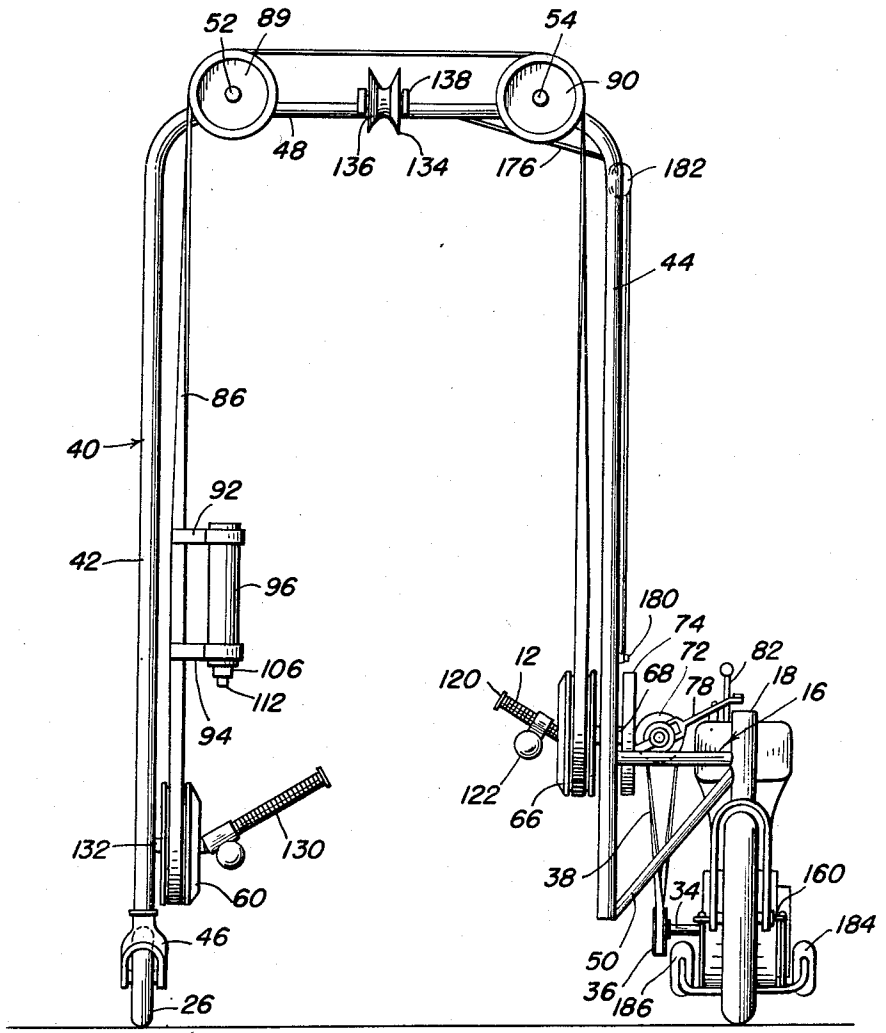
April 3, 1951 F. C. WIEMERS 2,547,352

SNAP BEAN STRINGER

Filed June 11, 1948 4 Sheets-Sheet 1

Fig. 1.



