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(54) **BACK DRAG SYSTEM FOR PLOW TRIP BLADE**

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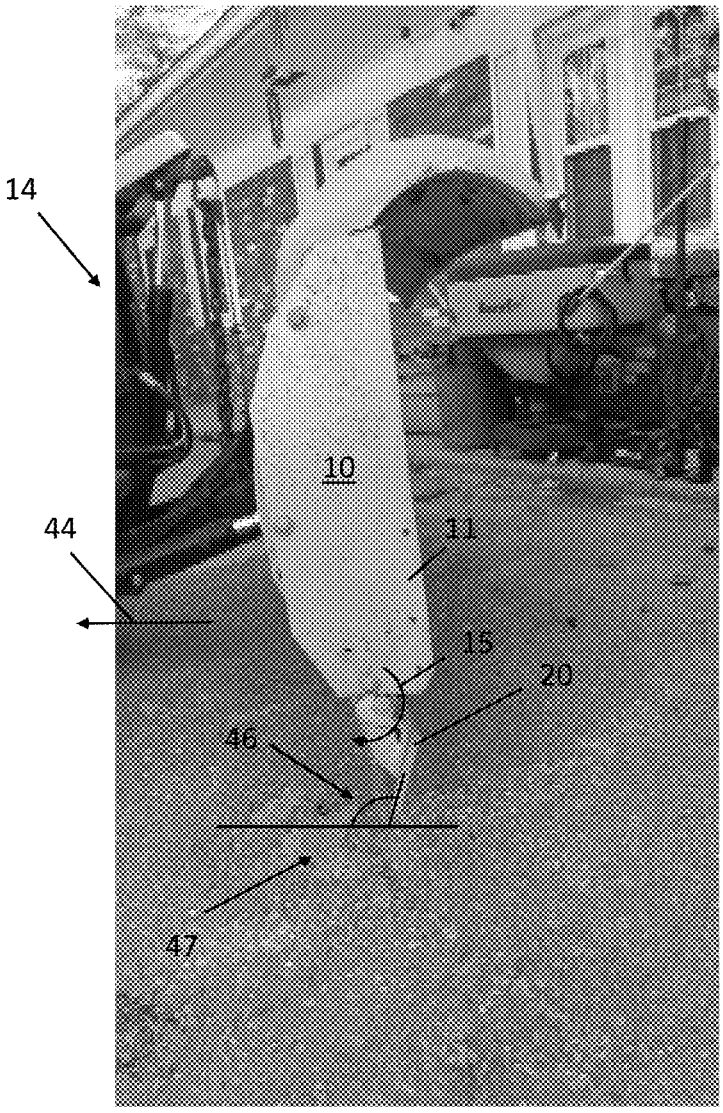
(57) **ABSTRACT**

Embodiments of the innovation relate to a plow comprising a plow and a trip blade mechanism coupled to a plow body, the trip blade mechanism comprising a trip blade hingedly coupled to a base of the plow body and a blade return device coupled between the plow body and the trip blade. The plow comprises a back drag system coupled to the trip blade mechanism and configured to dispose the trip blade between a first plowing position relative to the plow body and a second back drag position relative to the plow body.



