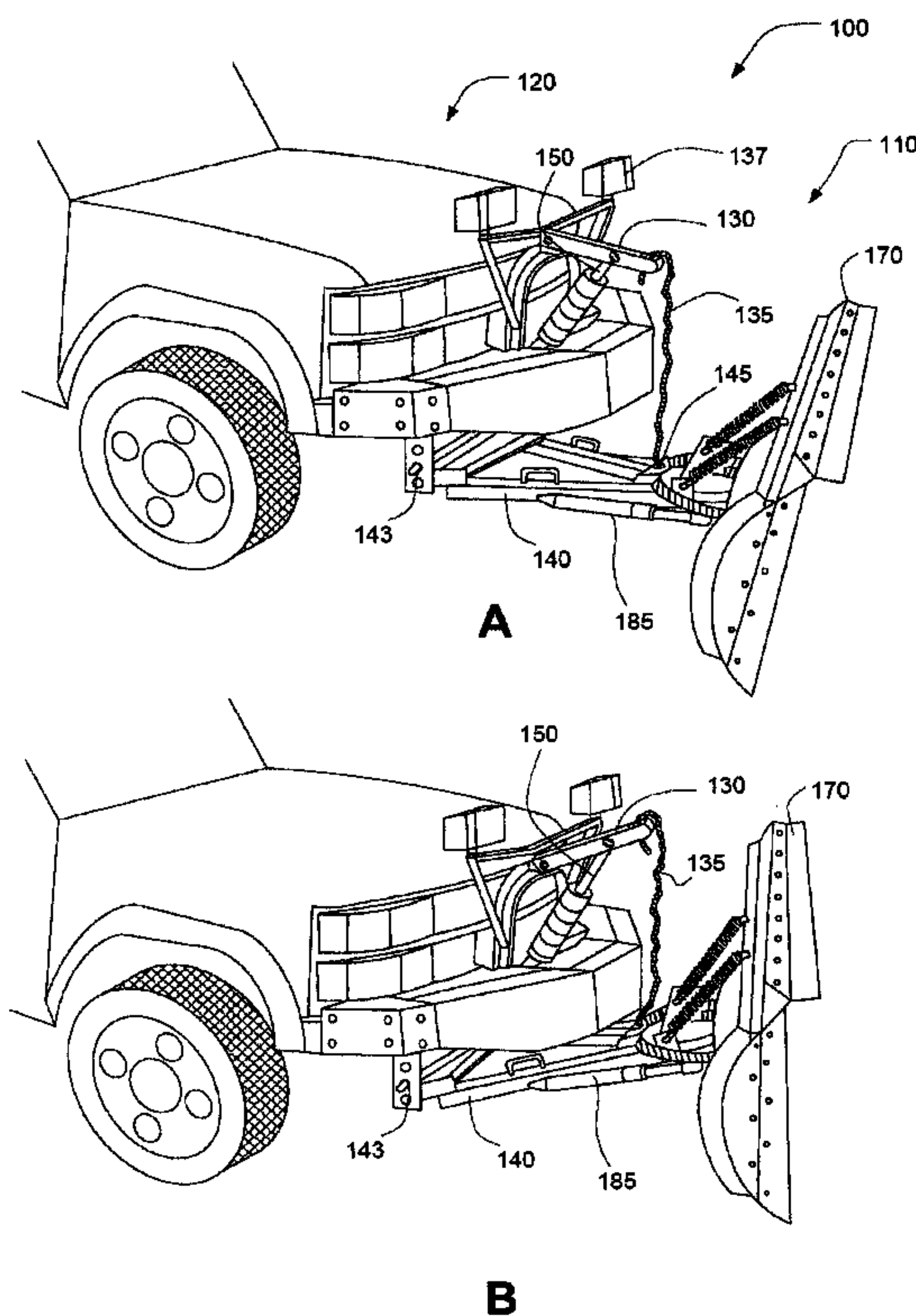




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(57) **Abrégé/Abstract:**

A secondary lift mechanism configured for quick attachment to an existing snowplow assembly. A secondary lift mechanism is intended as a backup lift mechanism in the event the primary lift mechanism of a snowplow assembly fails. The secondary lift mechanism (the secondary snowplow lift mechanism) is attachable to the lift arm of any of a variety of snowplow assemblies without the use of tools. A novel mounting plate allows the secondary snowplow lift mechanism to be quickly and easily attached to a variety of lift arm configurations common to various snowplow assemblies, the secondary snowplow lift mechanism restores vertical control of the moldboard when the primary lift mechanism has failed.

**Docket #****QUICK-ATTACH SECONDARY LIFT MECHANISM FOR SNOWPLOWS****ABSTRACT**

A secondary lift mechanism configured for quick attachment to an existing snowplow assembly. A secondary lift mechanism is intended as a backup lift mechanism in the event the primary lift mechanism of a snowplow assembly fails. The secondary lift mechanism (the secondary snowplow lift mechanism) is attachable to the lift arm of any of a variety of snowplow assemblies without the use of tools. A novel mounting plate allows the secondary snowplow lift mechanism to be quickly and easily attached to a variety of lift arm configurations common to various snowplow assemblies. The secondary snowplow lift mechanism restores vertical control of the moldboard when the primary lift mechanism has failed.

**Docket #****QUICK-ATTACH SECONDARY LIFT MECHANISM FOR SNOWPLOWS****RELATED APPLICATIONS**

**[0001]** The present application claims priority under 35 U.S.C. § 119(e) from the following previously-filed Provisional Patent Application, U.S. Application No. 61/108,629, filed October 27, 2008, entitled "Quick-Attach Secondary Lift Mechanism for Snowplows," and which is incorporated herein by reference in its entirety.

**TECHNICAL FIELD**

**[0002]** The present exemplary system and method relates to lift mechanisms for snowplow assemblies. More particularly, the present exemplary system and method relates to removable secondary lift mechanisms attachable to snowplow assemblies.

**BACKGROUND**

**[0003]** A wide variety of snowplows have been used for a number of years to remove snow from roads and parking lots. Several manufactures have developed snowplows that are mountable on nearly any vehicle. Typically, such snowplow assemblies include a frame portion mounted to the vehicle, a lift portion often including a hydraulic pump, a moldboard, and an A-frame allowing the moldboard to be turned side-to-side, raised, and lowered.

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**[0004]** Many components of a snowplow assembly undergo significant stress during use. It is not uncommon for portions of the assembly to break or bend upon impact with snow, curbs and other objects. The cold temperatures present during the winter season only act to aggravate the likelihood of breakage. While the metal components of a snowplow can be bent and broken, they are not the only components of the assembly that may fail. A majority of snowplow assemblies include a lift mechanism actuated by a hydraulic pump. The hydraulic pump often performs the function of lifting the moldboard, via a lift arm and chain, and also turning the moldboard from side-to-side.

**[0005]** According to many traditional embodiments, a hydraulic pump is connected to large piston. When the piston is extended a lift arm is forced upward. The lift arm, connected by a chain or cable to the A-frame will cause the A-frame to pivot upward. This pivoting action of the A-frame will raise the moldboard. Similarly, the piston can be released causing the lift arm, A-frame, and moldboard to lower again. In a similar fashion, smaller pistons located on the A-frame allow the moldboard to be pivoted side-to-side.

**[0006]** During a snowstorm, snowplow operators often work through the night. A broken snowplow often costs the operator or owner a significant amount of money in lost income. Consequently, any failure with the snowplow assembly, including the hydraulic pump, is a financial setback. Furthermore, it is often not possible to fix the snowplow until it is too late to recuperate the lost income. Of particular interest to the present system and method is failure of the hydraulic pump. When the hydraulic pump fails, the operator is unable to utilize the snowplow. Often professional services are required to repair this mechanically complicated hydraulic pump. The operator is forced to retire the truck and snowplow until professional services can be obtained, this may result in significant lost income and possibly lost clients.

**SUMMARY**

**[0007]** A secondary snowplow lift mechanism is provided herein. the secondary snowplow lift mechanism is configured to attach to a preexisting

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snowplow assembly in the event the primary lift mechanism fails. According to several exemplary embodiments, a secondary snowplow lift mechanism is secured to the lift arm of a preexisting snowplow assembly without the use of tools. This provides a distinct advantage in that the secondary snowplow lift mechanism is easily attached when the primary lift mechanism fails, instantly allowing the operator to continue plowing. According to one embodiment, the secondary snowplow lift mechanism includes an electric motor attached to a wound cable, a hook to connect the cable to the A-frame of a preexisting snowplow assembly, and a mounting plate configured to secure the secondary snowplow lift mechanism to the lift arm of the preexisting snowplow assembly. No modification of the original snowplow assembly is necessary.

**[0008]** According to one embodiment of the present system and method, an electric motor may be any number of sizes, shapes, and strengths. A mounting plate acts to couple the secondary snowplow lift mechanism to the lift arm of the snowplow assembly. The mounting plate, according to one exemplary embodiment, is configured to allow the secondary snowplow lift mechanism to be mountable on any of the numerous varieties of lift arms. Consequently, the secondary snowplow lift mechanism, comprising a lift mechanism and such a mounting plate can be universally mounted to any snowplow assembly.

**[0009]** One exemplary embodiment of the secondary snowplow lift mechanism includes connecting the secondary snowplow lift mechanism directly to the vehicle's battery via alligator or parrot jaw clamps. Alternatively, according to another exemplary embodiment, the secondary snowplow lift mechanism is configured with cables to be connected directly to the electric leads of the preexisting hydraulic pump.

**[0010]** According to one exemplary embodiment of the secondary snowplow lift mechanism, a controller is placed within the vehicle near the operator to control the up and down movement of the lift mechanism of the secondary snowplow lift mechanism. According to one exemplary embodiment, a cable extending from the secondary snowplow lift mechanism through the vehicle's door or window connects the controller to the electric motor. Alternatively, the controller may

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be wirelessly connected to the electric motor. According to yet another exemplary embodiment, the electric motor is configured with an adapter allowing the preexisting hydraulic pump's controller and power source to be connected to the secondary snowplow lift mechanism. According to this embodiment, the operator is able to use the preexisting controller and need not connect additional cables to the vehicle's battery.

**[0011]** According to various exemplary embodiments of the present system and method, the wound cable controlled by the electric motor may comprise various sizes, braids, and strengths of metal cables, or alternatively a strap or chain might be used. Furthermore, any number of means of connecting the strap cable, or chain to the A-frame or directly to the moldboard may be utilized, including a hook, D-rings, carabineers, clamps, magnets, a combination thereof, or simply looping the strap, cable or chain around a portion of the either the A-frame or moldboard. Additional elements of various embodiments are described in detail below.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**[0012]** The accompanying drawings illustrate various embodiments of the present system and method and are a part of the specification. The illustrated embodiments are merely examples of the present system and method and do not limit the scope thereof. Several drawings include features of the secondary snowplow lift mechanism interacting with a snowplow assembly according to one exemplary embodiment. However, the present system and method is configured for use with a variety of snowplow assemblies according to various embodiments.

**[0013]** **Figs. 1A and 1B** illustrate a snowplow assembly attached to a vehicle in lowered and a raised positions, respectively, according to one exemplary embodiment.

**[0014]** **Figs. 2** illustrates a portion of a snowplow assembly including a hydraulic pump, a piston, and a lift arm, according to one exemplary embodiment.

**[0015]** **Figs. 3** illustrates a perspective view of the present system, the secondary snowplow lift mechanism, according to one exemplary embodiment.

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**[0016]** Figs. 4A and 4B show views of a mounting plate, according to one exemplary embodiment, configured to couple the secondary snowplow lift mechanism to various lift arms.

**[0017]** Fig. 5 illustrates a mounting plate being secured to the secondary snowplow lift mechanism, according to one exemplary embodiment.

**[0018]** Fig. 6 illustrates the secondary snowplow lift mechanism and a mounting plate being secured to a lift arm of a snowplow assembly, according to one exemplary embodiment.

**[0019]** Fig. 7A illustrates the secondary snowplow lift mechanism preliminarily secured to a lift arm of a snowplow assembly, according to one exemplary embodiment.

**[0020]** Fig. 7B illustrates the secondary snowplow lift mechanism being fully secured to a lift arm of a snowplow assembly through the use of a pins, according to one exemplary embodiment.