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SNAP BEAN STRINGER

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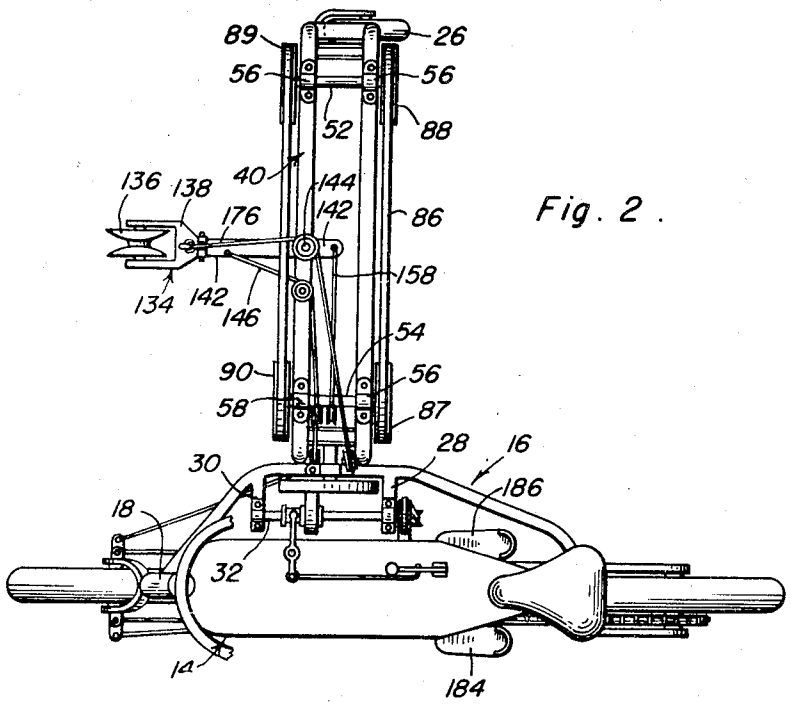
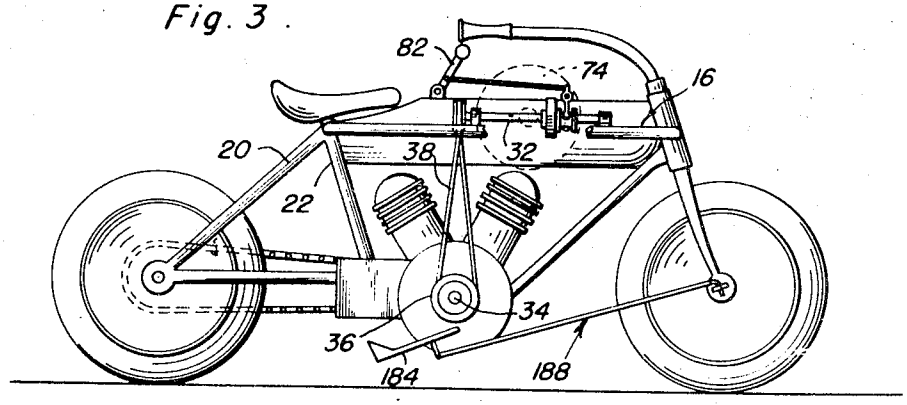


Fig. 2.

Fig. 3.



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SNAP BEAN STRINGER

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Fig. 4

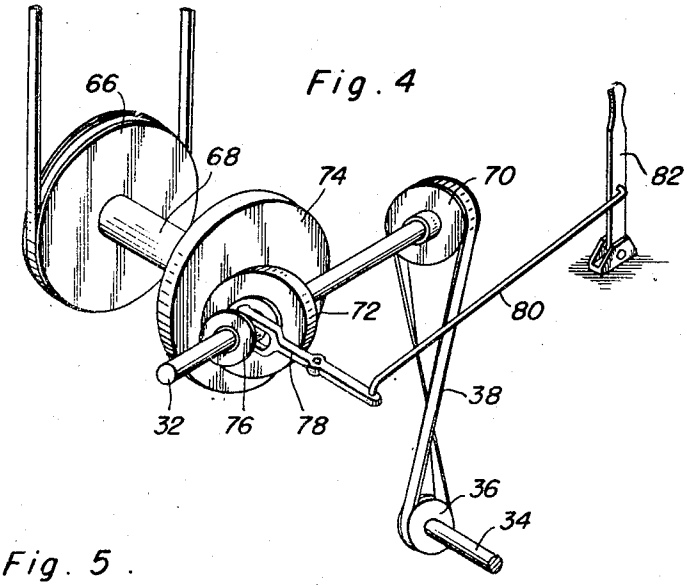


Fig. 5.

