May 18, 1926.

1,585,118

J. E. SCHOOLFIELD

PULLING DEVICE

Filed Oct. 21, 1922

4 Sheets-Sheet 1

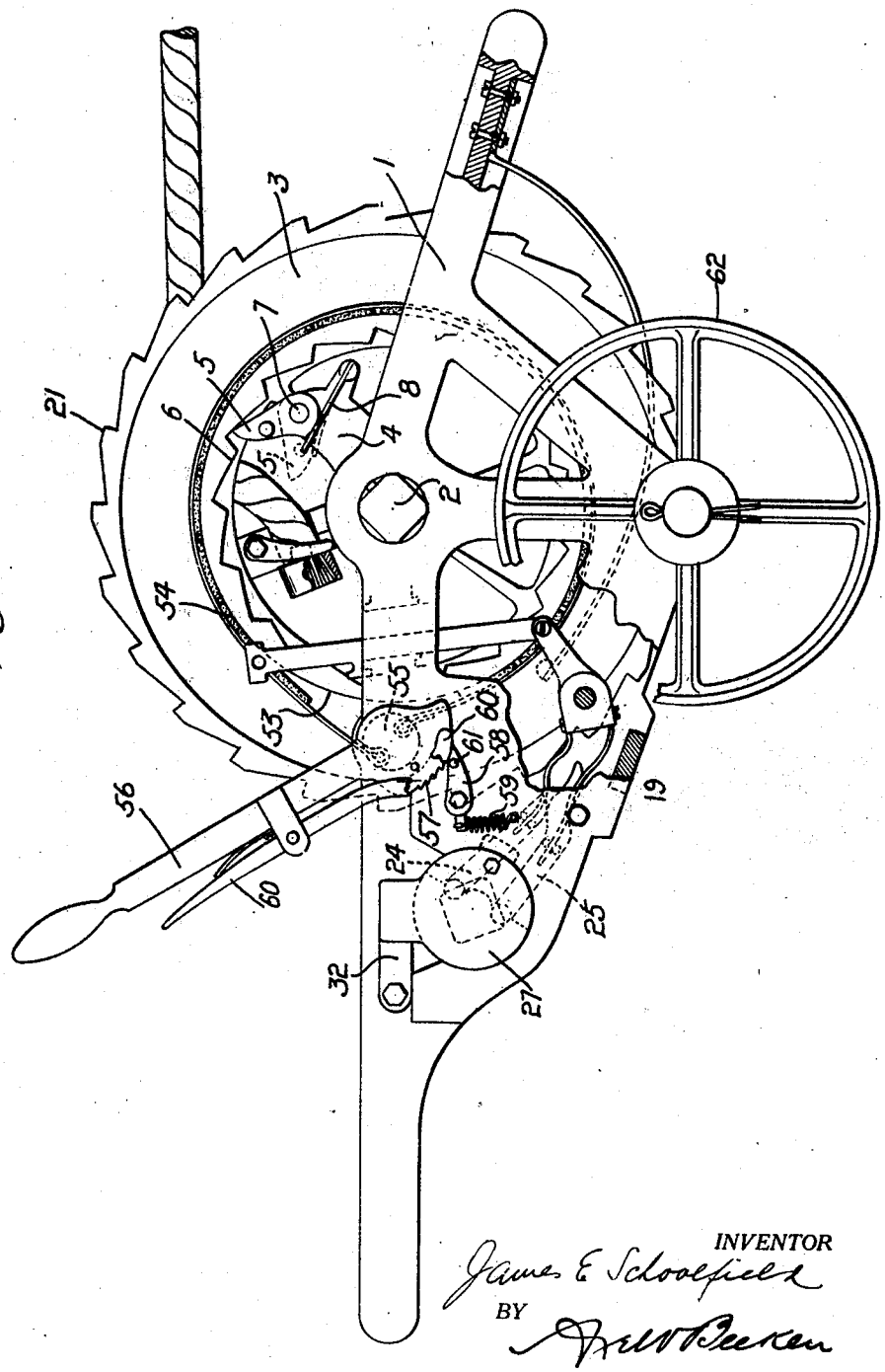


Fig. 1.