**[0021]** Fig. 8A shows the secondary snowplow lift mechanism fully secured to a snowplow assembly attached to a vehicle, according to one exemplary embodiment.

**[0022]** Fig. 8B shows the secondary snowplow lift mechanism fully secured to a snowplow assembly with wiring and controls connected to a vehicle, according to one exemplary embodiment.

**[0023]** Fig. 9 is a flow chart illustrating a manner of connecting the secondary snowplow lift mechanism to a preexisting snowplow assembly, according to one exemplary embodiment.

**[0024]** Throughout the drawings, identical reference numbers identify similar elements or acts. The sizes and relative positions of elements in the drawings are not necessarily drawn to scale. For example, the shapes of various elements and angles are not drawn to scale, and some of these elements are arbitrarily enlarged and positioned to improve drawing legibility. Further, the particular shapes of the elements as drawn, are not intended to convey any information regarding the actual shape of the particular elements, and have been solely selected for ease of recognition in the drawings.

**Docket #****DETAILED DESCRIPTION**

**[0025]** An exemplary system and method providing a secondary lift mechanism configured for attachment to a snowplow assembly is provided below. Several embodiments of the present system and method are provided wherein the secondary lift mechanism is configured to be attached to a snowplow assembly without the use of tools. Several unique embodiments of the present exemplary system and method are provided; however, any individual embodiment may be used exclusive of, or in conjunction with, one or more alternative embodiments. While it may be advantageous to secure the present system and method without the use of tools, alternative embodiments allow the system to be secured with tools.

**[0026]** Numerous specific details are set forth for purposes of explanation and to provide a thorough understanding of a secondary lift mechanism for quick attachment to a snowplow assembly. It will be apparent, however, to one skilled in the art, that the present systems and methods may be practiced without one or more of these specific details. Reference in the specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. The appearance of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment.

**[0027]** Unless the context requires otherwise, throughout the specification and claims which follow, the word "comprise" and variations thereof, such as, "comprises" and "comprising" are to be construed in an open, inclusive sense, that is as "including, but not limited to."

**[0028]** Throughout the description the words "chain" and "cable" shall be understood to mean any structural connecting member, including, but not limited to, a cord, a wire, a strap, a cable, a chain, a rope, linked members of alternative suitable materials and/or other similar objects.

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**[0029]** Additionally the term “lift arm” used throughout the description and claims is explained herein as being the mechanical feature that a primary lift pump or motor actuates. A cable or chain attached to the lift arm translates the force of the lift pump or motor to raise the moldboard of a snowplow. Although several snowplow manufacturers may refer to this mechanical feature by alternative names, including chain mount, lift plate, chain plate, arm, etc, throughout the specification and claims, this mechanical feature will be referred to as the “lift arm”.

**[0030]** The following description is presented to illustrate and describe several embodiments of the present exemplary system and method; it is not intended to limit the system and method to any exact form disclosed in conjunction with the various embodiments.

**[0031]** The present system and method provides a lift mechanism configured for quick attachment to a snowplow assembly. A greater understanding of the present system and method will be attained by considering the presented details in light of one of the primary purposes of the system and method, namely, to provide a backup plan in the event of a primary lift mechanism's failure. According to one exemplary embodiment, the present system and method (“the secondary snowplow lift mechanism”) is configured for use with a preexisting snowplow assembly. the secondary snowplow lift mechanism provides a secondary, “backup”, lift mechanism for a preexisting snowplow assembly when the primary, typically hydraulic, lift mechanism fails. One distinct advantage of the secondary snowplow lift mechanism, according to various embodiments, is that it can be attached to an existing snowplow assembly easily and quickly, without the use of tools or modification of the original snowplow assembly.

**[0032]** A traditional snowplow assembly attached to a vehicle is described below with particular focus on the lift mechanism and lift arm. Subsequently, an exemplary embodiment of the secondary snowplow lift mechanism is described in detail. A mounting plate configured to attach the secondary snowplow lift mechanism to an existing lift arm is then described followed by the secondary snowplow lift mechanism secured to a snowplow assembly. Finally, a detailed description of the functionality of a snowplow assembly configured with the

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secondary snowplow lift mechanism is described in conjunction with an exemplary method of installment and use.

**Exemplary embodiments**

**[0033]** Fig. 1A illustrates a vehicle setup (100) including a traditional snowplow assembly (110) attached to a vehicle, according to one exemplary embodiment. The front portion of a vehicle body (120) is illustrated with a snowplow assembly (110) secured in place, according to one exemplary embodiment. The pertinent elements common to all snowplow assemblies (110) are described and illustrated in Fig. 1A. A snowplow assembly (110) typically includes a moldboard (170) whose primary purpose is to push and direct snow. The moldboard (170) is held directly by an A-frame (140). The A-frame (140) allows the moldboard (170) to be lifted up and down and turn side-to-side. The A-frame (140) pivots on a connection point (143) for the up/down movement, and pistons (185) create the side-to-side movement. A lift mechanism, often comprising a hydraulic motor and a piston (150) causes a lift arm (130) to raise and lower. A chain (135) connects (145) the A-frame (140) to the lift arm causing the A-frame (140) to rise and lower simultaneously with the lift arm (130). An operator actuates the lift mechanism causing the piston (150) to extend, this raises the lift arm (130) and chain (135), thereby causing the A-frame (140) to pivot about the connection point (143) and raise the moldboard (170).

**[0034]** The raising and lowering of the moldboard (170) is exemplified in Fig. 1B. It can be seen in the figure that the piston (150) is extended causing the lift arm (130) to rise. The chain (135) connected to the A-frame (140) at the chain connection point (145) forces the A-frame (140) to pivot about the connection point (143). Consequently, as is illustrated in Fig. 1B, the moldboard (170) is raised significantly compared to the illustration of Fig. 1A.

**[0035]** The previously described traditional snowplow assembly (110) of Figs. 1A and 1B is according to one exemplary embodiment. The present exemplary system and method is configured for use with a wide variety of snowplow assemblies. While many variations of snowplow assemblies exist, many, if not all,

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contain lift mechanisms similar to the illustrated piston (150) of Figs. 1A and 1B. Nearly all snowplow assemblies utilize a lift arm (similar to 130 of Fig. 1) to cause a moldboard (170) to rise. The present system and method is intended as a backup or secondary lift mechanism for a traditional snowplow assembly. Consequently, the present exemplary system is compatible with any variety of a snowplow assembly having a lift mechanism.

**[0036]** A detailed view of the lift mechanism (250) including the piston (150) and lift arm (130) is illustrated in Fig. 2, according to one exemplary embodiment. Fig. 2 includes portions of the framework (210) securing the lift mechanism (250) and other components to the vehicle. Also illustrated are the headlights (137) common to many snowplow assemblies. Fig. 2 illustrates the detailed interactions of the lift mechanism (250) with the lift arm (130) and the chain (135) that cause the moldboard (170, Fig. 1B) to rise. As illustrated, the lift mechanism (250) commonly includes a hydraulic motor and a piston (150). When the piston (150) is extended the lift arm (130) pivots about a connection (235) with the framework (210). Fig. 1B shows the piston (150) extended and the lift arm (130) pivoted. Returning to Fig. 2, the lift arm (130), according to various exemplary embodiments, comprises a chain-connecting feature (230). The chain-connecting feature (230) is intended to secure one end of a chain (135) to the lift arm (130).

**[0037]** The previous section provides a detailed understanding of the lift mechanism (250) common to many snowplow assemblies. The present system and method, the secondary snowplow lift mechanism, provides a tool-less attachment of a secondary lift mechanism when the primary lift mechanism (250) fails. the secondary snowplow lift mechanism will be described below in conjunction with the specific details of Figs. 1A, 1B, and 2; however, this is done for ease of explanation only. the secondary snowplow lift mechanism is configured for use with any number and varieties of snowplow assemblies, not exclusively those having the specific details set out in the Figs. 1A-2.

**[0038]** Fig. 3 illustrates a perspective view of the secondary snowplow lift mechanism (300), according to one exemplary embodiment. As illustrated, the primary components of the secondary snowplow lift mechanism are an electric motor

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(310) attached to a cable (320) coiled about a drum, several frame sections and cable-guide sections (330, 335, 345), electrical connectors (315, 317), a clutch (380), a cable (325), pulley (350), and finally a hook (355) used to secure the secondary snowplow lift mechanism (300) to an A-frame (140, Fig. 1A) or a moldboard (170, Fig. 1A). Each of these components is described in detail below.

**[0039]** According to one exemplary embodiment, a snowplow operator controls the electric motor (310) of the secondary snowplow lift mechanism. The coil of cable (320) is directly attached to the electric motor (310) and by winding the coil (320) about the drum, the hook (355) is raised, thereby raising the moldboard (170, Fig. 1A). To lower the moldboard (170, Fig. 1A) an operator unwinds the coil (320) and gravity pulls the moldboard (170, Fig. 1A) to the ground. According to one exemplary embodiment, the electric motor (310) is capable of exerting a force much greater than the force necessary to lift a moldboard. This allows the motor (310) to lift heavy snow or even be used for alternative purposes commonly performed by traditional winches.

**[0040]** Regarding the coil of cable (320), the term cable is defined above as including, but not being limited to, a cord, a wire, a strap, a chain, or other similar object. With this in mind, a cable (325) may be of any suitable length, so long as it is sufficient to extend from the secondary snowplow lift mechanism to either portion of a moldboard or an A-frame. The hook (355) at one end of the cable (325) can be secured to a portion of the existing snowplow assembly. During the attachment of the secondary snowplow lift mechanism to an existing snowplow assembly, an operator releases the clutch (380). With the clutch (380) released, the operator freely pulls the cable (325) from the coil (320). The clutch (380) enables the operator to secure the hook (355) where desired. By returning the clutch (380) to a locked position, the coil of cable (320) is secured again. In a locked position, the clutch (380) prevents the cable (325) from both winding and unwinding without direct operation of the electric motor (310).

**[0041]** According to one exemplary embodiment, the secondary snowplow lift mechanism (300) is secured to a lift arm (130, Fig. 2) through a mounting plate (400, Fig. 4A) illustrated in Fig. 4A. As illustrate in Fig. 4A, the back side of the

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mounting plate (400), according to one exemplary embodiment, includes two metal plates (401, 402) and three extension members (470) positioned on the upper metal plate (402). Each extension member (470) is configured with a hole (475). The three holes (475) in the extension members (470) are aligned and configured to receive class III and IV pull pins (410), commonly referred to as cauter pins. The pin (410), according to one exemplary embodiment, has a hole (415) on one end configured to receive a click pin (417). The click pin (417) acts to secure the pin (410) within the holes (175) of the extension members (470). According to one exemplary embodiment, the mounting plate (400) is formed of a single metal plate as opposed to an upper (402) and a lower (401) plate bolted (450) together. Alternatively, the mounting plate (400) may comprise two plates (401, 402) fastened alternatively through welds, screws, glues, nuts, etc.

**[0042]** The backside of the mounting plate (400) described in reference to the drawing Fig. 4A is the portion of the mounting plate that interacts with a lift arm (130, Fig. 2). Consequently, the three extension members (470) are configured to interact with a wide variety of lift arms. This novel configuration allows the mounting plate (400) to universally connect and secure the secondary snowplow lift mechanism to any lift arm. According to alternative embodiments, the mounting plate (400) comprises any of a variety of materials including, but not limited to, metals, plastics, composites, fiberglass, carbon fibers, etc. Additionally, while the present exemplary embodiment illustrates three extension members (470), any number of extension members may be utilized. Furthermore, the extension members may extend varying amounts and be of various lengths. In particular, a mounting plate (400) may be customized for use with a specific snowplow assembly.

**[0043]** Should it be desired, a mounting plate may be configured that would allow for securement to any portion of a snowplow assembly, not exclusively a lift arm. Odd shaped extension members and additional holes or other features are within the scope of the present system and method. Indeed, considering the wide variety of possible snowplow assemblies it is expected that many variations of mounting plates are possible. It is conceivable and within the scope of the present system and method to customize a mounting plate allowing the secondary snowplow

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lift mechanism (300) to be mounted on any possible snowplow in a variety of locations.