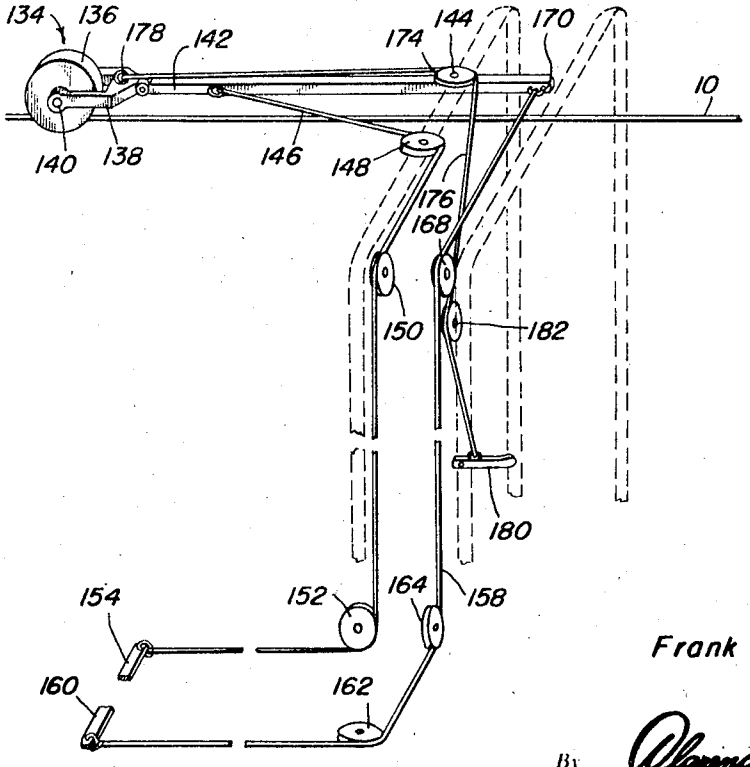
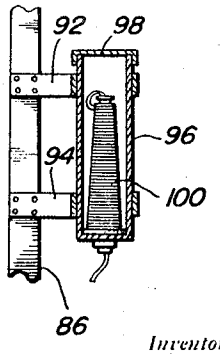


Fig. 6.



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SNAP BEAN STRINGER

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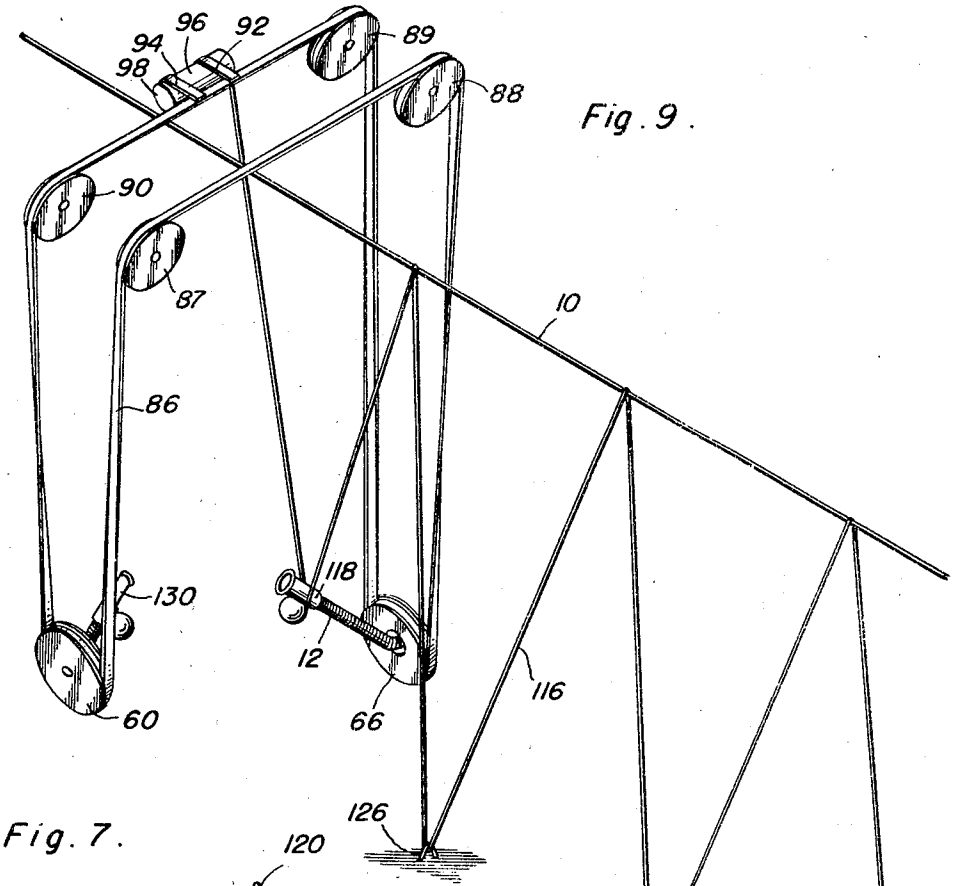
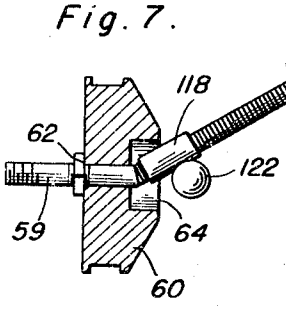


Fig. 9.