INVENTOR

James E. Schoolfield

BY

Fred W. Beeken

ATTORNEY

May 18, 1926. 1,585,118

J. E. SCHOOLFIELD

PULLING DEVICE

Filed Oct. 21, 1922 4 Sheets-Sheet 2

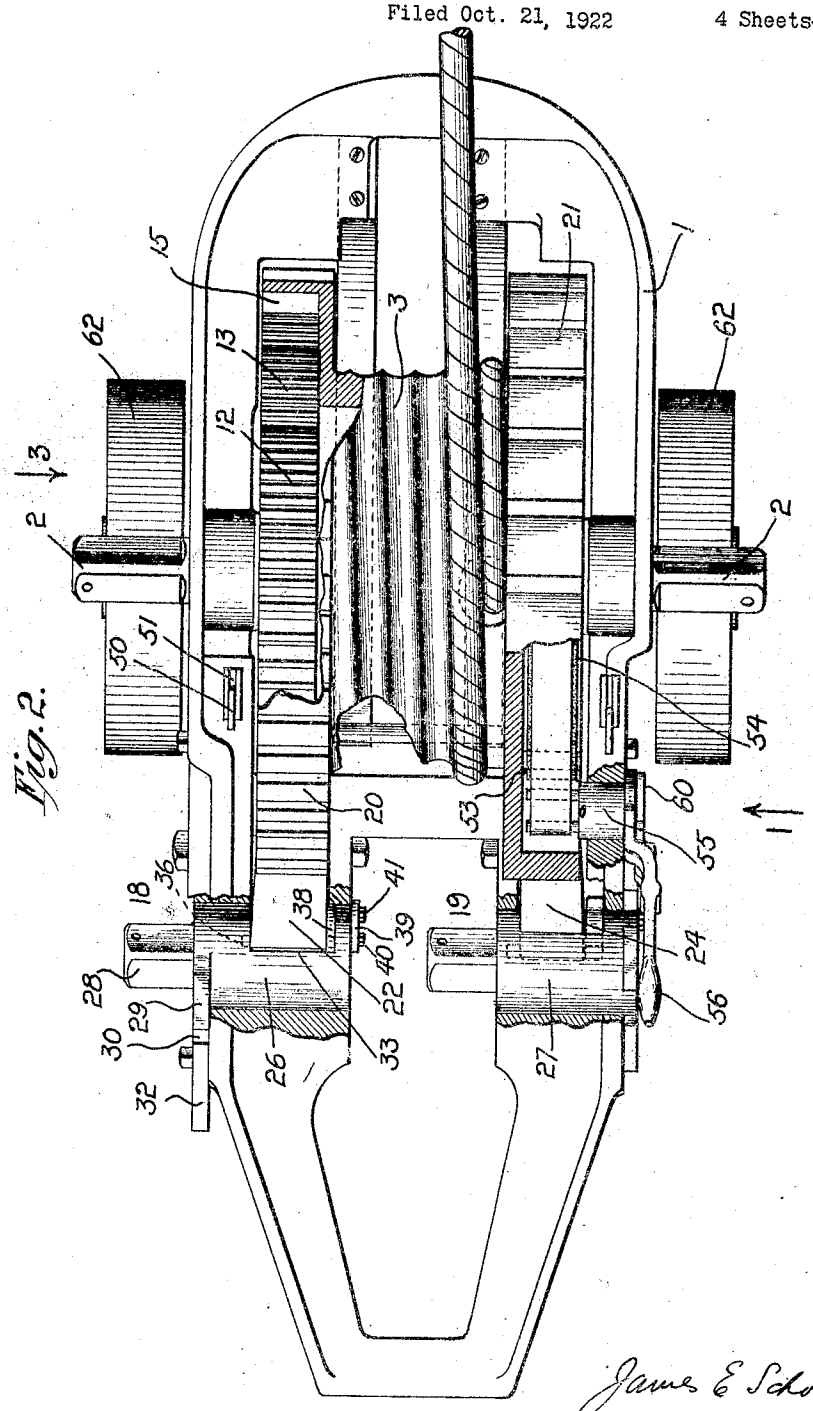


Fig. 2.