**[0044]** Fig. 4B illustrates the front side of the mounting plate (400) of Fig. 4A, according to one exemplary embodiment. The front side of a mounting plate (400) is configured to engage and be secured to the frame sections (330, 335, 345, of Fig. 3) of the secondary snowplow lift mechanism (300). Holes (470) in the lower plate (401) allow fasteners to be passed through for securement of the mounting plate (400) to the frame (330) of the secondary snowplow lift mechanism (300). Additionally, an overhang portion of the upper plate (402), best seen in Fig. 4B, may be configured to interact with the frame (330) of the secondary snowplow lift mechanism (300). Feet, (460) each having a hole (465), also provide a location for the mounting plate (400) to be secured by fasteners to the frame (330) of the secondary snowplow lift mechanism.

**[0045]** The purpose of the mounting plate (400) is to provide a coupling means between the main portions of the secondary snowplow lift mechanism (300) and a snowplow assembly (110). Consequently, many possible variations exist and are possible when alternative snowplow assemblies and alternative the secondary snowplow lift mechanism configurations are used. According to one exemplary embodiment, a typical winch is used instead of a custom electric motor (310), cable (325), coil (330), and frame (330). Accordingly, depending on the configuration of the winch, a mounting plate (400) may be configured for attachment to the specifics of a given winch.

**[0046]** Ultimately, while many variations of the backside (shown in Fig. 4A) of the mounting plate (400) are possible, a design similar to that shown in Fig. 4A has proven to be of specific use in that it is compatible with a wide variety of commonly used snowplow assemblies. Additionally, the mounting plate shown in Figs. 4A and 4B can be universally used with a wide variety of winches and is securable to the lift arms of a various commonly used snowplow assemblies. So, while many variations are possible and within the scope of the present system and method, the illustrated embodiment has specific utility in that it may be universally used with many snowplow assemblies.

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**[0047]** Previously unmentioned, the mounting plate (400), according to one exemplary embodiment, is configured with a loop (480). In several applications the loop (480) provides a means for the cable (325) to be passed there through in order to impart a downward force on the extension members (470) when the cable is retracted, aiding in the securement of the mounting plate (400) and in the overall securement of the secondary snowplow lift mechanism (300). The loop (480) provides another means of allowing a single configuration of a mounting plate (400) to be used with a wide variety of snowplow assemblies.

**[0048]** Fig. 5 illustrates the mounting plate (400) of Figs. 4A and 4B being secured to the backside of the embodiment of the secondary snowplow lift mechanism (300) illustrated in Fig. 3. According to this embodiment, the mounting plate (400) is mounted to the frame (330) of the secondary snowplow lift mechanism (300). As illustrated, the mounting plate (400) may be securely coupled to the secondary snowplow lift mechanism (300) using any number of fastening systems including, but in no way limited to, fasteners, welding, adhesive, and/or engagement with the overhang (420) and feet (460). With a mounting plate (400) secured to the secondary snowplow lift mechanism (300), the secondary snowplow lift mechanism is ready to be installed on a lift arm (130, Fig. 2). Fig. 6 illustrates the secondary snowplow lift mechanism (300) with an attached mounting plate (not shown in Fig. 6) being secured to a lift arm (130) of a snowplow assembly (110). The extension members (470) couple with the chain-connecting feature (230) of the lift arm (130).

**[0049]** Once in place as is illustrated in Fig. 7, a class III or IV pin (410) is inserted through the holes (475) in the extension members (470). This is shown in Fig. 8, according to one exemplary embodiment, wherein the pin (410) is inserted to secure the secondary snowplow lift mechanism (300) to the lift arm (130). After the class III or IV pin (410) has been inserted, a click pin (417) is inserted to fully locking the secondary snowplow lift mechanism (300) to the lift arm (130) of the snowplow assembly (110).

**[0050]** Fig. 8A illustrates the secondary snowplow lift mechanism (300), according to one exemplary embodiment, secured to a snowplow assembly (110) attached to a vehicle (120). As is illustrated in Fig. 8A, the secondary snowplow lift

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mechanism (300) is secured specifically to the lift arm (130) of the snowplow assembly (110). The cable (325) is extended sufficiently for the hook (355) to be attached to the A-frame (140) of the snowplow assembly (110). According to one exemplary embodiment and as illustrated in Fig. 8A, the A-frame (140) is fitted with a chain-connection point (145) suitable for attachment of the hook (355). According to alternative embodiments, should a suitable attachment location for the hook (355) not be present, additional d-rings may be fitted to accommodate the hook (355). Alternatively, the cable could be wrapped around a portion of the A-frame (140) and the hook (355) subsequently hooked around the cable (325) itself. Various methods of securing the cable (325) to the snowplow assembly (110) are possible, and any method wherein the cable (325) is free to raise up the moldboard (170) is satisfactory.

**[0051]** With the secondary snowplow lift mechanism (300) fully secured to the lift arm (130) and the cable (325) secured by means of the hook (355) to the A-frame (140), the electrical connections necessary for a user to operate the secondary snowplow lift mechanism (300) can be made. Fig. 8B illustrates these connections according to one exemplary embodiment. For the electric motor (310) to receive power, power cables (825) connect the electric connectors (315) on the secondary snowplow lift mechanism (300) to the battery (820) of the vehicle, possibly via alligator or parrot jaw clamps. Electric connectors (315) also receive input from the operator via a controller (810) connected by a cable (815). When the operator presses either up or down on the controller (810) the electric connectors (315) of the secondary snowplow lift mechanism (300) will relay the correct polarization of current to the connectors (818) on the electric motor (310).

**[0052]** According to alternative embodiments, the controller (810) may be wirelessly connected to the electric connectors (315), as opposed to the illustrated method via a cable (815). Additionally, it is also conceivable to connect the power cables (825) to the preexisting power cables on the primary lift mechanism. According to one exemplary embodiment, the power cables are connected from a relay box near electric connectors (315) on the secondary snowplow lift mechanism (300) to the power input terminals on the primary lift mechanism. Additionally, either

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an adaptor or a splice connects the preexisting snowplow controller to the relay box. According to this embodiment, advantages may include not having to run a new controller to the operator, and not having to attach cables to the battery. However, a drawback may include including cable adaptors for the electric connectors to accommodate the variety of snowplows or splice wires.

**[0053]** By pressing 'up' on the controller (810) power will be transferred from the battery (820) to the electric motor (310). This will cause the coil of cable (320) to wind the cable (325), which in turn will pull the A-frame (140) upwards via the hook (355). The upward force on the A-frame (140) will pivot about the connection point (143) and cause the moldboard (170) to rise. If the primary lift mechanism (250, Fig. 2) should fail, an operator may, without the use of a single tool, secure the secondary snowplow lift mechanism (300) to the existing lift arm (130) and connect the various electrical leads (315, 815, 825, 818) and regain vertical control of the moldboard (170). Once the secondary snowplow lift mechanism (300) is fully installed, the operator may again raise and lower the moldboard (170) and continue to plow snow until an opportunity arises to repair the primary lift mechanism (250).

**[0054]** According to one exemplary embodiment, the secondary snowplow lift mechanism (300) is extended to include two similar apparatuses mounted near the pistons (185) located on the A-frame (140). These two similar smaller versions of the secondary snowplow lift mechanism may be connected to the same controller (810) adding 'left' and 'right' (side-to-side) functionality to the overall system. Consequently, according to this exemplary embodiment, three the secondary snowplow lift mechanism apparatus are connected to the existing snowplow assembly returning full functionality to a snowplow assembly with a failed primary lift mechanism.

**Method of use**

**[0055]** Fig. 9 provides a flow chart illustrating a process of utilizing the secondary snowplow lift mechanism once a primary lift mechanism has failed, according to one exemplary embodiment. When a lift mechanism fails in a

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snowplow assembly an operator is unable to raise the moldboard. As previously described in detail, the secondary snowplow lift mechanism (300, Fig. 3) returns vertical control of the moldboard (700, Fig. 8B) to an operator. Fig. 9 details a process of connecting the secondary snowplow lift mechanism (300, Fig. 8B) to an existing snowplow assembly (110). Throughout the following description, all reference numbers refer to Fig. 8B unless otherwise noted.

**[0056]** Before attaching the secondary snowplow lift mechanism (300) to a snowplow assembly (120) the first step is to remove the chain (135, Fig. 1A) that connects the lift arm (130, Fig. 1A) to the A-frame (140) (Step 1). Once the preexisting chain is removed, the secondary snowplow lift mechanism is positioned on the lift arm (130) (Step 2). This is illustrated in Figs. 5, 6, 7A, and 7B. Fig. 5 illustrates a mounting plate (400) configured to secure the secondary snowplow lift mechanism (300) to a lift arm (130). Fig. 6 illustrates the placement of the secondary snowplow lift mechanism (300) on the lift arm (130). Figs. 7A and 7B illustrate the secondary snowplow lift mechanism (300) in place on the lift arm (130) and the locking in place of the secondary snowplow lift mechanism (300) via the class III or IV pin (410) (Step 3).

**[0057]** With the secondary snowplow lift mechanism (300) secured to the lift arm (130), an operator releases the clutch (380). With the clutch (380) released, the operator is free to pull the hook (355) and unwind enough cable (325) to secure the hook (355) to either a portion of the A-frame (140) or to the moldboard (170) itself (Step 4). Should there not be an adequate location for the hook (355) to be secured, D-rings may be attached to the moldboard (170) or the A-frame (140). The D-rings provide a location for the hook (355) to be attached. Once the hook (355) is in place, the clutch (380) is locked again (Step 5). This ensures that only the electric motor (310) will control the cable (325) being wound and unwound. In other words, the electric motor (310) allows the cable (325) to raise the moldboard (170) without the cable (325) freely unwinding because the clutch is locked.

**[0058]** Finally, the power cables (825) are connected to the battery (820) and a cable (815) connects a controller (810) to the electric connectors (315) on the secondary snowplow lift mechanism (300). The power cables (825), according to

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one exemplary embodiment, are connected directly to the battery (820) through the use of alligator clamps or parrot jaw clamps (Step 6). According to one exemplary embodiment, a cable (810) runs through the window or door of a vehicle connecting the controller (810) to the electric connectors (315). Alternative embodiments include wireless connectivity, and power cables (825) connecting to existing lift mechanisms, possibly allowing the use of the existing controller to control the movement of the secondary snowplow lift mechanism (300).

**[0059]** The preceding description provides a method of securing the secondary snowplow lift mechanism to a snowplow assembly, according to one exemplary embodiment. The steps delineated in Fig. 9 may be performed in the order described above; however, the same results may be achieved by performing the steps in an alternative order, so long as it results in the secondary snowplow lift mechanism (300) being locked to the lift arm (130), the hook (355) being secured to the A-frame (140), and the necessary electric connections being made.

**[0060]** The preceding description has been presented only to illustrate and describe the present method and system. It is not intended to be exhaustive or to limit the present system and method to any precise form disclosed. Many modifications and variations are possible in light of the above teaching.

**[0061]** The foregoing embodiments were chosen and described in order to illustrate principles of the system and method as well as some practical applications. The preceding description enables others skilled in the art to utilize the method and system in various embodiments and with various modifications, as are suited to the particular use contemplated. It is intended that the scope of the present exemplary system and method be defined by the following claims.

**Docket #****WHAT IS CLAIMED IS:**

1. A snowplow apparatus comprising:  
a first member configured to selectively raise and lower a second member of a snowplow; and  
a mounting plate;  
wherein said mounting plate is configured to removably couple said first member to a portion of a snowplow assembly.
2. The snowplow apparatus of claim 1, wherein said portion of said snowplow assembly comprises a lift arm of said snowplow assemblies.
3. The apparatus of claim 1, wherein said second member comprises a flexible member.
4. The apparatus of claim 3, wherein said second member comprises one of a strap, cable, wire, chain, rope, or linked members.
5. The apparatus of claim 3, wherein said first member comprises  
a drum;  
an motor coupled to said drum;  
said flexible member comprising a first end and a second end, said first end being secured to said drum;  
wherein said motor is configured to rotate said drum, thereby winding said flexible member about said drum.
6. The apparatus of claim 5, wherein said second end of said flexible member is fixedly attached through a securing means to a portion of said snowplow assembly, wherein when said flexible member is wound about said drum a moldboard of said snowplow assembly is raised.

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7. The apparatus of claim 6, wherein said securing means comprises a hook configured to be secured to an A-frame of said snowplow assembly.