Fig. 7.



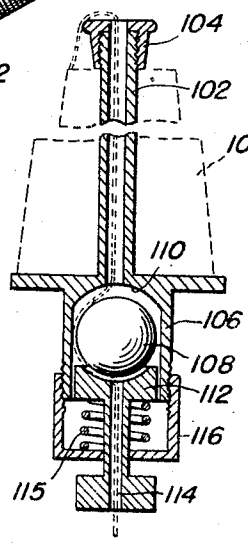


Fig. 8.

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2,547,352

UNITED STATES PATENT OFFICE

2,547,352

SNAP BEAN STRINGER

Frank C. Wiemers, Manson, Iowa

Application June 11, 1948, Serial No. 32,433

21 Claims. (Cl. 47—1)

1

This invention appertains to novel and useful improvements in implements for use in reducing the time and effort involved in stringing a field preparatory to growing climbing flora, such as snap bean plants and plants of similar description.

An object of this invention is to weave a string over and below the usual field string which extends substantially parallel to the grade line by improved means.

Another object of this invention is to support a small vehicle with an attachment for performing the above function, which small vehicle is steered by means of a device on the attachment running on the field line.

A still further object of this invention is to supply the small vehicle with a substantially U-shaped frame which extends over the field line, actuate an endless conveyor-type belt around pulleys and sheaves on the U-shaped frame, the said endless conveyor or belt carrying a supply of string, the string being attached at a predetermined position in a single cycle of operation to a resiliently mounted arm, whereby the string may be anchored by conventional means in the ground, the cycle of operation taking place while the vehicle is in movement thereby progressively stringing the flexible cord or the like throughout the length of the field.

Another object of this invention is to include means associated with the U-shaped frame not only for steering the small vehicle but also for pivotally raising the steering means to the inoperative position thereby permitting the vehicle to be turned in order that a second field string may be treated.

A still further object of this invention is to prevent back lash of the string or cord by regulating the amount and speed of issue of the string from the string container, which is attached to the said belt or endless conveyor system.

And another object of this invention is to provide the small vehicle with a transmission and clutch mechanism whereby the actuation of the endless conveyor may be selectively controlled by the individual performing the stringing operations.

And another object of this invention is to obviate a great amount of field labor in applying cord in a snap bean field, it being necessary only that the operator attach the string firmly in the ground, since the string or cord is raised and lowered by means of the attachment on the small vehicle.

2

Ancillary objects and features of novelty will become apparent to those skilled in the art, and following the description of the preferred form of the invention, illustrated in the accompanying drawings, wherein:

Figure 1 is an elevational view of a preferred form of the invention, a portion of the conventional small vehicle being omitted for clarity;

Figure 2 is a plan view of the invention shown in Figure 1;

Figure 3 is an elevational side view of the small vehicle whereon the present invention is attached;

Figure 4 is a perspective diagrammatic view showing a single form of clutch which may be used in association with the invention and a portion of the transmission;

Figure 5 is a perspective diagrammatic view showing the steering means for controlling the movement of the small vehicle;

Figure 6 is a sectional view illustrating a cord holder used in association with the invention;

Figure 7 is a sectional view showing one of the sheaves and rods mounted in proper juxtaposition relative thereto;

Figure 8 is an enlarged sectional view showing the back lash prevention means associated with the cord holder, and

Figure 9 is a perspective diagrammatic view showing the endless conveyor or belt positioned relative to the field string or wire.

As is well known it is often a difficult task to provide the necessary props in a field wherein it is desired to grow certain types of plants such as those for producing snap beans. This type of plant is a "climber" and grows most effectively when there is something on which the plant may climb. Accordingly, it is conventional to supply a field with a field string 10, which is generally of a durable material such as wire, and then progressively place a cord or the like thereover, extending the cord over the field string 10 and anchoring the same to the ground at spaced positions. It is obvious that such a task when manually performed requires a considerable amount of effort. It is within the purview and one of the objects of the invention to reduce the manual labor and effort involved in such operations.