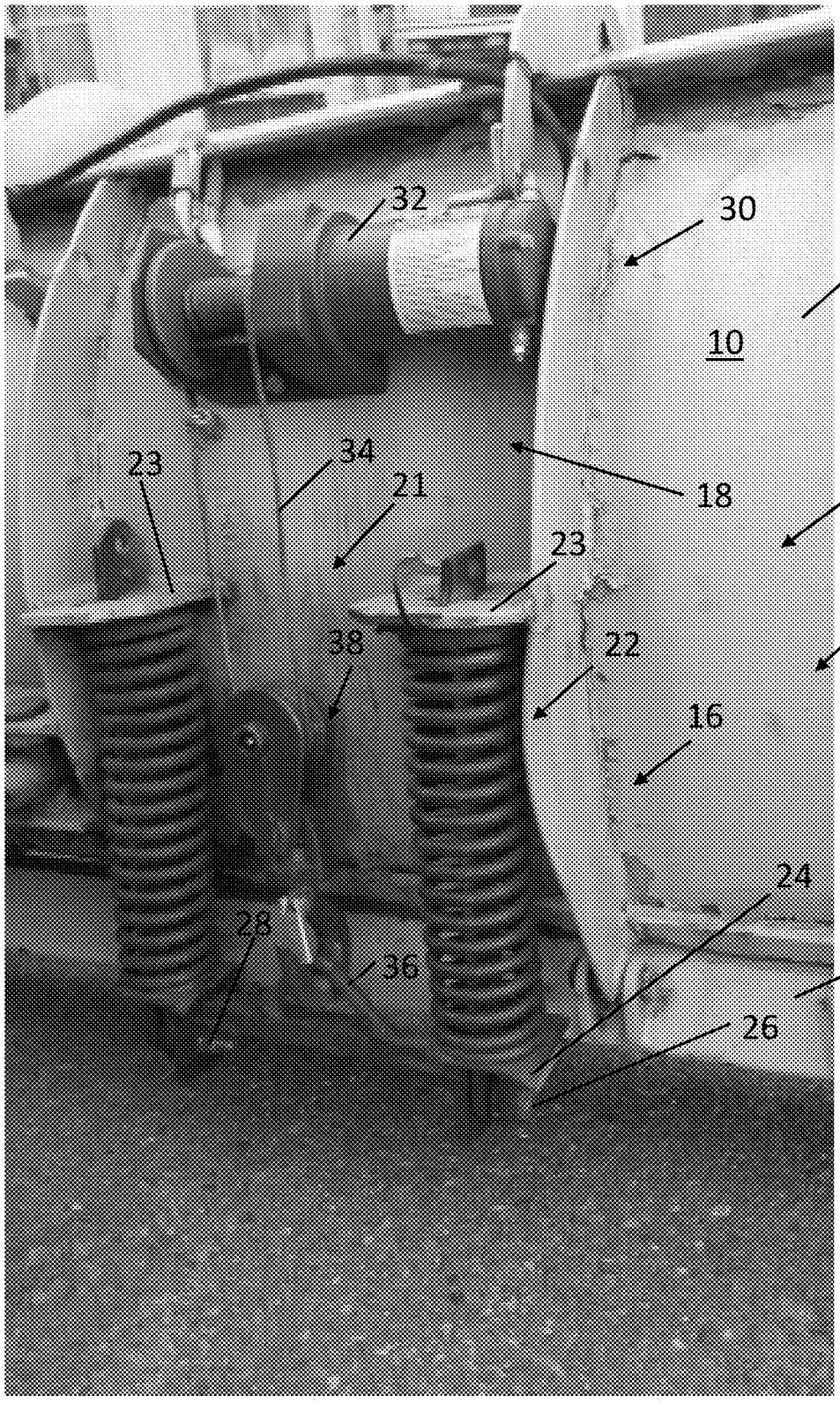


FIG. 1

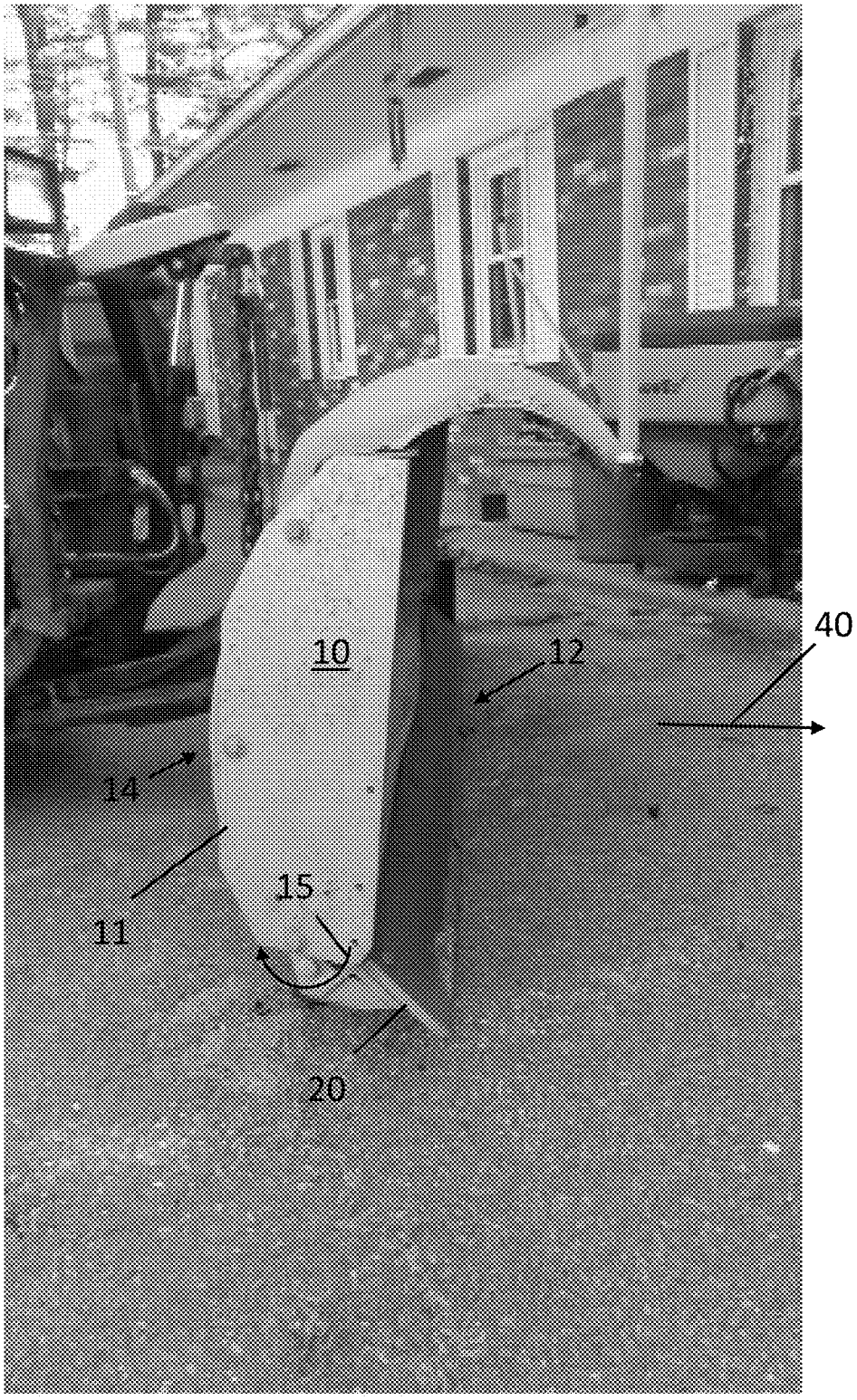


FIG. 2

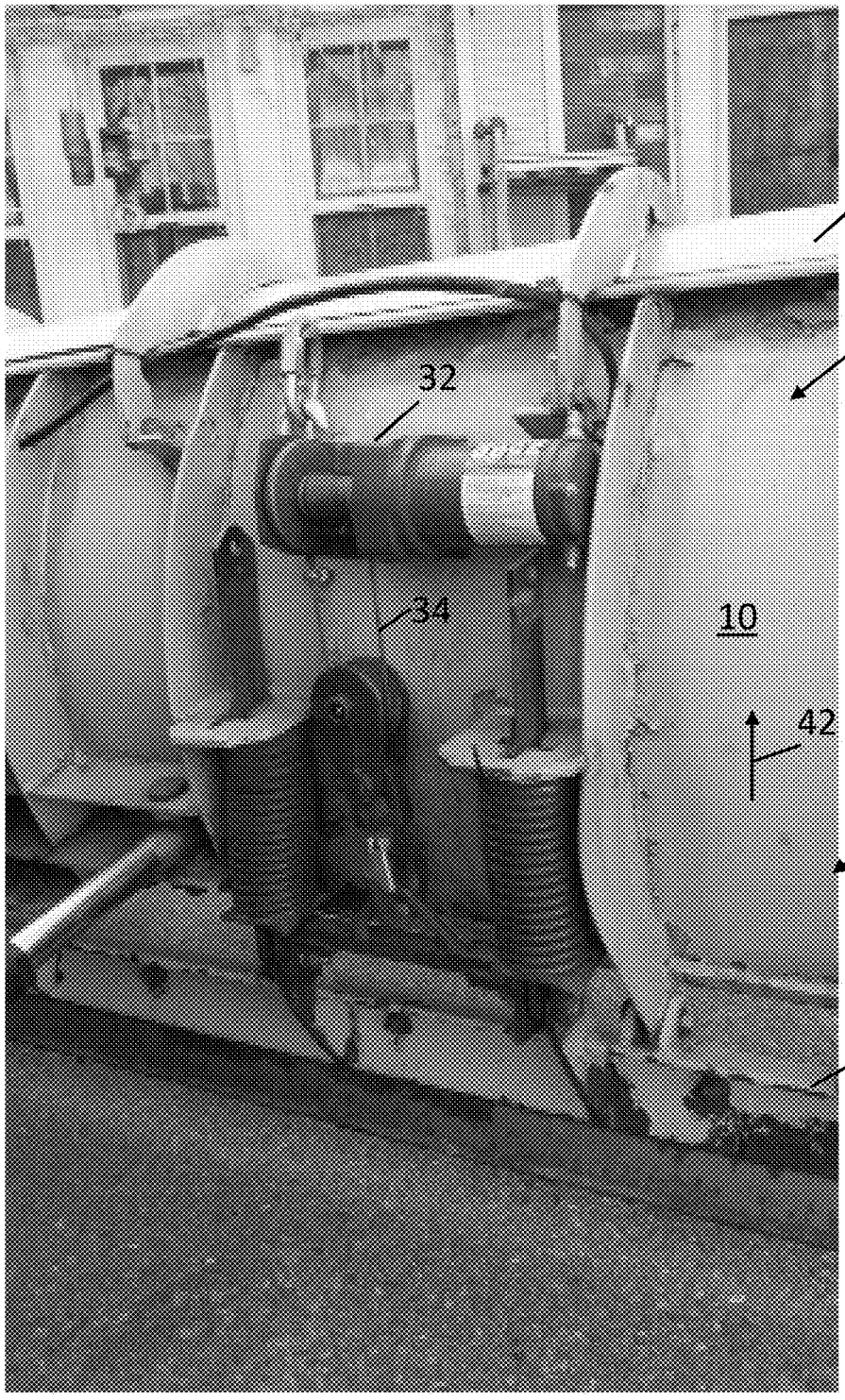


FIG. 3

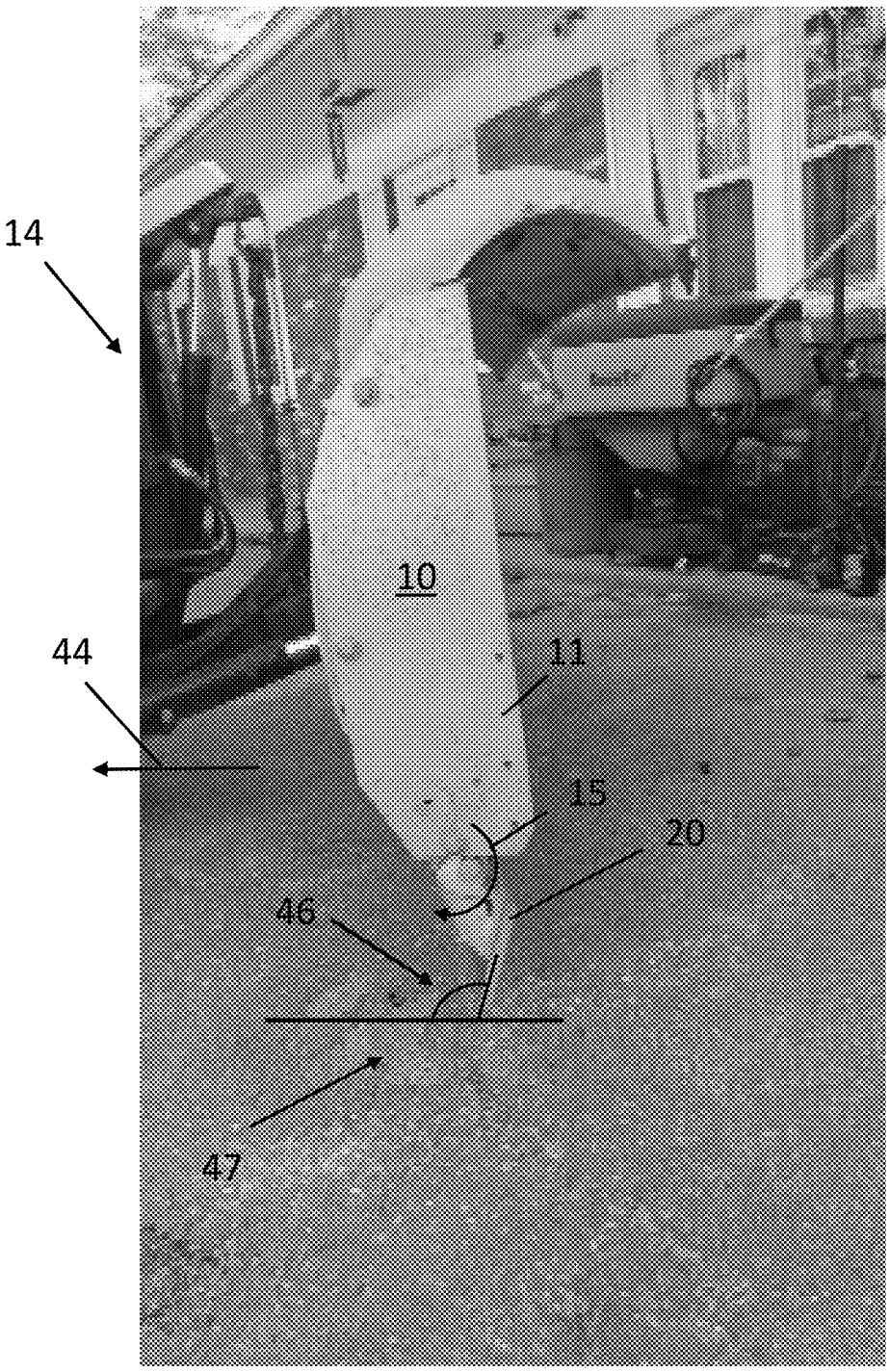


FIG. 4

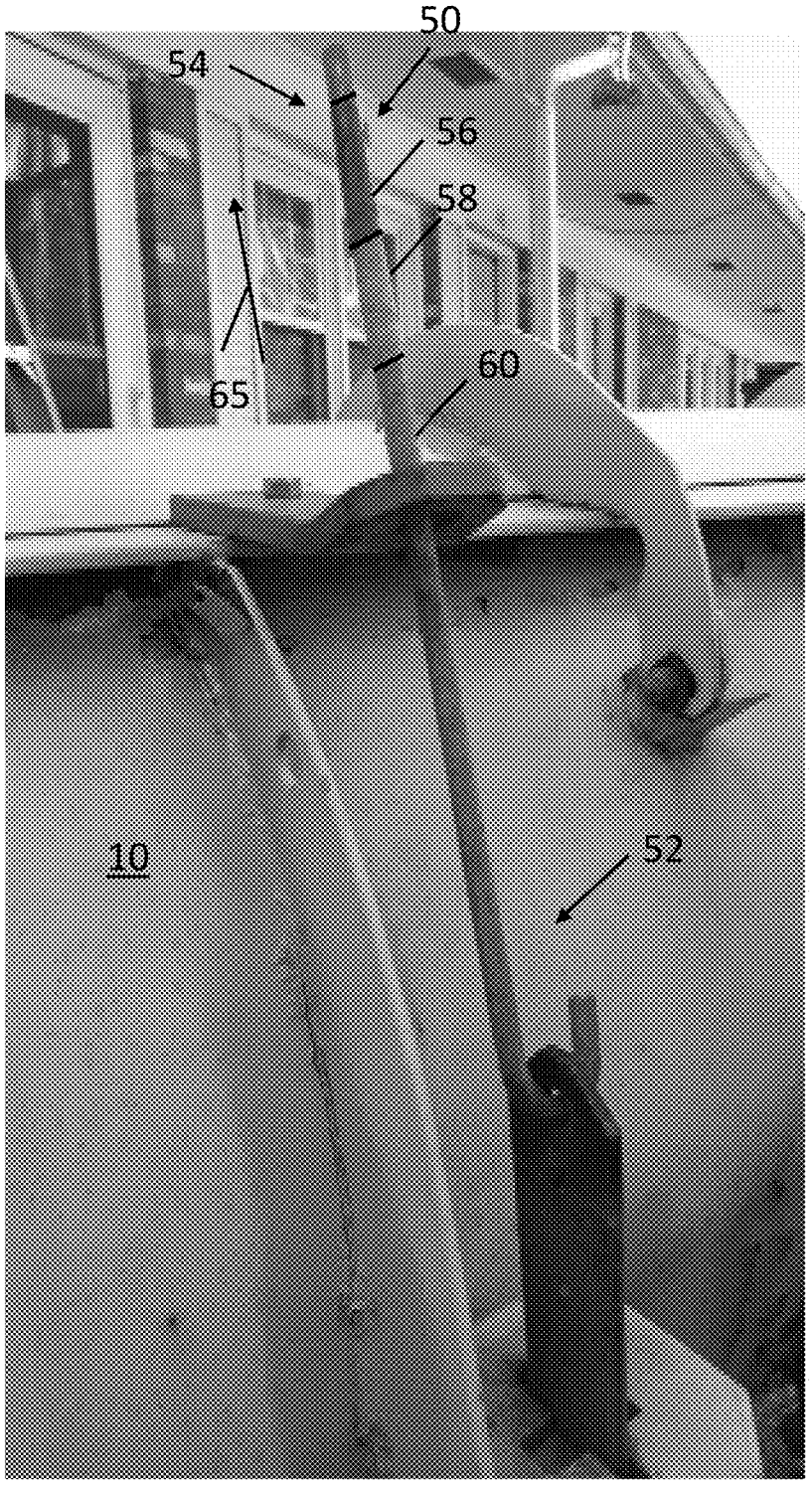


FIG. 5

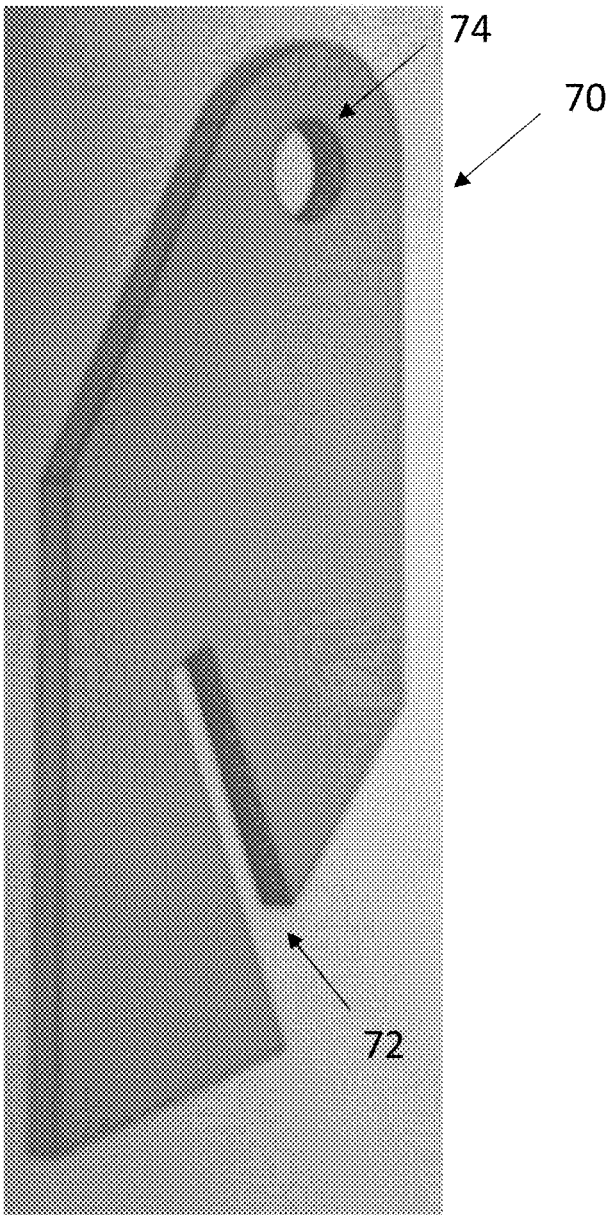


FIG. 6

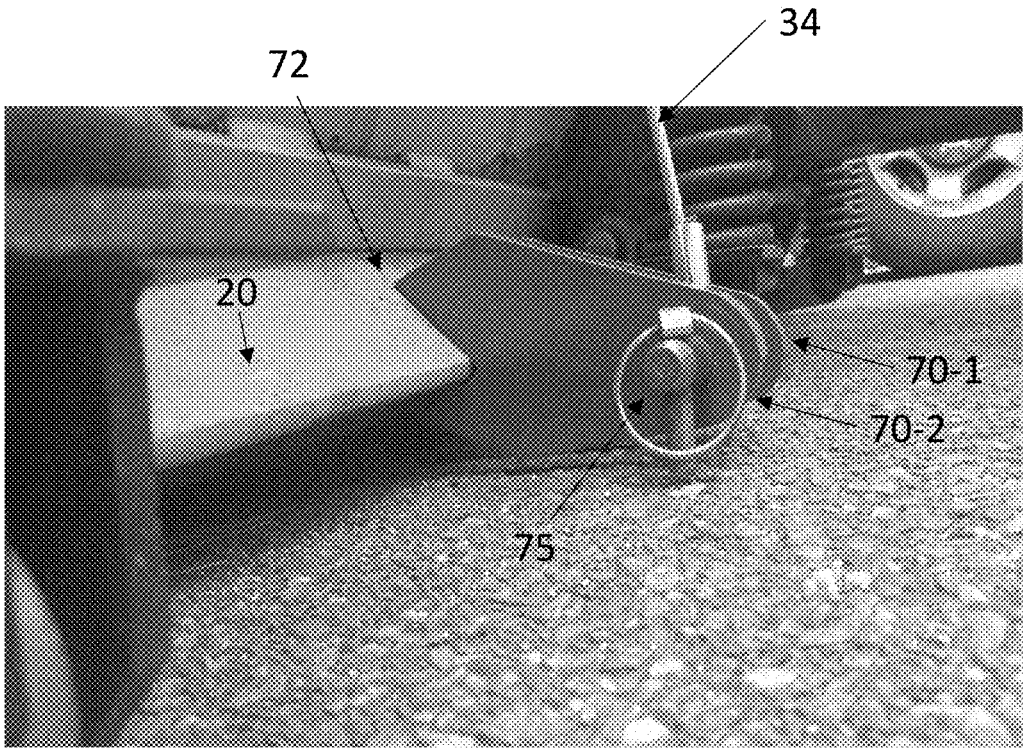


FIG. 7

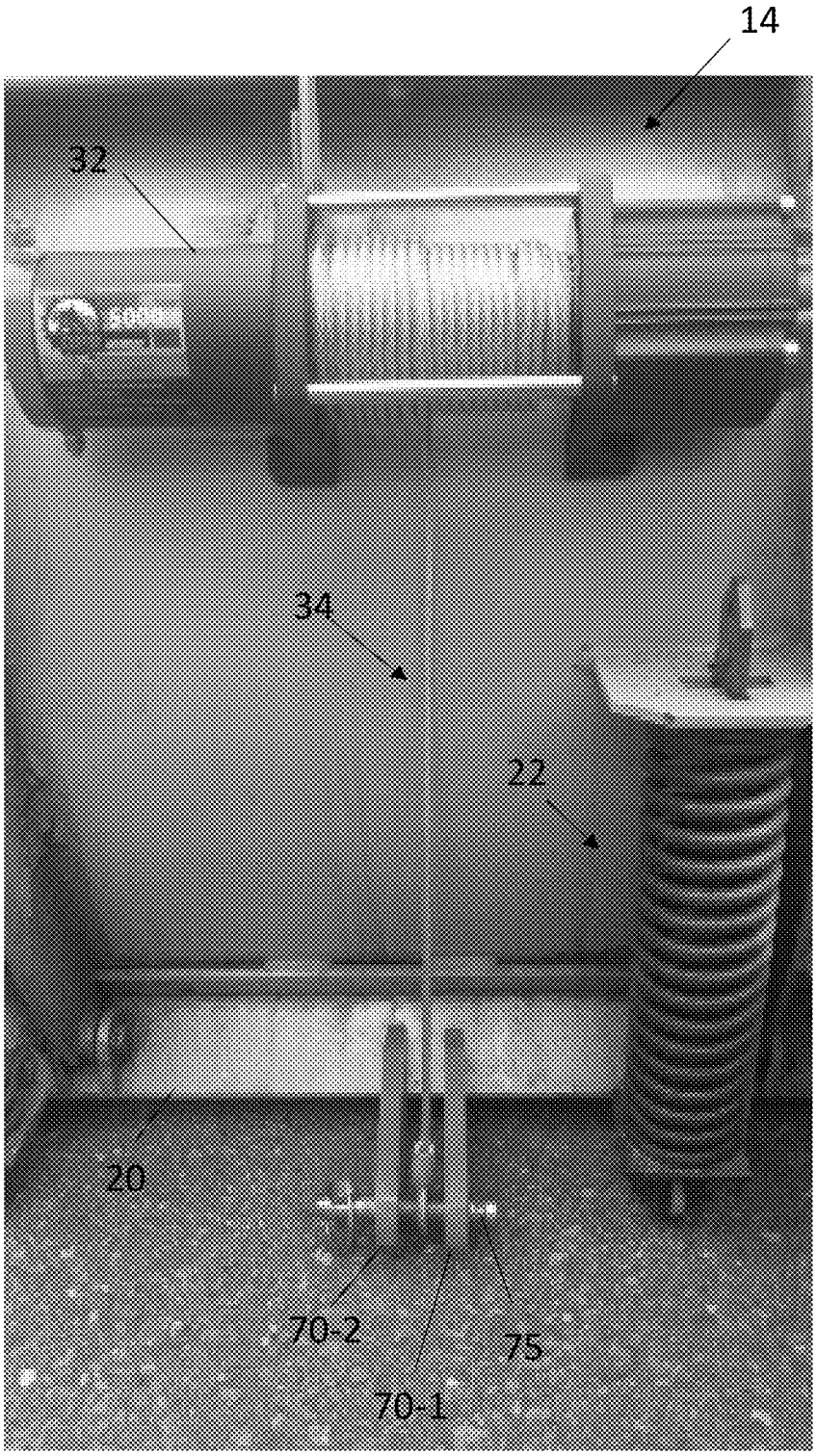


FIG. 8

BACK DRAG SYSTEM FOR PLOW TRIP BLADE

RELATED APPLICATIONS

[0001] This patent application claims the benefit of U.S. Provisional Application No. 63/027,019, filed on May 19, 2020, entitled, "Back Drag System for Plow Trip Blade," the contents and teachings of which are hereby incorporated by reference in their entirety.

BACKGROUND

[0002] Vehicles, such as trucks, utilize vehicle accessories, such as plows, to move snow, dirt, sand, gravel, or other plowable materials.

[0003] Conventional plows are configured to push or direct these materials from a particular area to a destination. For example, as the operator drives the vehicle forward, the plow pushes the material along the forward direction of travel in order to clear the material from a given area. However, for relatively small areas, such as driveways, the plow operator can be limited in his ability to manipulate the plow the materials. For example, in the case where a large volume of snow is located in a relatively small driveway, the plow operator may be unable to push the snow to a free or otherwise available location. As such, the operator may utilize a back drag procedure to pull the snow from the area.

