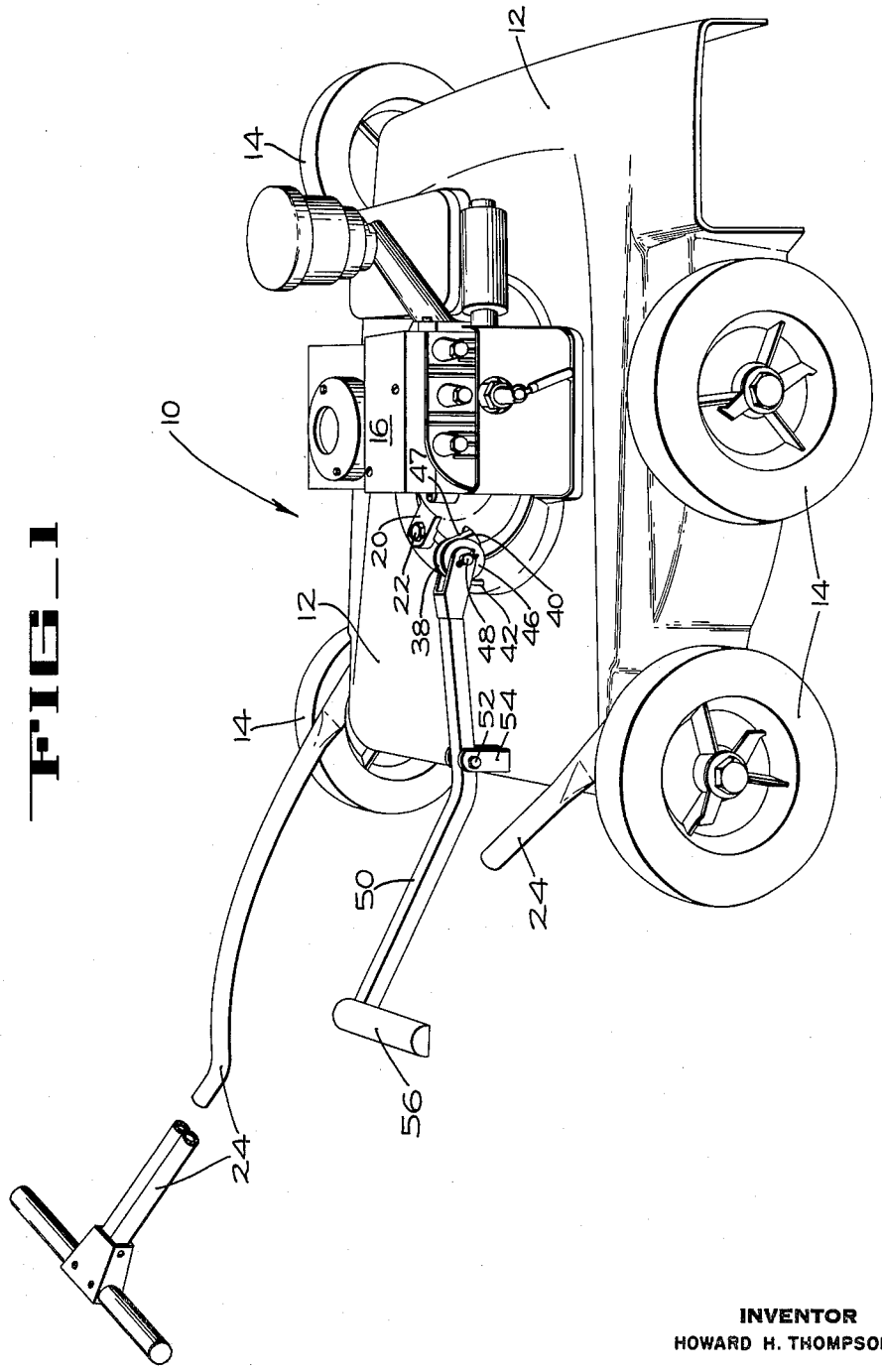
Jan. 30, 1962 H. H. THOMPSON 3,018,768

ENGINE STARTING APPARATUS

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FIG. 1



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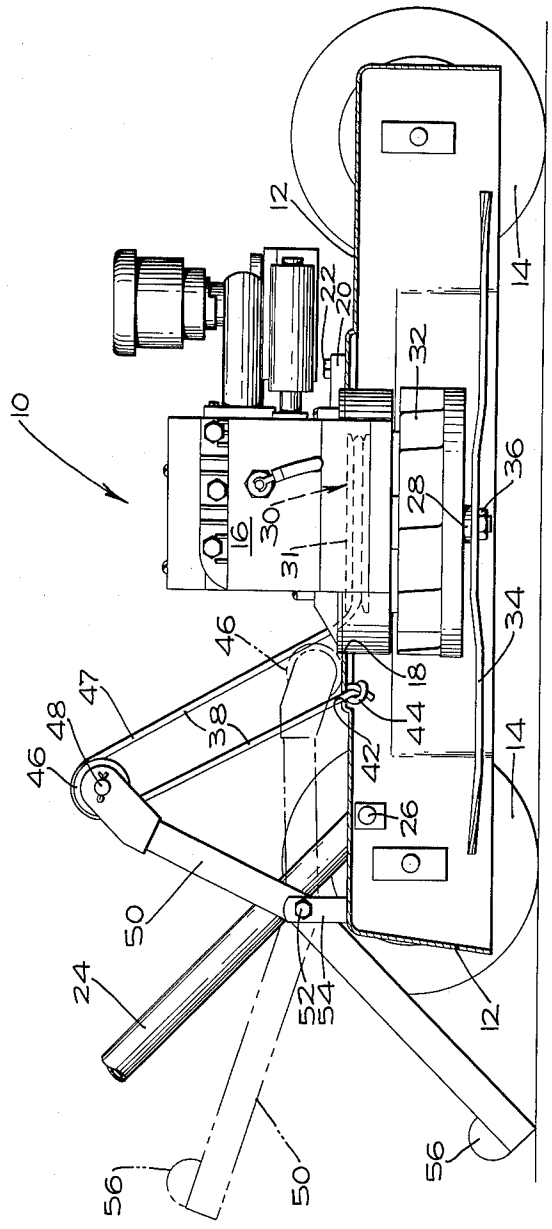
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FIG. 2



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ENGINE STARTING APPARATUS

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This invention relates to engine-powered gardening machinery and more particularly relates to starting apparatus for the engines of such machinery.

An object of the invention is to provide improved apparatus for starting power gardening machines.

Another object is to provide improved starting apparatus having an advantage with respect to the length of pull required to start the engine of greater than 1:1.

Another object of the invention is to provide an improved kick-starter for a power lawnmower, i.e., a starter enabling a person to start the engine of the lawnmower by means of a foot-actuated lever.

These and other objects and advantages of the invention will be apparent from the following description and the accompanying drawing wherein:

FIG. 1 is a partly broken away perspective of a power lawnmower having the starter of the invention operatively installed thereon.

FIG. 2 is a side elevation, partially in section, of the lawnmower of FIG. 1 and illustrates two operational positions of the starter.