INVENTOR
James E Schoolfield
BY
ATTORNEY

May 18, 1926. 1,585,118

J. E. SCHOOLFIELD

PULLING DEVICE

Filed Oct. 21, 1922 4 Sheets-Sheet 3

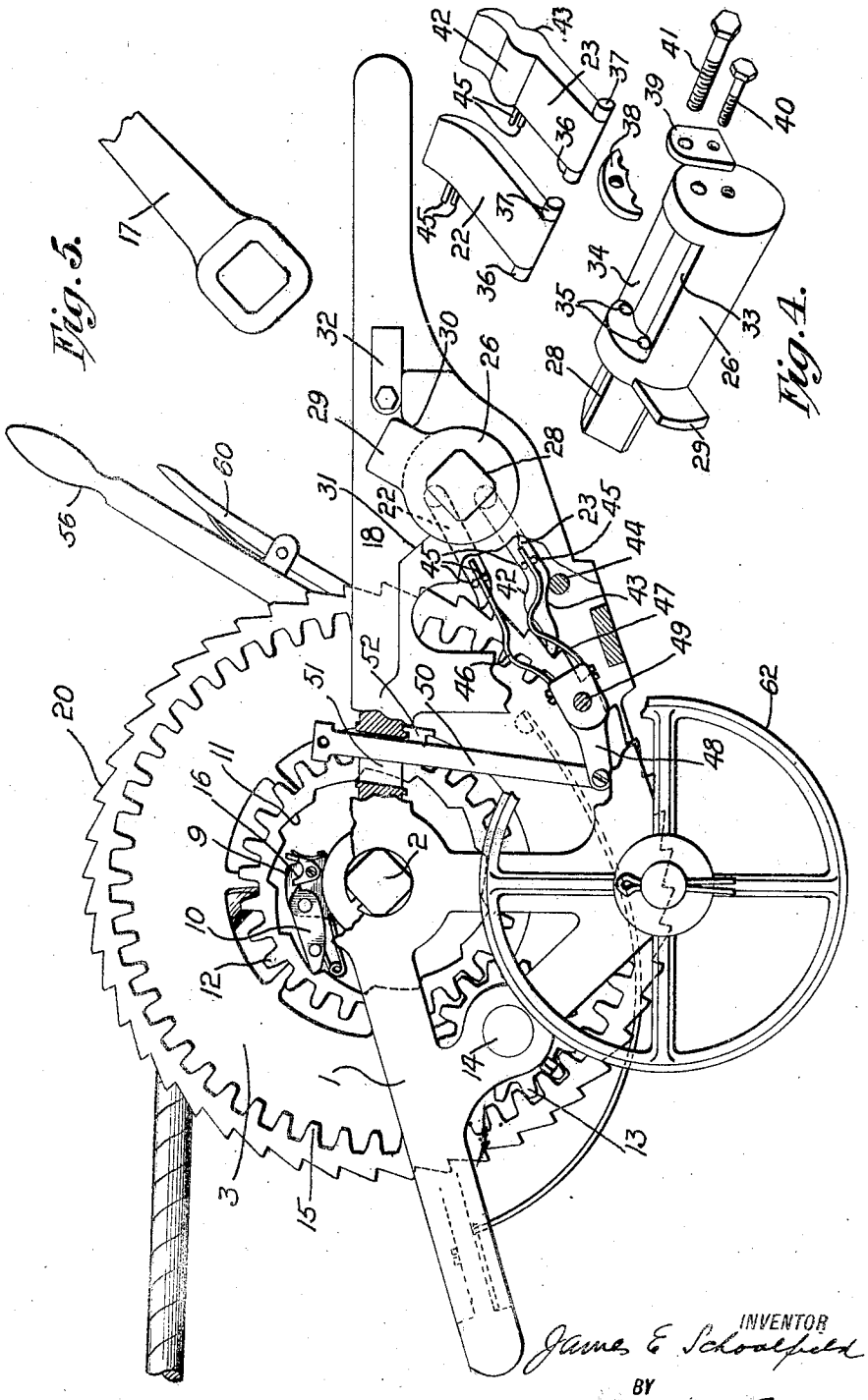


Fig. 3.