8. The apparatus of claim 6, wherein said motor coupled to said drum is configured to rotate said drum in two directions;

a first direction causing said flexible member to be wound about said drum;  
and

a second direction causing said flexible member to be unwound from said drum;

wherein a controller controls the direction of rotation of said drum from within a vehicle to which said snowplow assembly is attached.

9. A detachable snowplow lift mechanism comprising:

a drum;

a motor coupled to said drum;

a flexible member comprising a first end and a second end, said first end being secured to said drum;

a mounting plate;

a controller communicatively coupled to said motor; and

at least one power lead configured to couple said motor to a power source;

wherein said motor is configured to rotate said drum, to selectively wind said flexible member about said drum; and

wherein said mounting plate is configured to secure said detachable lift mechanism to a snowplow assembly.

10. The detachable lift mechanism of claim 9, wherein said mounting plate is configured to secure said detachable lift mechanism to a lift arm of said snowplow assembly.

11. The detachable lift mechanism of claim 9, wherein said flexible member comprises one of a strap, a cable, a wire, a chain, a rope, or linked members.

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12. The detachable lift mechanism of claim 9, wherein said second end of said flexible member is detachably coupled to a second portion of said snowplow assembly;

wherein when said flexible member is wound about said drum, said flexible member causes a moldboard of said snowplow assembly to rise.

13. The detachable lift mechanism of claim 12, wherein said flexible member is detachably coupled to said snowplow assembly by a hook configured to secure said flexible member to an A-frame of said snowplow assembly.

14. The detachable lift mechanism of claim 13, further comprising a controller;

wherein said controller is communicatively connected to said motor; and

wherein said controller transmits a signal to said motor causing said motor to selectively rotate in either of a first direction or a second direction;

said first direction causing said flexible member to be wound about said drum, causing said moldboard to rise; and

said second direction causing said flexible member to be unwound from said drum, causing said moldboard to lower.

15. A mounting plate comprising:

a front portion; and

a rear portion;

said front portion of said mounting plate further includes at least one attachment feature configured to secure said mounting plate to a lift mechanism; and

said rear portion of said mounting plate further including at least one extension member configured to be securely mated with a portion of a snowplow assembly.

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16. The mounting plate of claim 15, wherein said portion of said snowplow assembly comprises a lift arm;

said at least one extension member including at least one mounting tab configured to engage with a chain-securing feature of said lift arm.

17. The mounting plate of claim 16, comprising at least three mounting tabs formed on said rear portion of said mounting plate;

said at least three mounting tabs being configured to engage with a chain-securing feature of said lift arm.

18. The mounting plate of claim 17, wherein said mounting plate is secured to a lift arm without the use of tools;

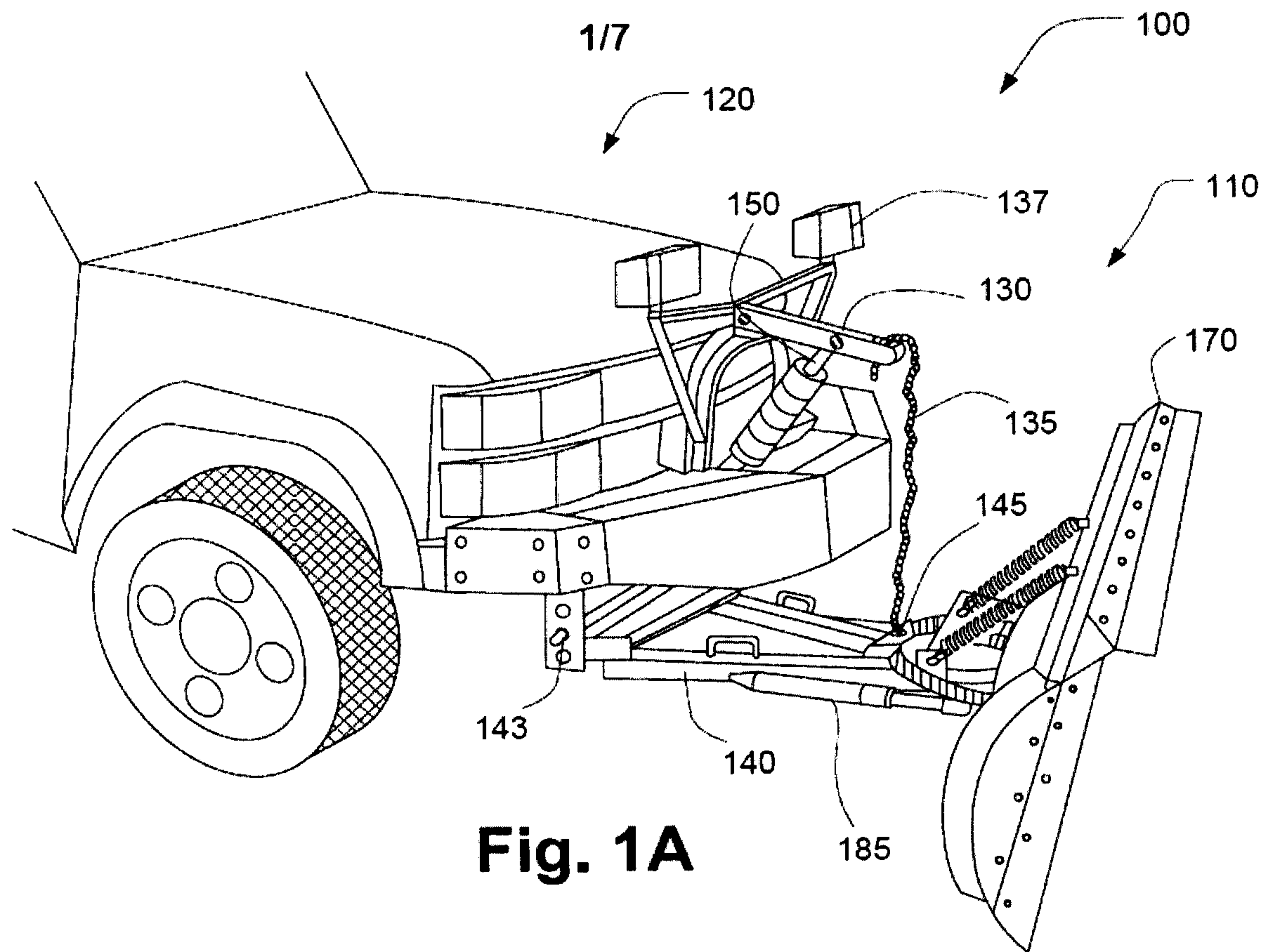
wherein each of said at least three mounting tabs further define a thru-bore, said thru-bores being aligned and configured to receive a pin;

said pin being configured to lock said mounting plate to said lift arm.

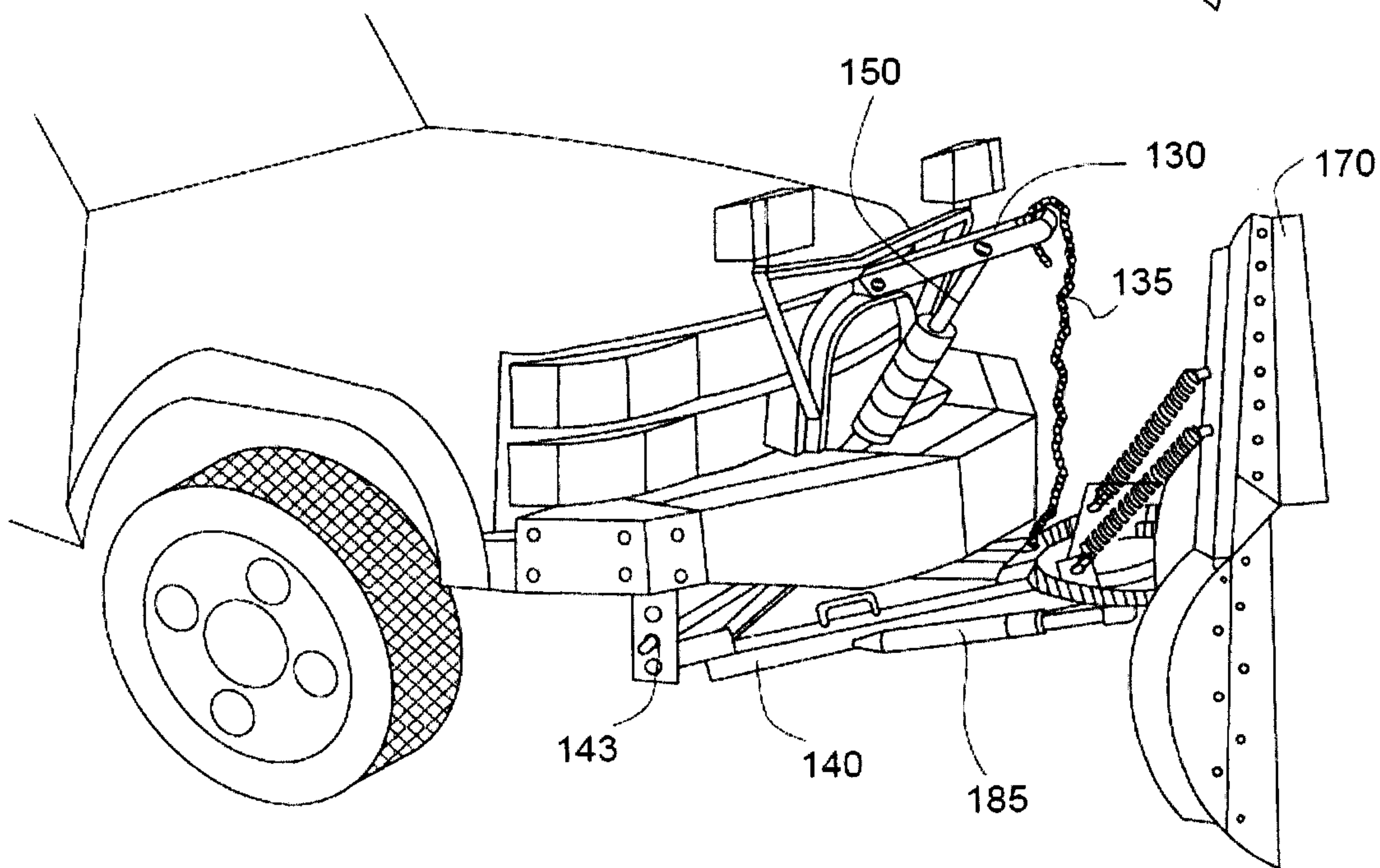
19. The mounting plate of claim 15, further defining thru-bores configured to receive and pass fasteners through said mounting plate to secure said mounting plate to said lift mechanism.

20. The mounting plate of claim 19, wherein said attachment features comprise protruding features, wherein said protruding features are configured to engage said lift mechanism and aid in securing said mounting plate to said lift mechanism.