The power lawnmower **10** (FIGS. 1 and 2) comprises a housing or framework **12** having four wheels **14** rotatably mounted thereon, and an engine **16**. The engine **16** is centrally mounted on the lawnmower framework **12** and extends a short distance through a suitable central opening **18** in the housing. The engine includes several foot members **20**, which project over the housing **12** adjacent the opening **18** and support the engine on the framework. A bolt **22** passes through each foot member **20** to fasten the engine to the framework **12**. A handle **24** for the lawnmower is connected to the framework **12** by suitable axially aligned pivot pins such as the bolt **26** (FIG. 2).

Connected to the engine crankshaft **28** (FIG. 2) are an engine cranking mechanism **30**, a flywheel **32**, and a grass-cutting blade **34**. A nut **36** connected to the end of the crankshaft **28** retains these members in their operating positions. The engine cranking mechanism **30** is not shown in detail but comprises what is known in the art as a recoil starter and includes a cranking pulley **31**.

Recoil starters used on small engines are usually provided with a pull rope which is pulled briskly by hand, to crank the engine. In close quarters or in situations where the operator is required to assume an awkward position, such pull ropes cannot be operated satisfactorily. The advantage with respect to length of pull provided by the starting apparatus of the present invention permits small engines to be easily cranked even in close quarters and without liability of injury to the operator.