Fig. 4.

Fig. 5.

INVENTOR
James E. Schoolfield
BY
Wells Peeler
ATTORNEY

May 18, 1926. 1,585,118

J. E. SCHOOLFIELD

PULLING DEVICE

Filed Oct. 21, 1922 4 Sheets-Sheet 4

Fig. 6.

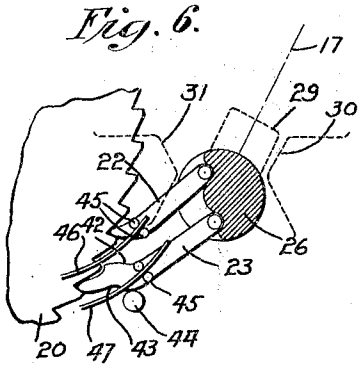


Fig. 7.

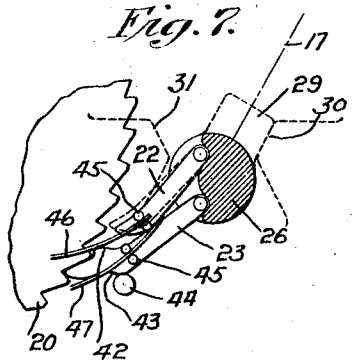


Fig. 8.

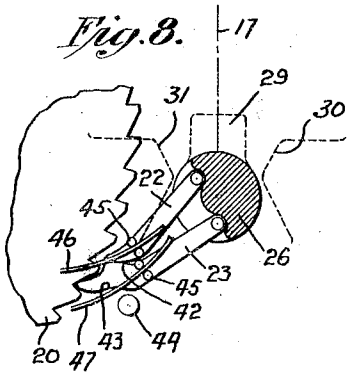


Fig. 9.

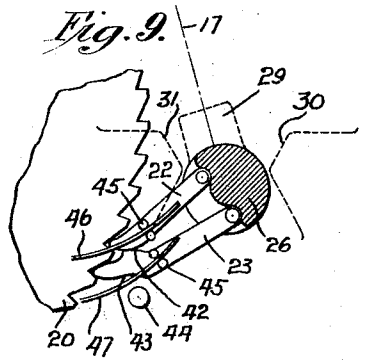


Fig. 10.

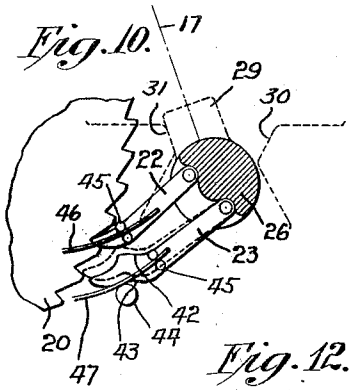


Fig. 11.

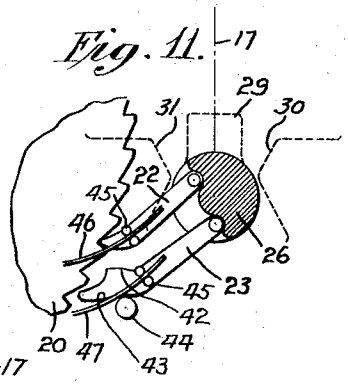
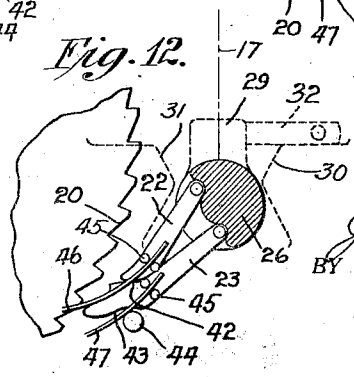


Fig. 12.