**Title:** Quick-Attach Secondary Lift Mechanism for Snowplows  
**Inventor:** Andrew T. Roberts  
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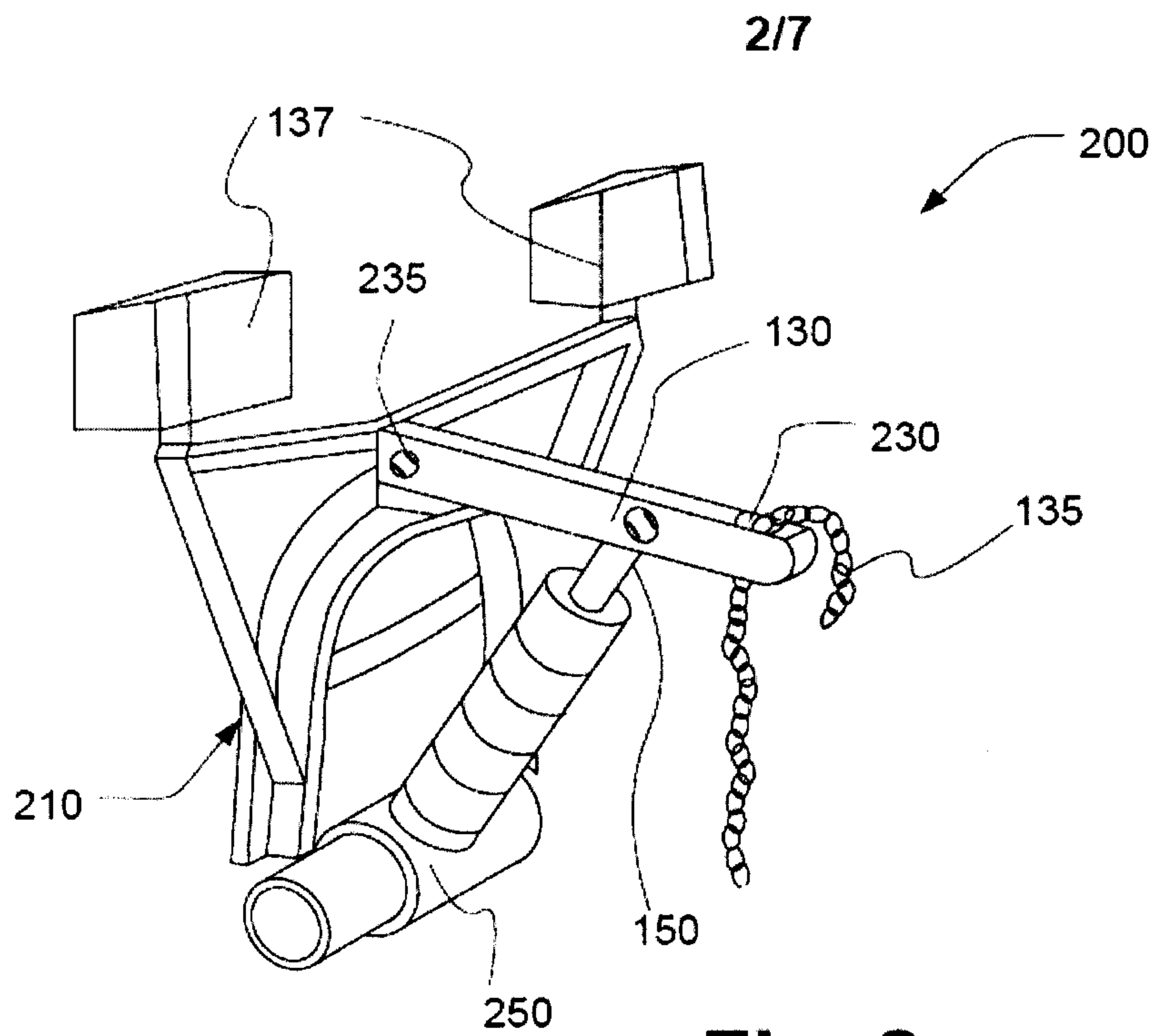


**Fig. 1A**

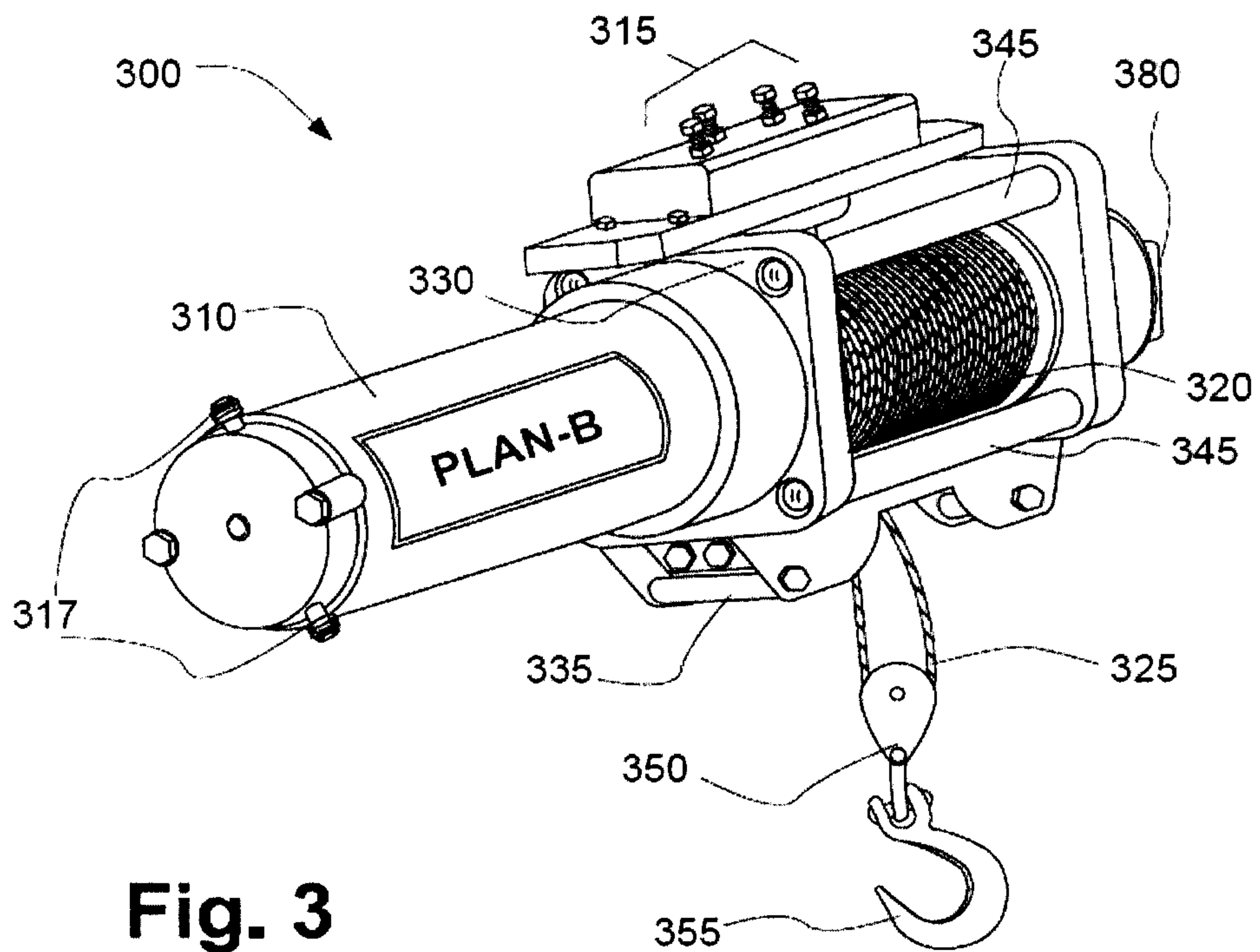


**Fig. 1B**

**Title:** Quick-Attach Secondary Lift Mechanism for Snowplows  
**Inventor:** Andrew T. Roberts  
**Docket No.:** Roberts - 2