Certain string or twine twisting mechanisms are known in the art however, it is within the purview of the invention to supply a device which is completely self-contained, utilizing a small vehicle which is self-powered. The power of the vehicle is used not only to propel the vehicle and

the entire mechanism but also to actuate an endless conveyor or a belt which carries a supply of twine or string in the desired and prescribed manner. The string is constantly raised and lowered over the field wire 10 and at a selected position in the cycle of operation the string rides over a rod 12 and is grasped by a special mechanism slidably received on the rod. Since this rod (two of which are supplied) is so positioned as to be easily reached by the operator of the vehicle, this operator may simply grasp the twine or string and staple it in the ground. By repeating this operation over and over a single wire or field string 10 may be entirely strung in a very short time. This is broadly the essence of the operation of my invention. Various refinements of structure are involved to render my invention smoothly operative, effective and practical which will be described at this time.

Vehicle and bracket construction

The present invention contemplates the use of various types of vehicles such as those involving two wheels, three wheels, or even four or more. For illustrative purposes, there is illustrated a vehicle generally indicated at 14 and is immediately recognizable as the motorcycle type involving only two wheels. The motorcycle has various appurtenances contiguous to any ordinary motorcycle and includes certain additional structure. This additional structure includes a bracket generally indicated at 16 which may be attached at one end to the steering rod bearing 18 and at the junction of a pair of motorcycle frame members 20 and 22, respectively. This specific attachment position has been chosen as it is above the center of gravity of the motorcycle and this attachment and motorcycle cooperating with a wheel 26 to be described subsequently, provides in reality a three-wheel vehicle which does not roll or become unsteady in the operation thereof.

The said frame 16 includes a pair of substantially parallel braces 28 and 30, respectively, projecting toward the vehicle 14 which serve as a support for a shaft 32.

Attached to the crankshaft 34 of the engine of the motorcycle 14 is a drive pulley 36 which has a belt 38 extending therearound.

Frame construction

Referring primarily to Figure 1, it will be seen that a substantially U-shaped frame 40 is provided and includes legs or sides 42 and 44, respectively, as well as a web or top portion 46. The said leg or side 42 has a substantially U-shaped yoke 46 at one end thereof which carries a small axle (unnumbered). This small axle journals the said wheel 26.

The said leg 44 is shorter than the leg 42 and has supporting braces 50 attached thereto which are also attached to the bearing 18. The said frame is rigidly associated with a second identical frame (see Figure 2) by means of tie members 52, which are in reality shafts. There are two of these shafts, one indicated at 52 and the other at 54. Bearings 56 journal the shaft 52 while bearings 58 journal the shaft 54.

At a point adjacent but not at the bottom of the said leg 44, the said U-shaped members or frame is rigidly attached to the bracket 16 as by welding, bolting, brazing or by any other suitable means.

Secured to a suitable cross member of the frame adjacent the lower end of the legs 42 is a stub

shaft 59 carrying a first sheave 60. This first sheave is rotatably journaled on the said stub shaft 59 and may have a thrust bearing 62 associated therewith. A recess 64 is supplied in the inner face of the said sheave 60 in order to accommodate a rod and a string or cord grasping means.

A second sheave 66 is supplied in a somewhat similar manner to the leg 44 of the U-shaped members and is journaled on a shaft 68.

Clutch and transmission assemblies

Attention is now directed primarily to Figures 3 and 4, wherein the drive pulley 36 is illustrated and the belt 38, as described above.

The said belt 38 extends around a counter-pulley 70 which is attached to the said shaft 32. It is now apparent that torque of the internal combustion engine of the vehicle is transmitted to the shaft 32 through the medium of the transmission belt 38. Keyed or otherwise slidably secured on the shaft 32 is a friction disk 72 forming a portion of a clutch mechanism. It will be noted at this point that any type of conventional clutch may be used in association with this portion of the mechanism. However, the clutch assembly shown will operate effectually.

Secured to the said shaft 68 is a relatively larger friction disk 74 operatively engaged by the said friction clutch member 72. A reduced collar 76 is attached to the said clutch member 72 and has a bifurcated lever 78 received in the reduced portion thereof. This lever or fork is pivotally mounted to a suitable component of the small vehicle 14 and has a pitman rod 80 attached at one end thereof. The said pitman rod is also secured to an operating lever 82, shown schematically in Figure 4, and operatively in Figure 3.

The operation of this clutch is deemed readily apparent, since upon movement of the lever 82 the clutch element or disk 72 is moved selectively toward the center and away from the center of the larger clutch element 74, thereby transmitting a greater or larger force and resulting speed to the shaft 68.