[0004] During a back dragging procedure, a vehicle operator drives the vehicle in a reverse direction of travel and can utilize the plow to pull material from a given area. In one arrangement, the operator can utilize the bottom edge of a conventional plow to remove the material, such as snow, from the area. For example, the operator can position the front of the vehicle adjacent to a volume of material, can lower the plow into the volume, and can drive the vehicle in reverse, thereby causing the rear portion of the plow to pull the material from the area. In another arrangement, the operator can install a back drag plate onto a lower edge of the plow. Typically, the back drag plate is hinged and rotatable when connected to the rear base portion of the plow. During operation, the operator can lower the plow and back drag plate into a volume of material and can drive the vehicle in reverse, thereby causing the back drag plate to pull the material from the area.

SUMMARY

[0005] Conventional back dragging mechanisms can suffer from a variety of deficiencies. As provided above, an operator can utilize the rear portion of the plow to pull material, such as snow, from a given area. However, the plow typically defines a curved geometry that is configured to push, rather than pull, material. As such, a conventional plow can be relatively inefficient in back dragging material from a given area, thereby requiring the operator to attempt several passes over the same area to remove the material.

[0006] Also, as provided above, the operator can install a back drag plate onto the plow which is designed for use during a back drag procedure. However, conventional back drag plates are relatively heavy and add to the overall weight of the plow. Further, because these back drag plates are typically hingedly and rotatably connected to the plow in a free-floating manner, sudden vehicle stops can cause the plates to swing against, and impact, the plow, thereby raising safety and potential damage concerns.

[0007] By contrast to conventional back dragging mechanisms, embodiments of the present innovation relate to a back drag system for a trip blade of a plow. The back drag system is configured to position a trip blade between a first, forward plowing position, and a second, reverse back drag position. For example, the back drag system includes a back drag mechanism coupled to the trip blade of the plow and an actuation mechanism, such as a winch, coupled to the back drag mechanism. In one arrangement, the back drag mechanism is configured as a horizontally-oriented plate and is disposed between the trip blade and a base portion of a blade return device, such as a set of compression springs or a hydraulic piston, carried by the plow. In another arrangement, the back drag mechanism is configured as a set of vertically-oriented plates coupled to the trip blade and disposed in proximity to the blade return device carried by the plow.

[0008] In use, the operator can raise the plow away from a road or plowing surface and can activate the actuation mechanism to cause the back drag mechanism to rotate the trip blade toward a rear portion of the plow. When the trip blade reaches an extended back drag position relative to the plow, the back drag system maintains the blade return device in a compressed state, which mitigates rotation of the trip blade toward a front portion of the plow during a back drag procedure. With such positioning, the back drag system orients the trip blade to define a back drag angle relative to the rear portion of the plow. As such, during a back drag procedure, as an operator drives the vehicle in a reverse direction, the back drag system configures the trip blade to capture and pull a volume of material from a given area in a relatively efficient manner. Following completion of the back drag procedure, the operator can activate the actuation mechanism to cause the back drag mechanism to rotate the trip blade toward a front portion of the plow to a plowing position. Accordingly, the back drag system can be utilized by conventional plows to provide efficient removal of material from a relatively tight area. Additionally, installation of the back drag mechanism does not substantially increase the weight of the plow.

[0009] Embodiments of the innovation relate to a plow comprising a plow and a trip blade mechanism coupled to a plow body, the trip blade mechanism comprising a trip blade hingedly coupled to a base of the plow body and a blade return device coupled between the plow body and the trip blade. The plow comprises a back drag system coupled to the trip blade mechanism and configured to dispose the trip blade between a first plowing position relative to the plow body and a second back drag position relative to the plow body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The foregoing and other objects, features and advantages will be apparent from the following description of particular embodiments of the innovation, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of various embodiments of the innovation.

[0011] FIG. **1** illustrates a rear view of a plow having a back drag system disposed in a first, forward plowing position, according to one arrangement.

[0012] FIG. **2** illustrates a side view of the plow of FIG. **1**, according to one arrangement.

[0013] FIG. **3** illustrates a rear view of the plow of FIG. **1** having the back drag system disposed in a second, back drag position, according to one arrangement

[0014] FIG. **4** illustrates a side view of the plow of FIG. **3**, according to one arrangement.

[0015] FIG. **5** illustrates a trip blade position indicator, according to one arrangement.

[0016] FIG. **6** illustrates an embodiment of a portion of a back drag mechanism, according to one arrangement.

[0017] FIG. **7** illustrates a perspective view of the back drag mechanism of FIG. **6**, according to one arrangement.

[0018] FIG. **8** illustrates a rear view of the back drag mechanism of FIG. **6**, according to one arrangement.

DETAILED DESCRIPTION

[0019] Embodiments of the present innovation relate to a back drag system for a trip blade of a plow. The back drag system is configured to position a trip blade between a first, forward plowing position, and a second, back drag position. For example, the back drag system includes a back drag mechanism coupled to the trip blade of the plow and an actuation mechanism, such as a winch, coupled to the back drag mechanism. In one arrangement, the back drag mechanism is configured as a horizontally-oriented plate and is disposed between the trip blade and a base portion of a blade return device, such as a set of compression springs or a hydraulic piston, carried by the plow. In another arrangement, the back drag mechanism is configured as a vertically-oriented plate coupled to the trip blade and disposed in proximity to the blade return device carried by the plow.

[0020] In use, the operator can activate the actuation mechanism to cause the back drag mechanism to rotate the trip blade toward a rear portion of the plow. When the trip blade reaches an extended back drag position relative to the plow, the back drag system maintains the blade return device in a compressed state, which mitigates rotation of the trip blade toward a front portion of the plow during a back drag procedure. With such positioning, the back drag system orients the trip blade to define a back drag angle relative to the rear portion of the plow. As such, during a back drag procedure, as an operator drives the vehicle in a reverse direction, the back drag system positions the trip blade to capture and pull a volume of material from a given area in a relatively efficient manner. Following completion of the back drag procedure, the operator can activate the actuation mechanism to cause the back drag mechanism to rotate the trip blade toward a front portion of the plow to a plowing position. Accordingly, the back drag system can be utilized by conventional plows to provide efficient removal of material from a relatively tight area. Additionally, installation of the back drag mechanism does not substantially increase the weight of the plow.