The pull rope or starting cable **38** of the engine **16** has one end thereof operably connected to the recoil starter **30** from which the rope extends through an opening **40** in the engine casting. The other end of the cable **38** is securely fastened to the framework **12**, as by passing it through a small hole **42** in the framework and then tying a knot **44** in it, as shown in FIG. 2. A sheave or pulley **46** engages the cable between the opening **40** and the hole **42**, thus forming a loop, or bight **47** in the cable. The pulley **46** is mounted on a pin **48** in one end of a lever **50**. The lever **50** is pivotally mounted on a bolt **52** which is carried in a bracket **54** welded or otherwise connected to the housing **12** of the lawnmower. A tread bar **56** is connected to the lever **50** at the end opposite the pulley **46**.

To crank the engine **16** the tread bar **56** is depressed

from its initial position (FIG. 1, and phantom line position in FIG. 2) to its alternate position (solid line position in FIG. 2). Depression of the tread bar **56** causes the pulley **46** to translate or bodily move in an arcuate path around the bolt **52**. In moving, the pulley causes the rapid withdrawal of the cable **38**, spinning the internal mechanism of the cranking mechanism **30** so as to crank the engine **16**.

The lever **50** is, of course, adapted to be operated by foot and with the disclosed arrangement the operator can with little effort, and without stooping or otherwise assuming an awkward position, impart a starting impulse to the engine. When the operator removes his foot from the tread bar **56** the lever is automatically returned to its initial position (FIG. 1) by the action of the recoil starter **30** rewinding the cable **38**.

Since the apparatus of the present invention actuates the starter by the use of a pulley engaging a bight portion **47** of the pull rope, the pulley end of the lever need travel only one half the distance to turn the cranking mechanism and therefore it attains an advantage with respect to length of pull of approximately 2:1 as compared to the 1:1 ratio provided by conventional starting devices wherein a single reach of a pull rope is withdrawn by hand. Other lever lengths and other pulley arrangements are variations which could be used to change the pressure required to operate the device and to change the ratio of the mechanical advantage attained thereby. The apparatus can be used for starting any engine of reasonable size.

While a particular embodiment of the present invention has been shown and described it will be understood that the device is capable of modification and variation without departing from the principles of the invention and that the scope of the invention should be limited only by the scope and proper interpretation of the claims appended hereto.

The invention having thus been described, that which is believed to be new and desired to be protected by Letters Patent is:

1. In a gardening machine having a frame, an engine mounted on said frame, and a cranking mechanism connected to said engine, the combination of a cable having one end thereof operatively connected to said cranking mechanism and the other end thereof fixed to the frame, and a foot-operated lever mounted for movement relative to said frame and having a portion operatively engaged with said cable intermediate said cable ends and movable along a path transverse to a line passing through said points of connection for imparting a starting impulse to the engine.

2. In a machine having an engine and an engine cranking mechanism including a starting pulley, the combination of a starting cable having one end thereof wound on said pulley and having the other end thereof fixed, a sheave engaging a bight of the starting cable between said ends, and foot-operated means mounted on said machine for bodily shifting said sheave in a direction away from the starting pulley to unwind the cable therefrom to rotate the pulley and thereby impart a starting impulse to the engine.

3. In a gardening machine having a frame, an engine mounted on said frame, and a cranking mechanism operatively connected to said engine, the combination of a starting cable having one end thereof operatively connected to the cranking mechanism and having its other end immobilized, a pulley operatively engaged with the starting cable, and a foot-operated lever connected to said pulley for translating the pulley in a manner drawing the cable from the cranking mechanism to impart a starting impulse to the engine.

4. Starting apparatus for a gardening machine having an engine mounted on the frame thereof and a cranking device connected to the engine, said apparatus comprising

a foot-operated lever, a starting cable having one end thereof operably connected to the cranking device and having the other end thereof fastened to the frame, and a pulley journalled on said lever and operatively positioned to pull the cable and thereby impart a starting impulse to the engine upon foot operation of said lever.

5. In a gardening machine having a frame, an engine mounted on said frame, and a cranking mechanism operatively connected to the engine crank shaft, the combination of a starting cable having one end thereof operatively connected to said cranking mechanism and having the other end thereof fastened to said frame, a foot-operated lever pivotally connected to said frame, and a sheave journalled on said lever for translation in response to foot-operation of said lever and engaged with a bight of the starting cable for rotating the cranking mechanism and starting the engine.

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