As appreciated from an inspection of Figure 4, the sheave 66 is rigidly connected with the shaft 68 and is mounted thereon, thereby receiving and further transmitting the torque of the shaft 68.

Endless conveyor and stringing system

An endless conveyor or belt 86 is entrained around both of the sheaves 60 and 66, respectively, and also around four pulleys. The said four pulleys 87, 88, 89 and 90, respectively, are supplied in pairs. The pair including that indicated at 87 and 90 is attached to the shaft 54. The other pulleys 88 and 89 form a second pair which are mounted on the shaft 52.

As described above, torque is applied to the sheave 66 and since the belt 86 extends therearound, the belt is of course, used in its endless travel.

Attached to the belt through the medium of a pair of straps 92 and 94, respectively, is a small housing 96 which is in reality a string container. A detachable closure or cap 98 may be supplied on the housing in order to render access to the interior thereof.

Viewing Figure 8 it will be seen that the supply of string 100 is of conventional character and is journaled on a sleeve 102 also in the interior of the housing. This sleeve may have a cap 104 attached at one end thereof having a through

bore whereby the string may be led through the sleeve 102, thence to a second housing 106. The interior of the second housing serves a secondary function as a valve chamber; there is a check valve supplied therein.

This check valve includes a ball 108 which is engageable with the arcuate interior upper surface of the second housing, thereby rendering this arcuate surface a valve seat 110. The said string is lead through the second housing or valve chamber, thence through a piston 112 or more specifically through a bore 114 extending axially of the piston.

The said piston 112 is resiliently biased through the medium of a conventional spring 115 which seats on a cap 116 and reacts on the ball 108. The said cap is threadedly received on the second housing in order to render it adjustable thereby regulating the effective compression of the spring 115. Through the utility of such a string dispenser back lash will be prevented or reduced to such a minimum as to be negligible and also, the amount of tension required to issue the string from the housing may be selectively regulated. This device prevents the string or cord 116 from sagging during the operation of the invention.

As the small vehicle is progressed through a field and since the U-shaped frame member extends over the field cord or wire 10 it is apparent that when the string container is in a position as substantially shown in Figure 1, the said string will become reachable by the operator of the vehicle. As the string is pulled slightly further over the top of the field string 10 and the endless conveyor progresses slightly more, the string engages the rod 12 and slides thereup. This rod has a sleeve or bearing 118 slidably received thereon which is adapted to be limited in its travel by an enlarged end or stop 120 and by reception in the recess 64. A depending member 122 is fixed to the sleeve 118, and at its junction with the sleeve 118, it constitutes a hooking means or device to engage the string 116 thereby sliding the sleeve 118 to the stop 120, which is relatively close to the operator of the vehicle. At this position the string is removed by the operator of the vehicle and stapled to the ground through the medium of conventional staples 126. In the meantime the endless conveyor and vehicle continue to be actuated and when the conveyor completes an additional one-half revolution the string will be again in position to be clamped. However, when the string is to be stapled again it is received from the second arm 130 which is substantially identical to the arm 12. This second arm is mounted on the frame by means of the shaft 132 which also journals the said sheave 60. This last-mentioned arm 130 is relatively shorter than the arm 12 for facility in operation. Both rods (12 and 130) include a resilient mounting means, as the springs (Figure 1) which encircle them, so as to provide a limited amount of resiliency in these assemblies. It will not be necessary for the operator to reach the additional length in the event that the arm 130 were the same size as the arm 12.

Vehicle steering means

In Figure 5 it will be noted that a trolley generally indicated at 134 is supplied and is composed of a trolley wheel 136 mounted on a yoke 138 through the medium of a small shaft 140. The yoke is hingedly connected to an end of an arm or rod 142. Adjacent but not at the opposite end of this arm 142 there is supplied a pivot pin 144 pivotally mounting the arm 142 to the web or top of the U-shaped member seen in Figure 1. Thus with the field wire 10 in the position relative to the U-shaped member as is seen in Figure 5, any deviation in travel from the movement parallel to the field wire 10 will be transmitted to pivotal movement of the arm 142.

Attached to one side of the arm 142 is a cable 146 which extends over various guide pulleys or guides 148, 150, and 152 mounted on the U-shaped member. This cable 146 terminates at a small arm 154 which is operatively associated with the sterring mechanism of the motorcycle 14. Thus, movement in one direction from the travel of the vehicle parallel to the field wire 10 will transmit a steering moment to the vehicle 14.