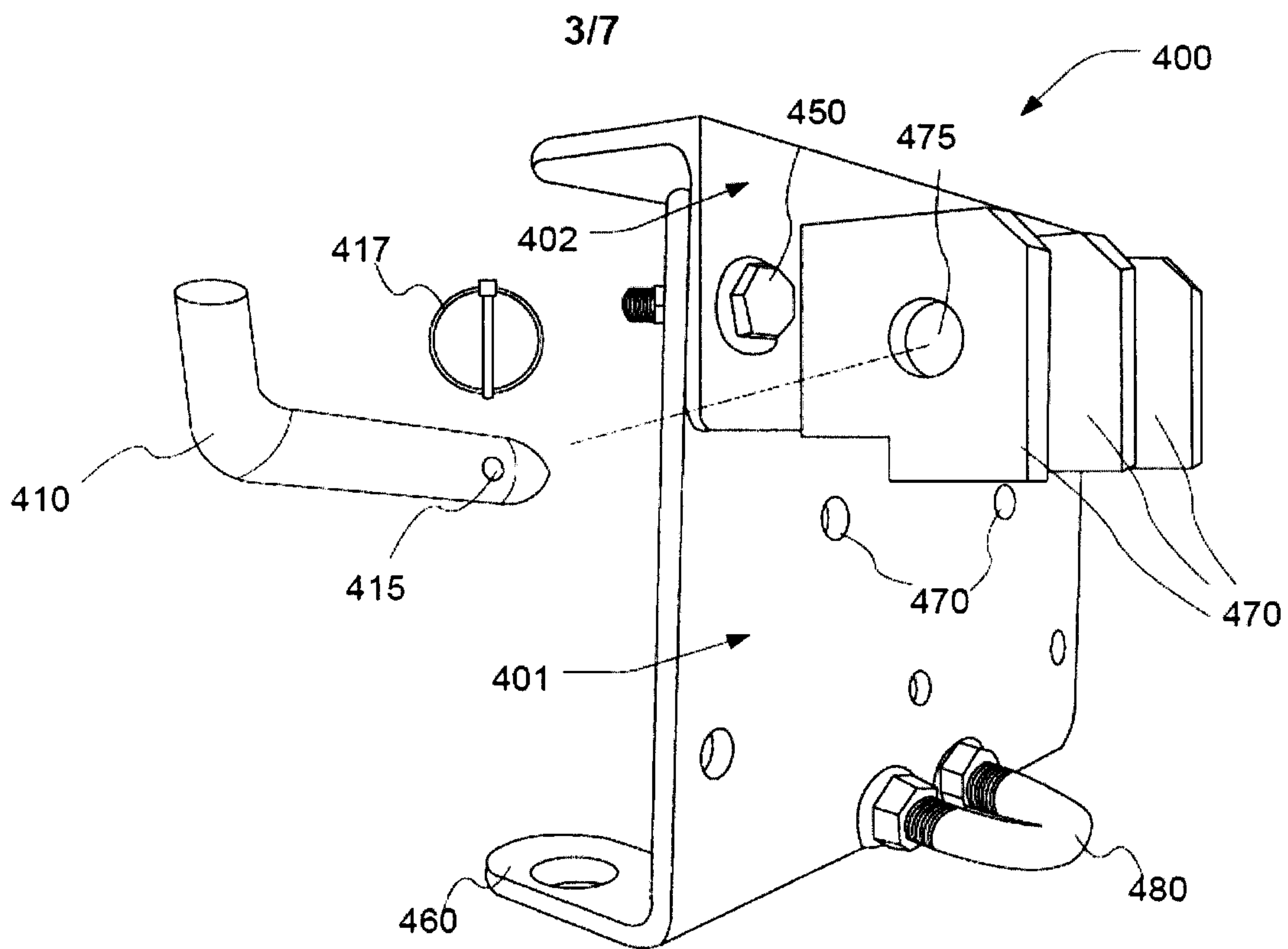


**Fig. 2**

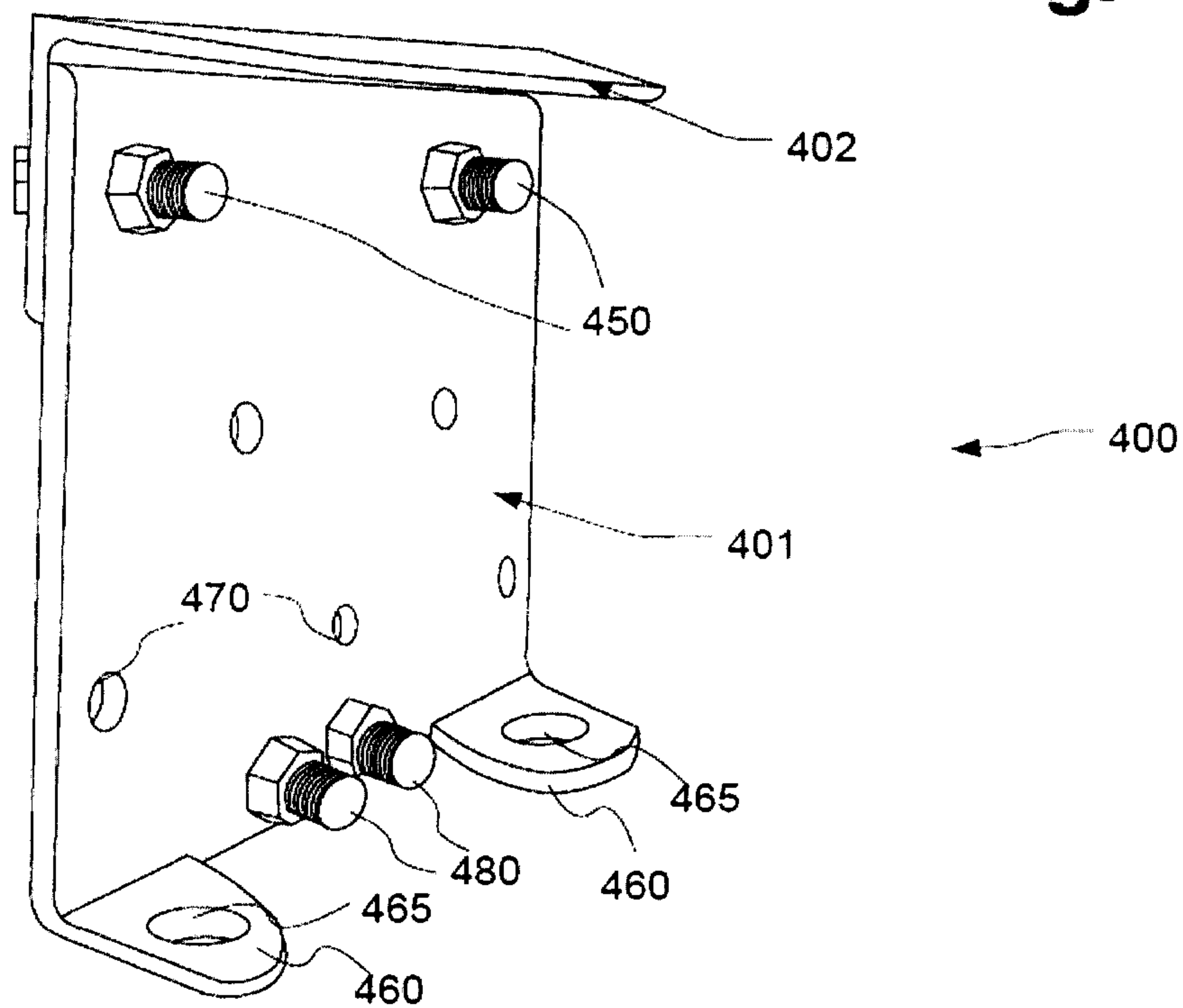


**Fig. 3**

**Title:** Quick-Attach Secondary Lift Mechanism for Snowplows  
**Inventor:** Andrew T. Roberts  
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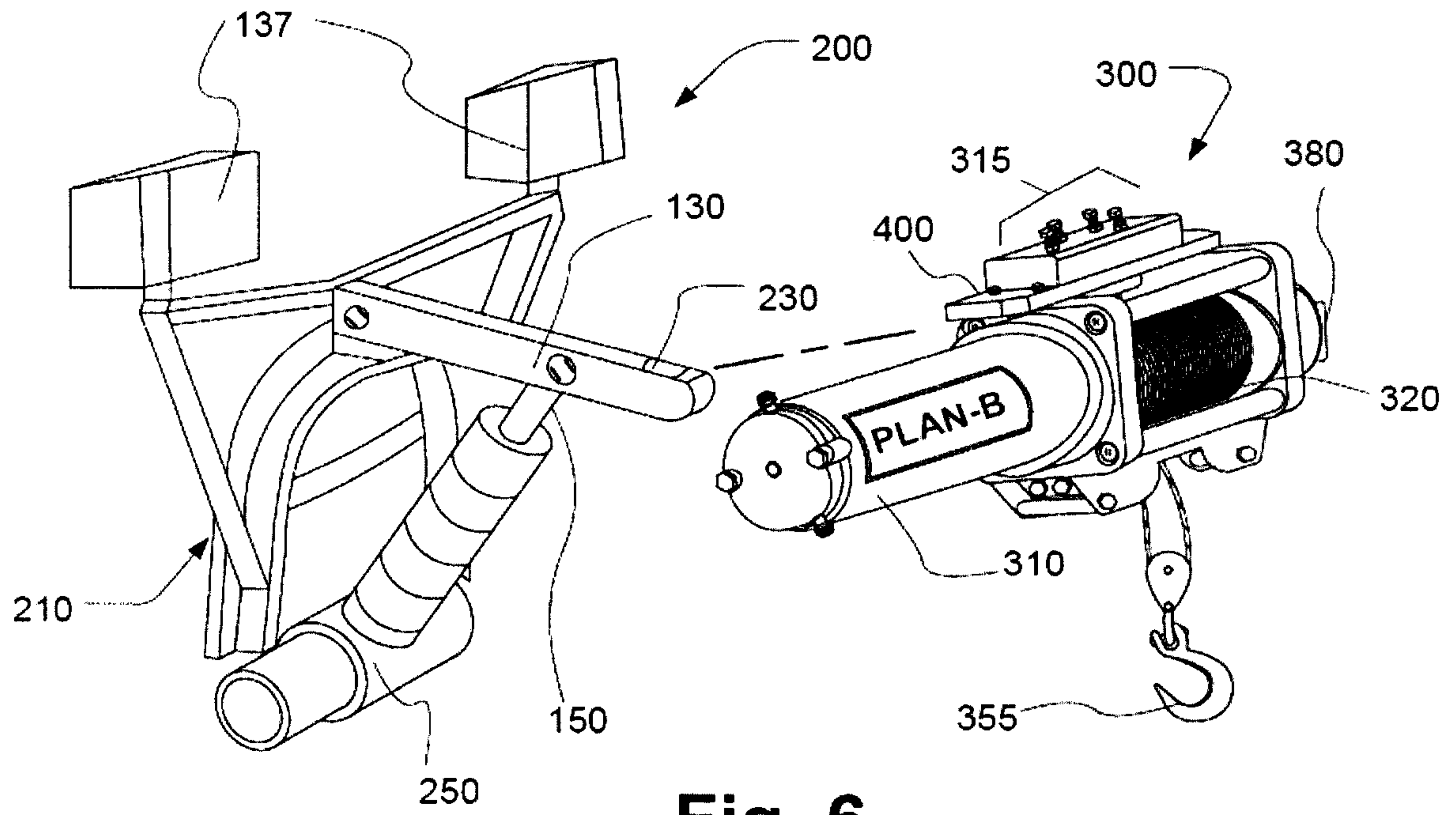
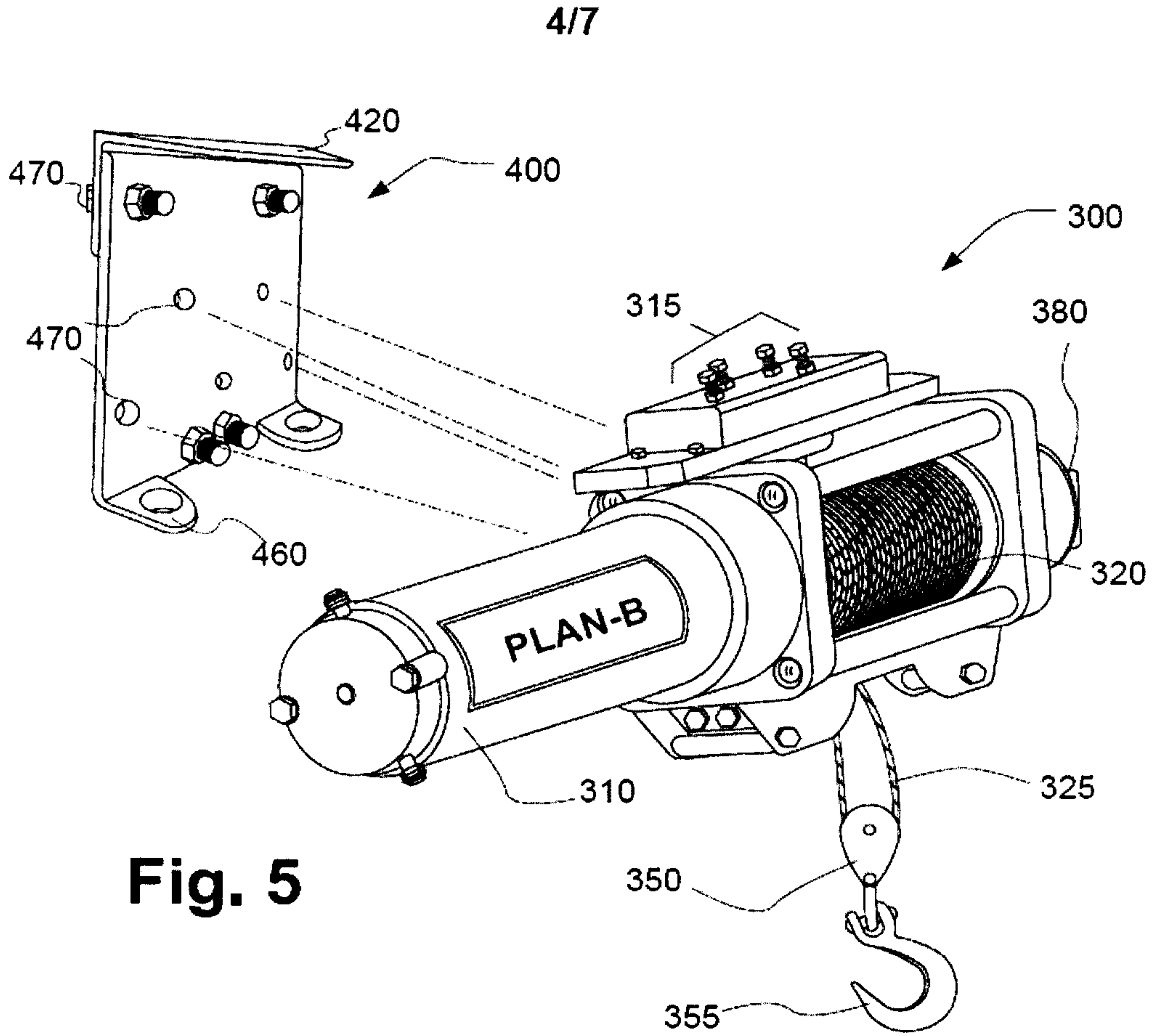