[0021] FIGS. **1** and **2** illustrates a plow **10** which includes a plow body **11** having a front portion **12** configured to collect and/or displace snow or other materials and a rear portion **14** configured to be secured to the frame of a vehicle. The plow **10** also includes a trip blade mechanism **16** and a back drag system **18** coupled to the plow body **11**, according to one arrangement.

[0022] In order to mitigate damage to the plow **10** or the associated vehicle, the trip blade mechanism **16** is configured to absorb impact loads experienced during operation. For example, when plowing a material such as snow, the plow **10** may strike a hidden object, such as rocks or other debris concealed beneath a layer of snow. As such, in one arrangement, the trip blade mechanism **16** includes a trip blade **20** hingedly coupled to a base of the plow **10** and to a blade return device **21**. During operation, as the trip blade **20** strikes an object, the trip blade **16** rotates toward the rear portion **14** of the plow body **11** about the hinge joint and along direction **15**. The blade return device **21** is configured to return the trip blade **20** from a rotated position to an operational or plowing position, as shown in FIG. **2**. For example, the blade return device **21** can be configured as a set of compression springs **22** coupled to the rear portion **14** of the plow **10** between a plow frame element **23** and the trip blade **20**. During operation, as the trip blade **20** strikes an object and rotates along direction **15**, the trip blade **20** compresses the compression springs **22** which absorb the impact load. The springs **22** can return to an extended position following impact to dispose the trip blade **20** to its operational position, as shown in FIG. **2**. In another example, the blade return device **21** can be configured as a set of hydraulic pistons (not shown) configured to absorb an impact load received by the trip blade **20** and to return the trip blade **20** to its operational, extended position following impact.

[0023] The back drag system **18** is configured to actuate the trip blade mechanism **16** to dispose the trip blade **20** in a back drag position, with additional reference to FIGS. **3** and **4**. In one arrangement, the back drag system **18** includes a back drag mechanism **25** coupled to the trip blade **20** of the plow **10** and an actuation mechanism **30** coupled to the back drag mechanism **25**.

[0024] The back drag mechanism **25** can be configured in a variety of ways. In one arrangement, the back drag mechanism **25** can be configured as a base **24**, such as a plate, coupled to the trip blade **20** via pins **26**, **28** in a substantially horizontal orientation relative to the trip plate **20**. With such orientation, as shown in FIG. **1**, the back drag mechanism **25** can be placed in physical communication with the compression springs **22**. For example, the base **24** is disposed between the trip blade **20** and a base portion of each of the compression springs **22**.

[0025] The actuation mechanism **30** can be configured in a variety of ways. For example, actuation mechanism **30** can be configured as a winch **32** and a cable **34**. The actuation mechanism **30** is configured to apply or release a load on the back drag mechanism **25** to cause the trip blade **20** to rotate relative to the plow **10**. For example, the cable **34** of the winch **32** can be coupled to the base **24** via a coupling member **36** which extends from the base **24**. Activation of the actuation mechanism **30** causes the winch **32** to rotate either in a first direction to shorten the length of the cable **34** and to rotate the trip blade **20** toward the rear **14** of the plow **10** or in a second direction to extend the length of the cable **34** and to rotate the trip blade **20** toward the front **12** of the plow **10**. The actuation mechanism **30** can also include a pulley **38** disposed between the cable **34** and the coupling member **36**. The pulley **38** is configured to reduce the load generated by the winch **32** on the cable **34**.

[0026] During a conventional plowing operation, as indicated in FIGS. **1** and **2**, the back drag system **18** maintains the trip blade mechanism **16** in a first position relative to the plow **10**. For example, in the first positon, the compression springs **22** are disposed in an uncompressed state and the trip

blade **20** is disposed in a plowing position, as shown. As such, as the vehicle moves the plow **10** forward along direction **40**, the plow **10** collects and pushes material, such as snow, from a given area.

[0027] During a back drag plowing operation, as indicated in FIGS. **3** and **4**, the back drag system **18** can dispose the trip blade mechanism **16** in a second position relative to the plow **10**. For example, the vehicle operator can raise the plow **10** relative to the road or plowing surface **47** and can activate the actuation mechanism **30**. The actuation mechanism **30** generates a load on the back drag mechanism **25** along direction **42**, which, in turn, causes the trip blade **20** to rotate along direction **15** towards a rear portion **14** of the plow **10**. When the trip blade **20** reaches an extended back drag position relative to the plow **10**, the back drag system **25** orients the trip blade **20** to define a back drag angle **46** relative to a horizontal (e.g., road or plowing) surface **47**. For example, the back drag system **25** can dispose the trip blade **20** at an angle of between about 45° and 120° relative to the horizontal surface **47**. Further, the load generated by the actuation mechanism **30** causes the back drag mechanism **25** to translate along direction **42** which causes the base **24** to compress the compression springs **22**. When the trip blade **20** reaches the extended back drag position relative to the plow **10**, the back drag system **18** maintains the compression springs **22** in a compressed state, which mitigates rotation of the trip blade **20** toward the front portion **12** of the plow **10** during a back drag procedure.

[0028] Following positioning of the trip blade **20** in the second, extended position, during operation, the vehicle operator can then lower the plow **10** relative to the plowing surface and perform a back drag operation. For example, with the trip blade **20** disposed in the extended position, as the vehicle moves the plow **10** in a reverse direction, such as along direction **44**, the trip blade **20** can pull material, such as snow, from the plowing surface **47**. As such, the plow **10** is configured to remove material, such as snow, from a relatively narrow area in an efficient manner.

[0029] In one arrangement, the back drag system **18** can include a trip blade position indicator which is configured to identify the rotational positon of the trip blade **20** relative to the plow **10**. In one arrangement, as shown in FIG. **5**, the back drag system **18** can include, as the trip blade position indicator, a visual trip blade position indicator **50**. For example, the visual trip blade position indicator **50** can be configured as a rod or shaft having a first end **52** coupled to the trip blade **20** and a second end **54** extending form the plow body **11** and having markings **56**, **58**, **60** which correspond to the rotational position of the trip blade **20** relative to the plow body **11**.

[0030] Prior to operation of the back drag system **18**, the visual trip blade position indicator **50** is positioned such that only the first marking **56** is observable by the vehicle operator. Visual identification of the first marking **56** can indicate to the vehicle operator that the trip blade **20** is disposed in the operational or plowing position as shown in FIGS. **1** and **2**. When the operator engages the back drag system **18**, as the back drag system **18** rotates the trip blade **20** relative to the plow **10** along direction **15**, the visual trip blade position indicator **50** travels along direction **65** such that the second marking **58** can be observed by the vehicle operator. Visual identification of the second marking **58** indicates that the trip blade **20** is rotating toward the second back drag position as shown in FIGS. **3** and **4**. Further operation of the back drag system **18** causes further translation of the visual trip blade position indicator **50** along direction **65** such that the third marking **60** is observable by the vehicle operator. Such positioning of the second marking **58** indicates that the trip blade **20** has rotated toward the second back drag position as shown in FIGS. **3** and **4** and that the operator can power down the actuation mechanism **30** to set the final positon of the trip blade **20**.