INVENTOR

James E. Schoolfield

BY

ATTORNEY

Patented May 18, 1926. 1,585,118

UNITED STATES PATENT OFFICE.

JAMES E. SCHOOLFIELD, OF DANVILLE, VIRGINIA, ASSIGNOR TO PULLER MANUFACTURING CO. INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PULLING DEVICE.

Application filed October 21, 1922. Serial No. 595,922.

This invention relates to pulling mechanism or the like for hauling or lifting a load and has for its main object and feature means whereby different speed and power ratios may be established when using the device in connection with different loads, and whereby also the mechanism is reversible so that it may be used as a retarding device as when lowering a load. A further object and feature of the invention resides in the general arrangement of the parts whereby a simple, efficient and compact structure is produced.

In the accompanying drawings the invention is embodied in a concrete and preferred form in which,

Fig. 1 is a side elevation looking in the direction of arrow 1 of Fig. 2 of a machine embodying the invention, with parts broken away, and in section.

Fig. 2 is a top plan view of the device with parts broken away, and in section.

Fig. 3 is a side elevation looking in the direction of arrow 3, Fig. 2, with parts broken away, and in section.

Fig. 4 is a disassembled view of the pawls of the low speed device with their supporting means.

Fig. 5 is a detail view of the operating handle or crank.

Figs. 6 to 12 inclusive are diagrammatic views showing the operation of the low speed device.

1 indicates a framework of any suitable construction in which is loosely mounted a shaft 2 supported in suitable bearings in such manner that the shaft may be rotated or oscillated. Loosely mounted on shaft 2 is a drum 3. Mounted fast on shaft 2 is an arm 4 carrying a pawl 5 that engages ratchet teeth 6 on a flange of the drum. Said pawl is pivotally supported at 7 and is normally urged into engagement with the ratchet aforesaid by means of spring 8. By depressing the pawl forwardly into the dotted line position (Fig. 1), against the action of the spring, the pawl and ratchet mechanism is rendered inactive.

Also mounted fast on shaft 2 is an arm 9 on which is pivotally supported a pawl 10 normally urged by a spring into engagement with ratchet 11 on gear 12 which gear is mounted loosely on shaft 2. Meshing with gear 12 is a pinion 13 mounted for rotation at 14 in the framework, and meshing with pinion 13 is an internal gear 15 on one of the flanges of the drum. Pawl 10 may be thrown out of operation by depressing it against the action of the spring and holding it in this position by latch 16.

It will be seen from Fig. 2 that shaft 2 projects through the framework at either side thereof and has squared ends and that a lever 17 (Fig. 5) or a crank may be attached to either squared end of shaft 2, or, for that matter, a driving pulley or other transmission means may be secured thereto. It will further be seen from Fig. 2 that the two trains of transmission means are housed within side flanges on the drum. Also that since pawl 5 transmits its power directly to the drum and pawl 10 transmits its power indirectly through gearing to the drum, the speed and power ratio of the two sets of transmission means are different with respect to each other. Furthermore, ratchets 6 and 11 and pawls 5 and 10 face in opposite directions.

It will now be understood that, by means of the mechanism described, the drum may be actuated in a number of different ways. If both pawls are in engagement with the ratchets, then, by rocking shaft 2 in opposite directions, from either end thereof, as by means of handle 17, the drum will be rotated in one and the same direction. By throwing one or the other of the pawl and ratchet mechanisms out of operation, the drum can be intermittently rotated in the same direction. Finally, the drum may be rotated continuously by rotating shaft 2 in one direction or the other, the direction of rotation of shaft 2 determining the train of mechanism through which the drum is driven. In case shaft 2 is rotated continuously it is not necessary to throw one of the pawls out of action. It is rather an advantage to keep it in since the pawl not used for driving will act as a stop pawl to prevent backward rotation of the drum.