In order to steer the small vehicle 14 in the other direction a second flexible member such as a cable 158 is attached to another arm 160 which is also operatively associated with the steering mechanism of the small vehicle 14. This cable 158 extends around various pulleys or other suitable guides 162, 164 and 168 respectively, one of which may be attached to the small vehicle while the remainder are attached to the U-shaped frame. The said cable 158 in this instance terminates in a suitable eye or hook 170 which is secured to an end (opposite the trolley 134) of the arm 142. Since this end is beyond the pivot point of the arm 142 the steering moment will be transmitted in the proper (opposite) direction.

It will be noted that the pivot pin 144 is used not only to pivotally mount the arm 142 but also to journal a pulley or guide 174 for a third flexible member or cable 176. This cable terminates at one end in a suitable hooking member or eye 178 attached to the trolley yoke 138 and at its opposite end on a handle or lever 180. The said lever may be attached at a convenient position on one of the arms of the U-shaped members. Wherever it is found desirable, other guides may be used such as the pulley 182. By this expedient the entire trolley may be pivotally actuated for various reasons, such as in order to turn the device at the end of one field string or wire or in order to manually steer the small vehicle.

The foot rests 184 and 186 may be pivotally mounted in a suitable manner to the vehicle 14 and sufficient linkages generally indicated at 188 may connect each foot rest to the steering brackets or plates at the forward end of the vehicle, whereby foot control is supplied for steering purposes.

The operation of the invention has been set forth elsewhere in the specification. It is appreciated, however, that variations may be made without departing from the spirit of the invention.

Having described the invention, what is claimed as new is:

1. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending therearound, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle

steering means attached to said frame and associated with said vehicle.

2. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending thereabout, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle steering means attached to said frame and associated with said vehicle, said steering means including an arm pivoted to said frame, a trolley mounted on said arm, and means for transmitting movement of said arm to said vehicle.

3. The combination of claim 2 and means for pivotally actuating said trolley.

4. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending thereabout, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle steering means attached to said frame and associated with said vehicle, said string grasping means including a rod, resilient means mounting said rod on said frame, and a hook member slidably disposed on said rod.

5. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending thereabout, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle steering means attached to said frame and associated with said vehicle, and means operatively associated with said string retaining means for regulating the issue of string.

6. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending thereabout, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle steering means attached to said frame and associated with said vehicle, and means operatively associated with said string retaining means for regulating the issue of string, said last-mentioned means including a housing having a through opening and a spring loaded check valve in said housing closing said opening.

7. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending thereabout, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle steering means attached to said frame and associated with said vehicle, a transmission actuated by said vehicle driving said belt.

8. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending thereabout, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle steering means attached to said frame and associated with said vehicle, a transmission actuated by said vehicle driving said belt, and a clutch interposed between said belt and said transmission.

9. A field stringer comprising a self-powered vehicle with a bracket mounted thereon, a frame attached to said bracket, spaced pulleys journaled on said frame and an endless belt extending around said pulleys, sheaves journaled on said frame and having said belt extending thereabout, means for supporting a supply of string secured to said belt, string grasping means mounted on said frame and vehicle steering means attached to said frame and associated with said vehicle, a transmission actuated by said vehicle driving said belt, said steering means including an arm pivoted to said frame, a trolley mounted on said arm, and means for transmitting movement of said arm to the steering mechanism of the vehicle.

10. The combination of claim 9, and means for pivotally actuating said trolley.

11. In a field stringer, a self-powered vehicle with a bracket mounted thereon, a substantially U-shaped frame attached adjacent one end to said bracket, said U-shaped frame having sides and a top, the top adapted to overlie a field string, an endless conveyor mounted on said U-shaped frame, means associated with said endless conveyor and said vehicle for actuating and selectively controlling the actuation of said endless conveyor, means attached to the top of said frame for guiding the vehicle, a string container attached to said endless conveyor and means associated with said frame grasping string from the string container during predetermined portions of a cycle of operation of the endless conveyor.

12. The combination of claim 11, and means attached to said string container for selectively controlling the issue of string therefrom.