[0031] While the trip blade position indicator **50** is described as a visual indicator, such description is by way of example only. In one arrangement, the trip blade position indicator **50** can be configured as an electronic or mechanical indicator. Further, in one arrangement, the trip blade position indicator **50** can include a feedback mechanism which is configured to power down the actuation mechanism **30** once the trip blade **20** has rotated toward the second back drag position as shown in FIGS. **3** and **4**.

[0032] As provided above, the back drag mechanism **25** can be configured in a variety of ways. In one arrangement, with reference to FIGS. **6-8**, the back drag mechanism **25** can include one or more vertically-oriented plates **70**. For example, as shown in FIG. **6**, each plate **70** can define a slot **72** configured to couple with a lip of the trip blade **20** at a rear portion **14** of the plow body **11**. As indicated in FIGS. **7** and **8**, such coupling orients the plate **70** in a substantially vertical orientation relative to the trip plate **20** and allows the back drag mechanism **25** to be disposed adjacent to the blade return device **21** (e.g., compression springs **22**). Further, each plate **70** can define an opening **74** configured to receive a connecting element **75**, such as a pin. As indicated in FIGS. **7** and **8**, the connecting element **75** is coupled to the first plate **70-1** and the second plate **70-2** and disposes the plates **70-1**, **70-2** at a distance from each other. The connecting element **75** extends between the two plates **70** and is attached to the actuation mechanism **30** via cable **34**.

[0033] During operation, of the vehicle operator can activate the actuation mechanism **30** to cause the winch **32** and cable to generate a load on the connecting element **75** of the back drag mechanism **25**. Such loading causes the plates **70-1**, **70-1** to rotate the trip blade **20** towards a rear portion **14** of the plow **10** which, in turn, causes the trip blade **20** to compress the compression springs **22**. When the trip blade **20** reaches an extended back drag position relative to the plow **10**, the back drag system **18** maintains the compression springs **22** in a compressed state, which mitigates rotation of the trip blade **20** toward the front portion **12** of the plow **10** during a back drag procedure. Following the back drag procedure, the vehicle operator can activate the actuation mechanism **30** to cause the winch **32** and cable to reduce the load on the connecting element **75** of the back drag mechanism **25** to position the trip blade **20** to a plowing position, such as shown in FIG. **7**.

[0034] While various embodiments of the innovation have been particularly shown and described, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the innovation as defined by the appended claims.

What is claimed is:

1. A plow, comprising:

a plow body;

a trip blade mechanism coupled to the plow body, the trip blade mechanism comprising:

a trip blade hingedly coupled to a base of the plow body, and

a blade return device coupled between the plow body and the trip blade; and

a back drag system coupled to the trip blade mechanism and configured to dispose the trip blade between a first plowing position relative to the plow body and a second back drag position relative to the plow body.

2. The plow of claim **1**, wherein the blade return device comprises a set of compression springs disposed between the plow body and the trip blade.

3. The plow of claim **1**, wherein the back drag system comprises:

an actuation mechanism coupled to the plow body; and

a back drag mechanism coupled between the actuation mechanism and the trip blade.

4. The plow of claim **3**, wherein the actuation mechanism comprises:

a winch coupled to the plow body; and

a cable carried by the winch, the cable coupled to the back drag mechanism.

5. The plow of claim **3**, wherein the back drag mechanism comprises:

a base coupled to the trip blade, the blade return device disposed between the base and the plow body; and

a coupling member extending from the base, the actuation mechanism coupled to the back drag mechanism by the coupling member.

6. The plow of claim **3**, wherein the back drag mechanism comprises:

a first plate coupled to the trip blade;

a second plate coupled to the trip blade; and

a connecting element coupled to the first plate and the second plate and disposing the first plate and the second plate at a distance from each other, the actuation mechanism coupled to the back drag mechanism by the connecting element.

7. The plow of claim **1**, further comprising a trip blade position indicator coupled to the trip blade, the trip blade position indicator configured to identify a rotational position of the trip blade.

8. The plow of claim **7**, wherein the trip blade position indicator comprises:

a shaft having a first end coupled to the trip blade and a second end extending from the plow body and having a set markings which correspond to the a rotational position of the trip blade.

9. A back drag system, comprising:

an actuation mechanism; and

a back drag mechanism coupled to the actuation mechanism and configured to be coupled to a trip blade of a plow;

the actuation mechanism and back drag mechanism configured to dispose the trip blade between a first plowing position relative to the plow and a second back drag position relative to the plow.

10. The back drag system of claim **9**, wherein the actuation mechanism comprises:

a winch coupled to the plow body; and

a cable carried by the winch, the cable coupled to the back drag mechanism.

11. The plow of claim **9**, wherein the back drag mechanism comprises:

a base configured to be coupled to the trip blade; and

a coupling member extending from the base, the actuation mechanism coupled to the back drag mechanism by the coupling member.

12. The back drag system of claim **9**, wherein the back drag mechanism comprises:

a first plate configured to be coupled to the trip blade;

a second plate configured to be coupled to the trip blade; and

a connecting element coupled to the first plate and the second plate and disposing the first plate and the second plate at a distance from each other, the actuation mechanism coupled to the back drag mechanism by the connecting element.

13. The back drag system of claim **9**, further comprising a trip blade position indicator configured to be coupled to the trip blade, the trip blade position indicator configured to identify a rotational position of the trip blade.

14. The back drag system of claim **13**, wherein the trip blade position indicator comprises:

a shaft having a first end coupled to the trip blade and a second end extending from the plow body and having a set markings which correspond to the a rotational position of the trip blade.

15. A method for performing a back drag plowing operation, comprising:

disposing a plow of a vehicle in a raised position relative to a plowing surface;

activating an actuation mechanism of a back drag system to rotate a trip blade of the plow from a first plowing position relative to the plow body and a second back drag position relative to the plow body;

lowering the plow relative to the plowing surface; and

moving the vehicle in reverse to cause the trip blade to pull material from the plowing surface.

* * * * *