**Fig. 4A**

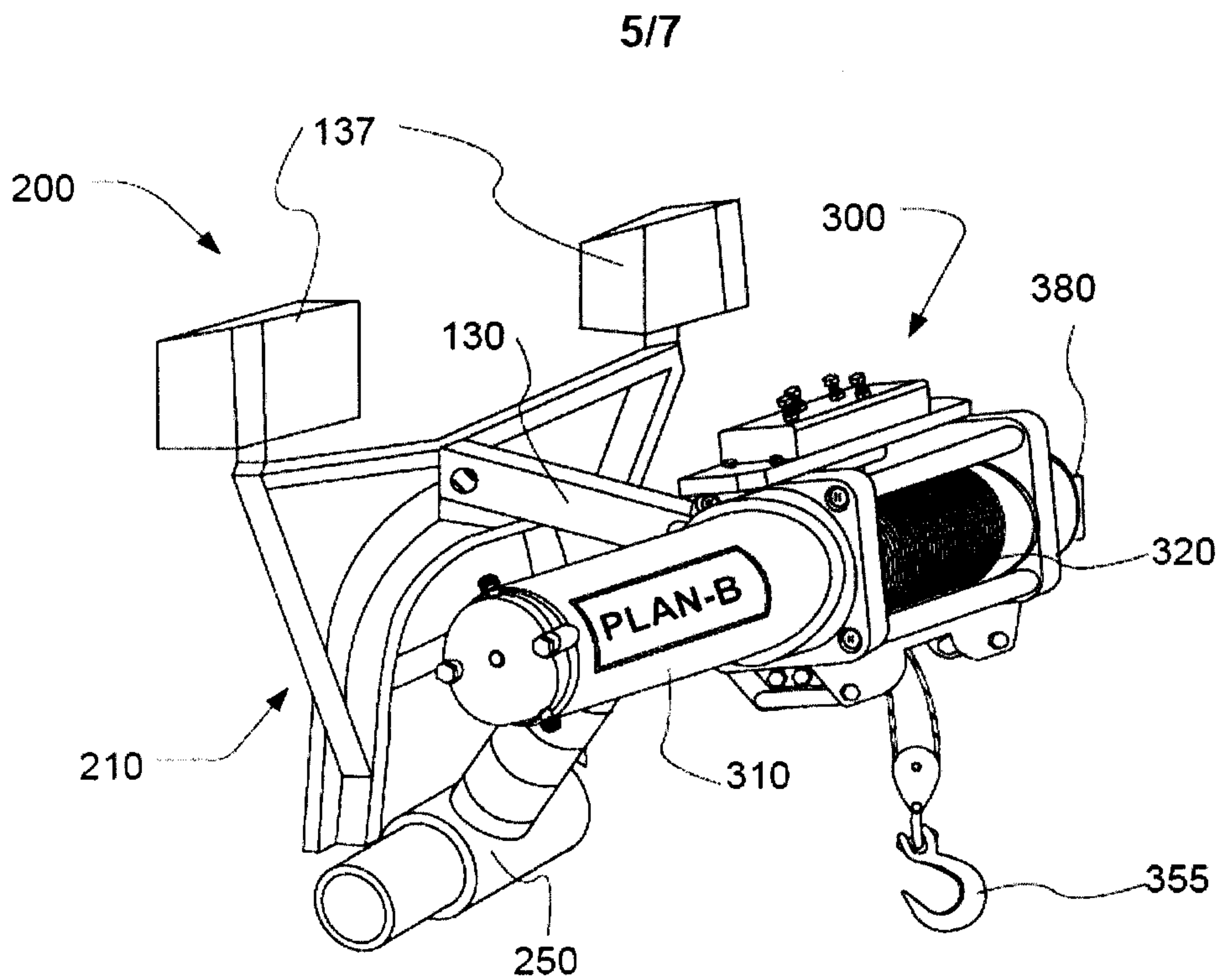


**Fig. 4B**

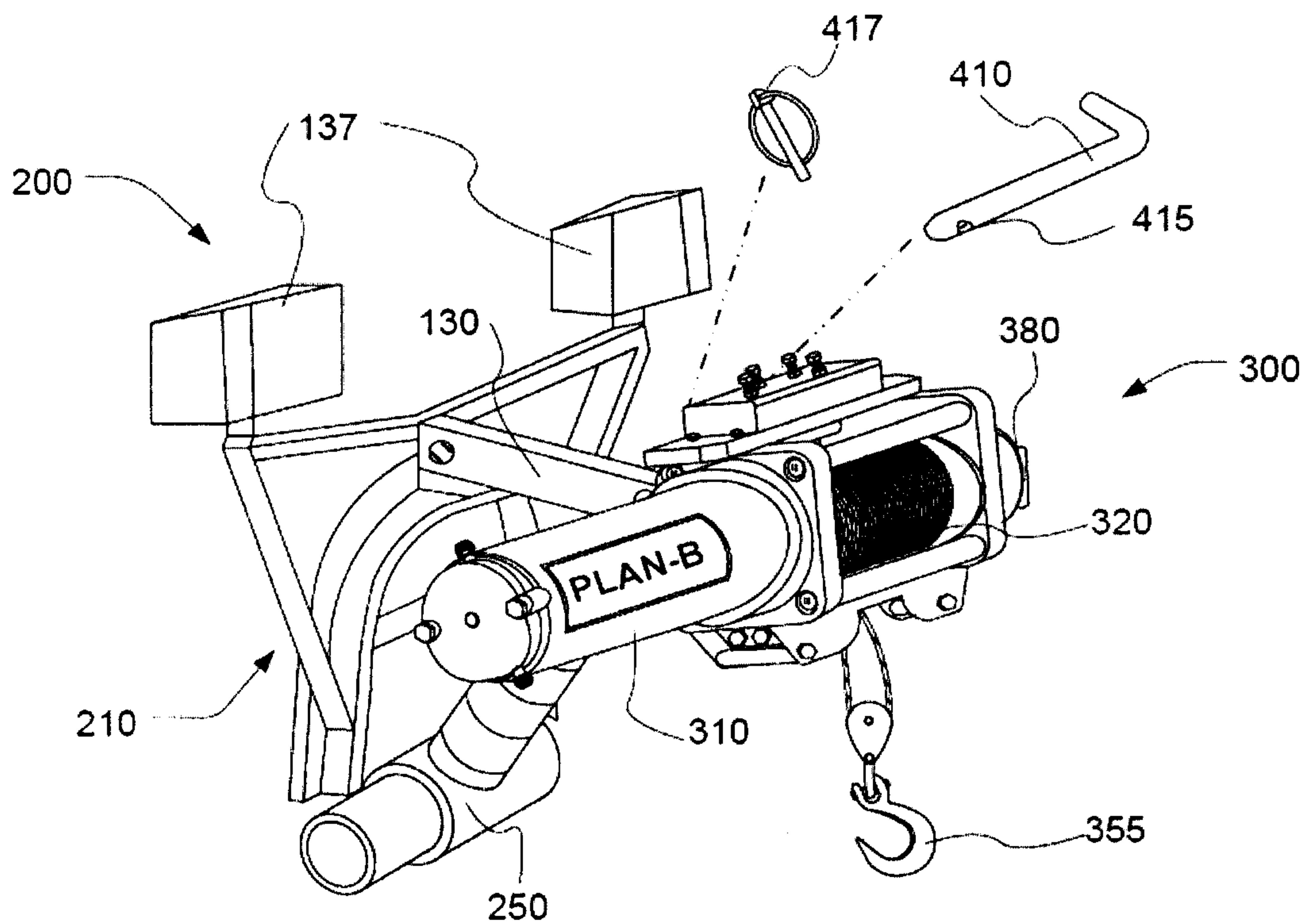
**Title:** Quick-Attach Secondary Lift Mechanism for Snowplows  
**Inventor:** Andrew T. Roberts  
**Docket No.:** Roberts - 2



**Title:** Quick-Attach Secondary Lift Mechanism for Snowplows  
**Inventor:** Andrew T. Roberts  
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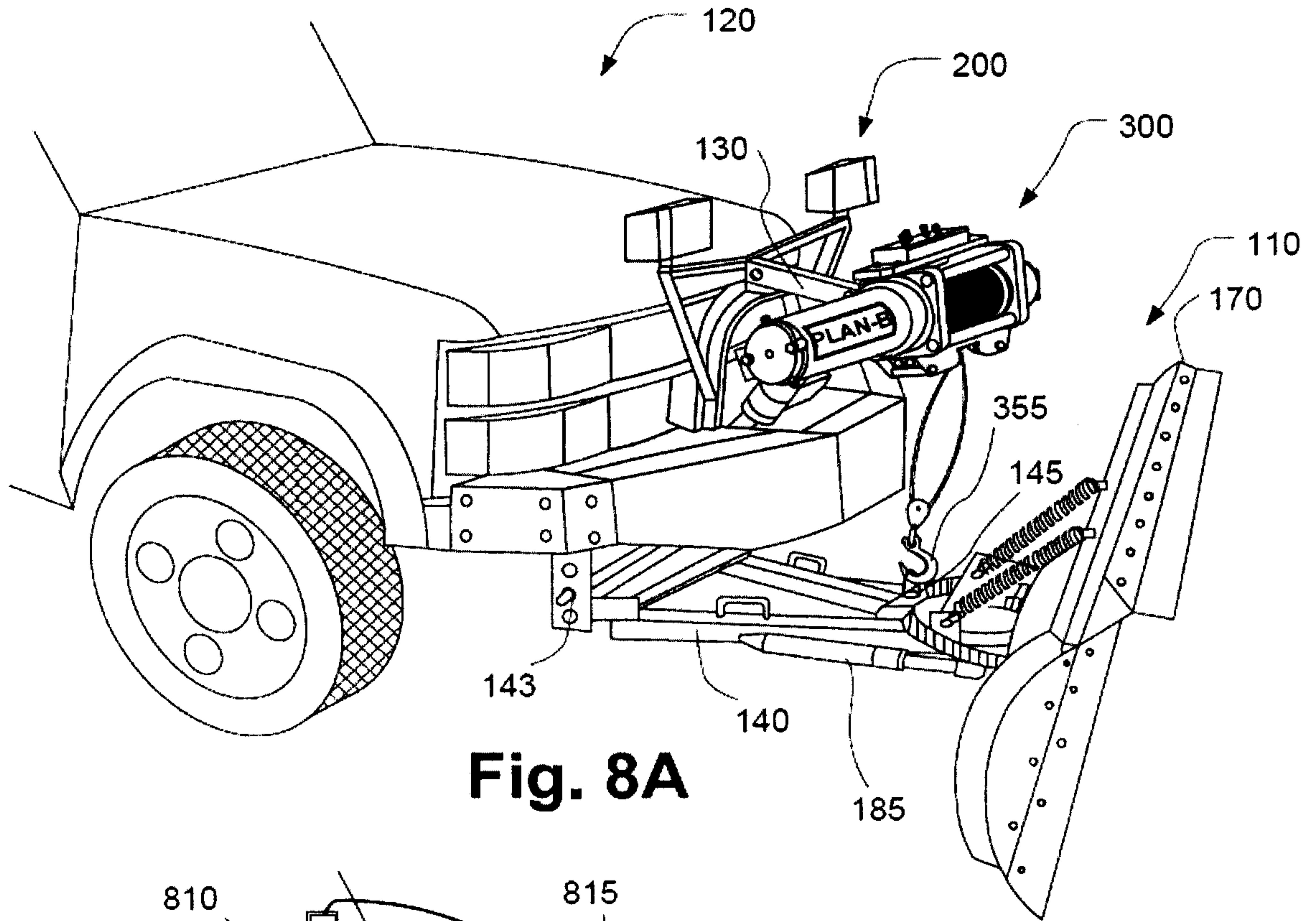
**Fig. 7A**