Within a small compass, therefore, and by relatively simple means, a number of different operating conditions can be met and different speed and power ratios can be obtained at the will of the operator.

Although several speeds of the drum are obtainable by the means just described, we will, as a matter of convenience, refer to the several trains of connections between the internal shaft and the drum as the "high

speed device" and it will be understood that such "high speed device" constitutes a complete mechanism for pulling, lifting or lowering objects, especially when associated with a brake mechanism to be presently described. It is preferred, however, to have one or more auxiliary low speed mechanisms having different speed and power ratios with respect to each other and with respect to the several speeds of the "high speed device". These mechanisms are designated by 18 and 19 (Fig. 2) and consist essentially of two ratchets 20 and 21 and two pairs of low speed pawls 22, 23 and 24, 25. It will be seen that ratchet 20 is in the outer circumference of the web of the drum that houses one set of gearing between shaft 2 and drum 3, internal gear 15 being on the inside of said web; and that ratchet 21 is on the outer circumference of a web of the drum on the other side of the machine. The two pairs of low speed pawls are carried by rocking members 26 and 27 respectively which are mounted independently of shaft 2 and exteriorly of drum 3 in the framework of the machine. Since the low-speed devices 18 and 19 are identical in construction except for their power and speed ratio, only one of these, namely 18, will be described in detail.

Rocking member 26 is mounted to oscillate in the framework and has a squared end 28 to which handle 17 may be fitted; and is further provided with a stop member 29 that limits its rocking movement by coming in contact with abutment surfaces 30 and 31. 32 indicates an auxiliary abutment member pivoted on the framework. Member 26 is provided with two pawl seats 33 and 34 having at one end apertures 35. Pawls 22 and 23 are provided with pivot extensions 36 and 37, one of which fits into aperture 35 and the other of which is held in position by cap 38 having two recesses in its lower surface as shown. Cap 38 is held in position by means of plate 39 secured to the end of member 26 by means of bolt 40; bolt 41 passing through plate 39, member 26 into cap 38 to secure the latter in position. Pawl 23 also has cam surfaces 42 and 43, and 44 indicates a pin on the framework against which pawl 23 acts. Each pawl is further provided with two pins 45 for the purpose of receiving springs 46 and 47 between them. These springs are carried by a pawl reversing member 48 pivotally supported at 49 in the framework and controlled by pawl reversing lever 50 pivoted to the end thereof and extending through a slot 51 in the framework. 52 is a projection that may engage a protuberance on the upper or lower side of that part of the framework to which it is adjacent. It will be understood that when the parts are in the position shown in Fig. 3 springs 46 and 47 urge the pawls toward the ratchet; and that when the parts are in the position shown in Fig. 1, where the parts relating to low speed device 19 are shown, springs 46 and 47 urge the pawls away from the ratchet.

With the parts in the position shown in Fig. 3, handle 17 may be attached to squared end 28 of member 26, and said member 26 now being moved to the left, in Fig. 3, will cause pawl 22 to engage a tooth of the ratchet thereby rotating the drum. This movement of pawl 22 is due to the fact that pawl 22 is pivoted at a point eccentric with respect to the center of oscillation of member 26. For the same reason pawl 23 will, during this movement to the left of lever 17 gradually withdraw in an upward and right hand direction until it passes the next tooth on the ratchet when spring 47 will force it into said tooth and this occurs just prior to the engagement of stop 29 with abutment surface 31. On the reverse stroke of lever 17 and member 26 pawl 23 pushes the drum and pawl 22 disengages until the next tooth is reached when spring 46 moves it into said tooth. Under these conditions, therefore, oscillation of member 26 will rotate the drum clockwise as viewed in Fig. 3.

During the operation just described, pin 44, while it contacts at times with the lower cam surface of pawl 23, does not function; and similarly the upper cam surface on pawl 23 does not function with respect to the lower surface of pawl 22.

If it is now desired to relieve the strain on the cable without entirely releasing the drum or to lower an object, pawl reversing member 48 is moved into the position shown in Fig. 1 in which position the springs normally urge the pawls away from the ratchet.