13. The combination of claim 12, and said string control means comprising a spring loaded valve.

14. In a field stringer, a self-powered vehicle with a bracket mounted thereon, a substantially U-shaped frame attached adjacent one end to said bracket, said U-shaped frame having sides and a top, the top adapted to overlie a field string, an endless conveyor mounted on said U-shaped frame, means associated with said endless conveyor and said vehicle for actuating and selectively controlling the actuation of said endless conveyor, means attached to the top of said frame for guiding the vehicle, a string container attached to said endless conveyor and means associated with said frame grasping string from the string container during predetermined portions of a cycle of operation of the endless conveyor, said string grasping means comprising at least one rod, and means resiliently attaching said rod to said frame, and a hook device slidably mounted on said rod.

15. In a field stringer, a self-powered vehicle with a bracket mounted thereon, a substantially U-shaped frame attached adjacent one end to said bracket, said U-shaped frame having sides

and a top, the top adapted to overlie a field string, an endless conveyor mounted on said U-shaped frame, means associated with said endless conveyor and said vehicle for actuating and selectively controlling the actuation of said endless conveyor, means attached to the top of said frame for guiding the vehicle, a string container attached to said endless conveyor and means associated with said frame grasping string from the string container during predetermined portions of a cycle of operation of the endless conveyor, said steering means comprising a trolley, means pivotally mounting said trolley to the top of said U-shaped frame and means actuated by said trolley for motivating the steering mechanism of the vehicle.

16. A stringer attachment for a vehicle which is adapted to be used in applying twine over a field line, said attachment comprising a frame including a pair of sides and a top connecting the sides and adapted to overlie the field line, an endless conveyor member, pulleys secured to said sides a substantial distance from said top, guide pulleys disposed adjacent the junction of said sides and said top, said conveyor member being entrained around said pulleys, a twine container secured to said conveyor member so that it moves with the conveyor member during cycles of operation of the conveyor member, and means secured to said frame for hooking the twine carried by said container as the container passes said hooking means during a portion of a cycle of operation of said conveyor.

17. A stringer attachment for a vehicle which is adapted to be used in applying twine over a field line, said attachment comprising a frame including a pair of sides and a top connecting the sides and adapted to overlie the field line, an endless conveyor member, pulleys secured to said sides a substantial distance from said top, guide pulleys disposed adjacent the junction of said sides and said top, said conveyor member being entrained around said pulleys, a twine container secured to said conveyor member so that it moves with the conveyor member during cycles of operation of the conveyor member, means secured to one of said sides and including a hanger bracket for fastening said frame to the vehicle, rods secured to said bracket and said frame, said rods having twine hooking members carried thereby to hook the twine carried by said twine container as the container passes said hooking members during a cycle of operation of said conveyor member.

18. A stringer attachment for a vehicle which is adapted to be used in applying twine over a field line, said attachment comprising a frame including a pair of sides and a top connecting the sides and adapted to overlie the field line, an endless conveyor member, pulleys secured to said sides a substantial distance from said top, guide pulleys disposed adjacent the junction of said sides and said top, said conveyor member being entrained around said pulleys, a twine container secured to said conveyor member so that it moves with the conveyor member during cycles of operation of the conveyor member, and means secured to said frame for hooking the twine carried by said container as the container passes said hooking means during a portion of a cycle of operation of said conveyor, a wheel disposed at the lower end of one of said sides to partially support said frame, and a hanger bracket secured to the other of said sides which is adapted to be fixed to the vehicle.

19. A stringer attachment for a vehicle which is adapted to be used in applying twine over a field line, said attachment comprising a frame including a pair of sides and a top connecting the sides and adapted to overlie the field line, an endless conveyor member, pulleys secured to said sides a substantial distance from said top, guide pulleys disposed adjacent the junction of said sides and said top, said conveyor member being entrained around said pulleys, a twine container secured to said conveyor member so that it moves with the conveyor member during cycles of operation of the conveyor member, means secured to one of said sides and including a hanger bracket for fastening said frame to the vehicle, rods secured to said bracket and said frame, said rods having twine hooking members carried thereby to hook the twine carried by said twine container as the container passes said hooking members during a cycle of operation of said conveyor member, said twine container having an outlet opening for passage of the twine, and a twine backlash preventing device carried by said container and operatively connected with the twine as it passes through said opening.

20. The combination of claim 19 and said backlash preventing device comprising a tube with a twine passage therein, a valve, and means yieldingly pressing said valve in the passage-closing position.

21. The combination of claim 17 and said hooking members having bearings which are slidably disposed on said rods, and a stop secured to each rod for engagement by said bearings limiting the movement of said hooking members on said rods.

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