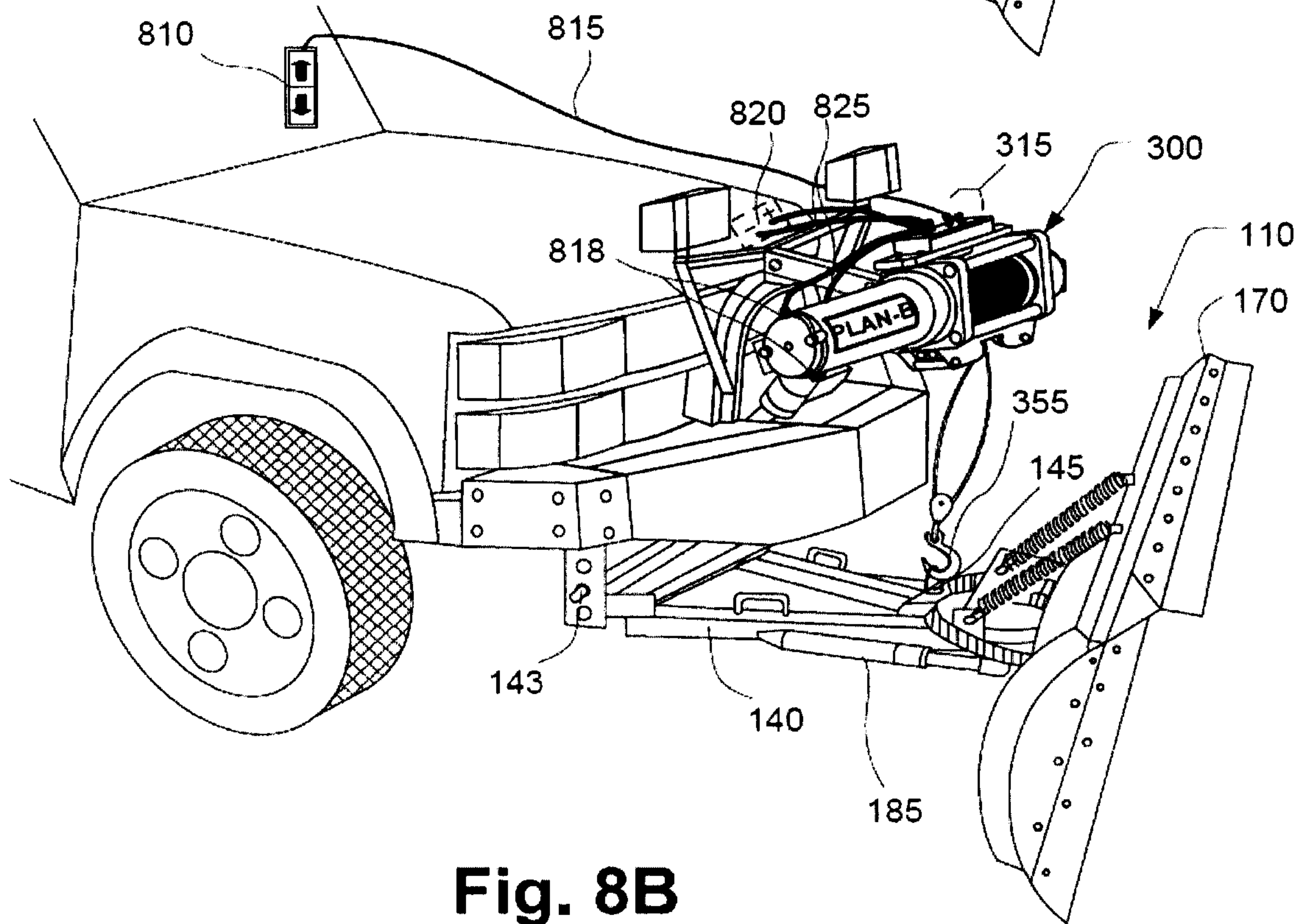
**Fig. 7B**

**Title:** Quick-Attach Secondary Lift Mechanism for Snowplows  
**Inventor:** Andrew T. Roberts  
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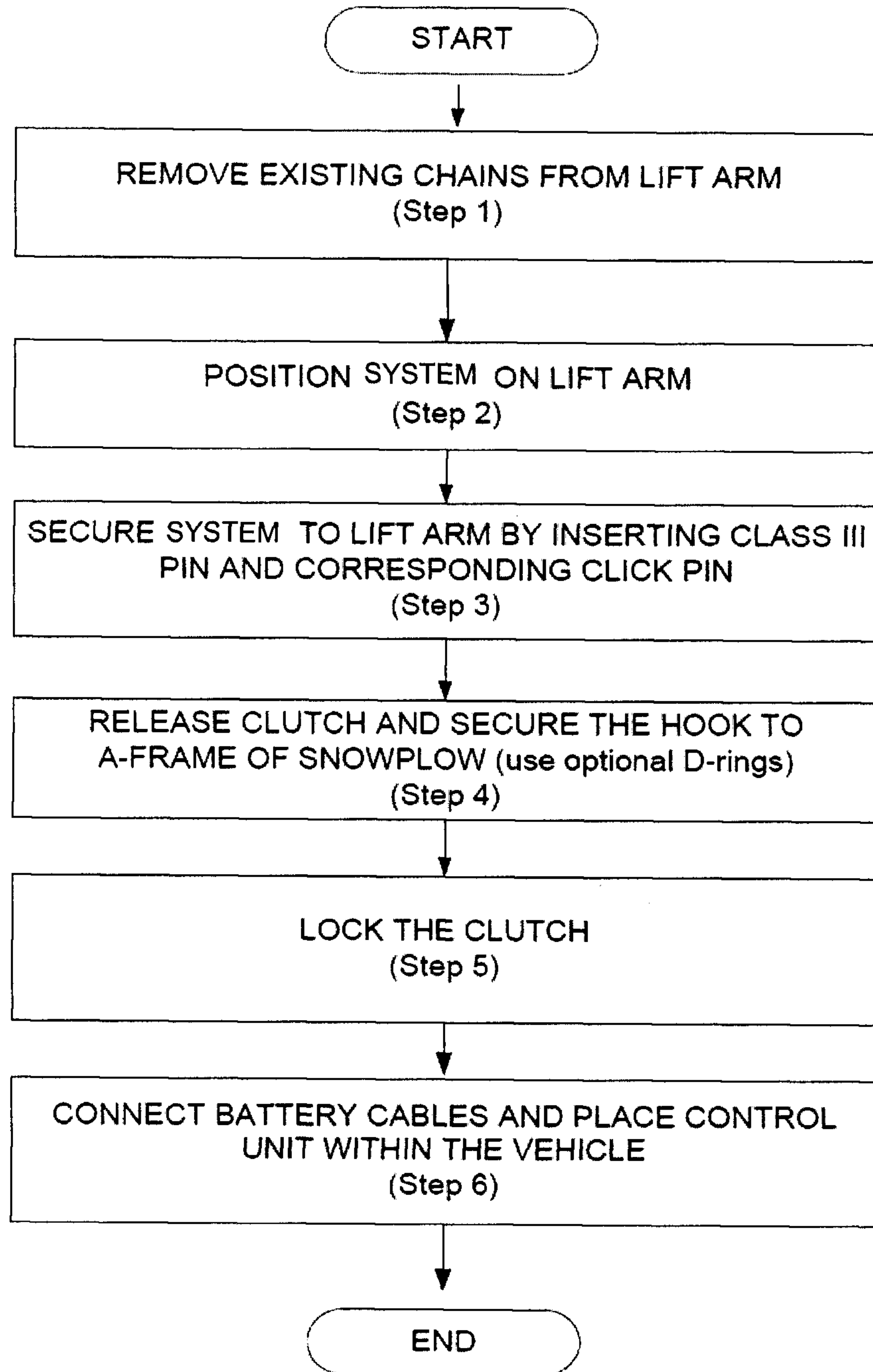
**Fig. 8A**



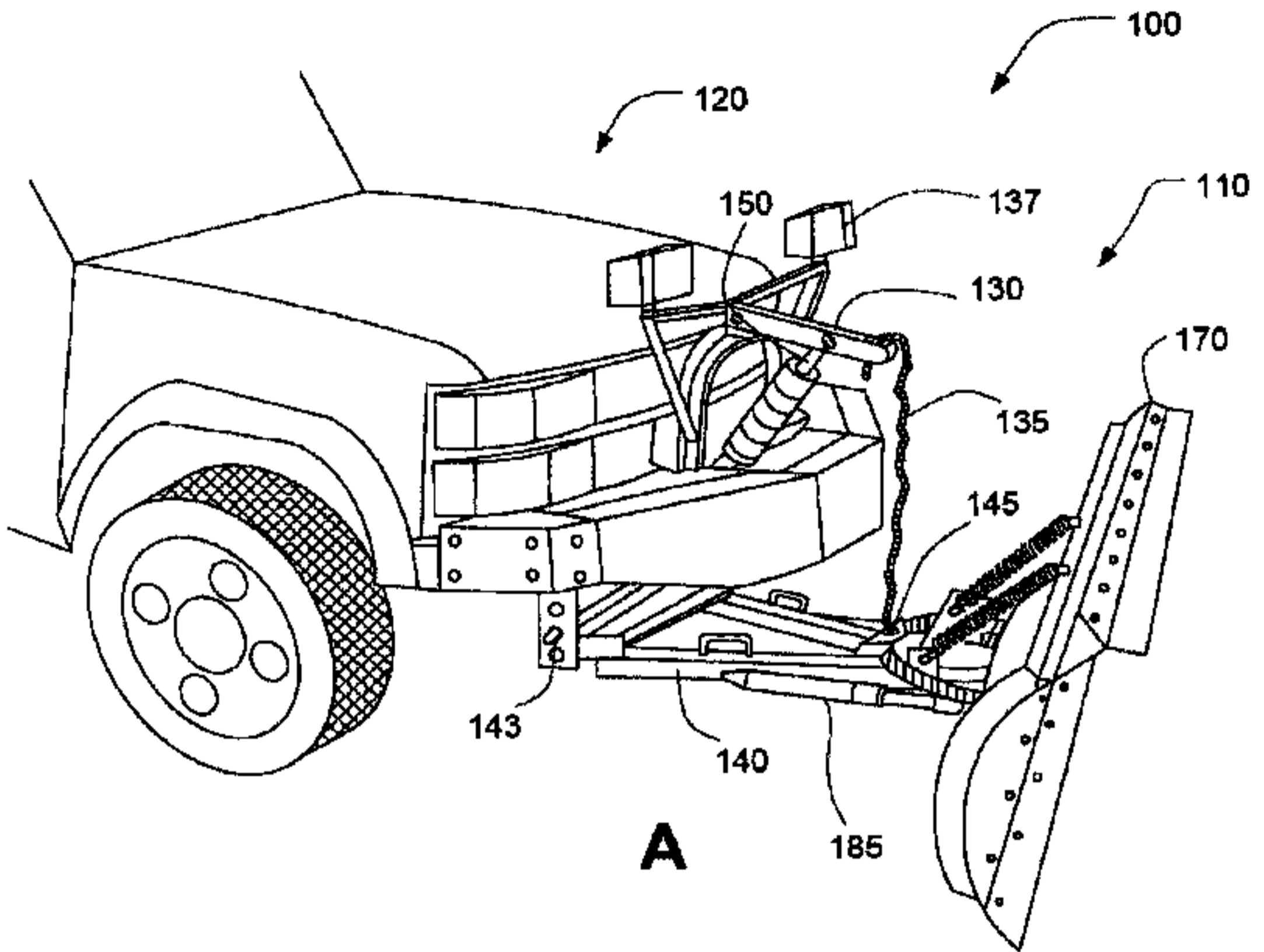
**Fig. 8B**

**Title:** Quick-Attach Secondary Lift Mechanism for Snowplows  
**Inventor:** Andrew T. Roberts  
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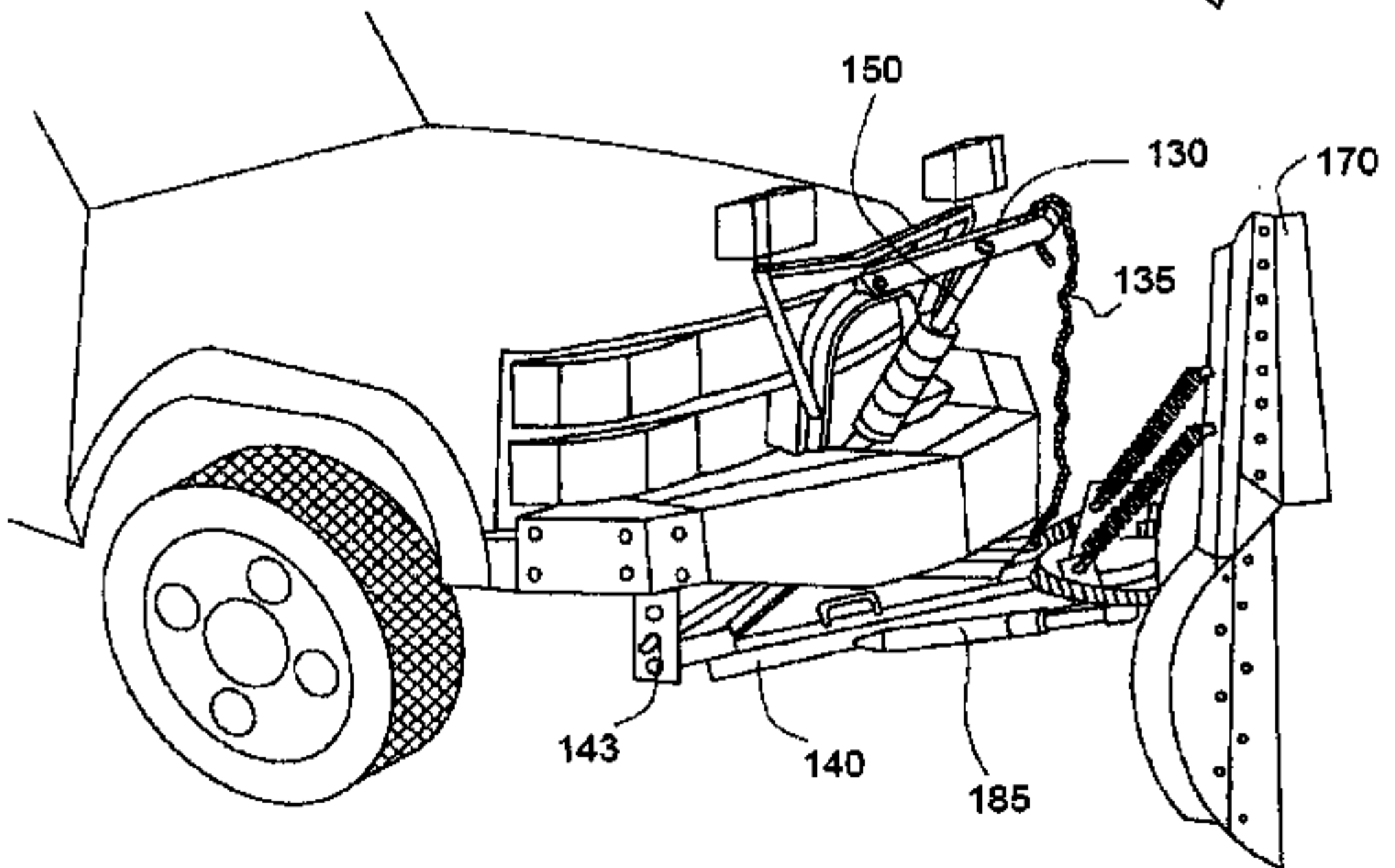
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**Fig. 9**



**A**



**B**