This action, however, will not materially affect pawls 22 and 23 because the load is equally distributed between them when the pulling motion is stopped by stop 29 moving slightly away from abutment 30 or 31 as the case may be. The same action will also occur when holding the load during pulling by the low speed pawls.

To begin the lowering operation when the low speed pawls 22 and 23 are in the position indicated in Fig. 6, lever 17 must first be pulled backward (to the right) until stop 29 comes against abutment member 30 thus releasing the holding pressure on pawl 22 and pulling it back far enough to allow spring 46 to throw it downward past the ratchet tooth, as indicated in Fig. 7, until it rests upon the upper surface of pawl 23. The pull of the load, being in the direction of arrow in Fig. 7, is now sustained by pawl 23 moving it backward and throwing lever 17 forward. During this action pawl 22 is advancing and its lower surface will ride

on the upper cam surface 42 of lever 23 until it is guided against the action of spring 46 into the next ratchet tooth. (Figs. 7, 8 and 9). When the parts reach the position shown in Fig. 9, they are in a holding position. By allowing the forward movement of lever 17 to continue until stop 29 comes against abutment member 31 (Fig. 10), the load will be thrown on pawl 22, whereby pawl 23 is released and falls into contact with pin 44. On the return stroke of lever 17, pawl 22 will be retracted and 23 will advance, and in so doing pin 44 will guide pawl 23 into engagement with the next ratchet tooth (Figs. 11 and 6) and will eventually release pawl 22 (Fig. 7).

Fig. 12 shows the parts in the neutral position when no load is on the drum, in which case springs 46 and 47 throw both pawls out of engagement with the ratchet. In this position stop 29 is in a vertical position and may rest against auxiliary stop 32 which has been thrown forward as indicated.

From what has been said it will now be evident that the so-called "high speed mechanism" rotates the drum in a clockwise direction when viewed in Fig. 3 regardless of whether shaft 2 is rocked or is rotated in either direction, and that either of the low speed mechanisms 18 or 19 will rotate the drum in a clockwise direction when viewed in Fig. 3. It follows, therefore, that when the drum is actuated by the high speed mechanism either one or both of the low speed mechanisms act as stop pawls preventing backward rotation. Therefore, if it is desired to run out the cable preparatory to beginning winding by means of the "high speed device", or when lowering a light load, the low speed pawls are placed in neutral (Fig. 12) while the cable is so running out and pawls 5 and 10 of the "high speed device" are likewise thrown out of engagement with their ratchets.

Associated with the pulling device is a suitable brake. In the present case the outer circumference of internal ratchet 6 forms a brake surface 53 surrounding which is a brake band 54, the free ends of which are attached to a rocking member 55 mounted in the framework, the points of attachment of the brake band being eccentric with respect to the center of member 55. Member 55 carries a brake handle 56 and has a ratchet 57 formed at its lower surface, with which latter engages latch pawl 58 which is urged into engaging position by spring 59. 60 is a brake release lever which acts against pin 61 on pawl 58 to release the pawl from the ratchet.

The device as a whole is conveniently mounted on road wheels 62 suitably journaled to the framework.

I claim:

1. A pulling device or the like comprising: an oscillatory shaft, a drum loose on the shaft, pawl and ratchet means between the shaft and drum for rotating the drum in the same direction upon a stroke in either direction of the shaft, a rocking member independent of the shaft, a pair of low speed pawls on the rocking member, and means, actuated by said low speed pawls, for rotating the drum in the same direction upon actuation of the rocking member in opposite directions.

2. A pulling device or the like comprising: a drum, two shafts, one loose within the drum and the other external of said drum, ratchet and pawl mechanism between the internal shaft and the drum for driving the drum in one direction upon oscillation of said shaft, and a second ratchet and pawl mechanism between the second shaft and the drum, having a different speed and power ratio from that of the first ratchet mechanism, for driving the drum in one direction upon oscillation of the second shaft.

3. A pulling device or the like comprising: a drum, three shafts, one loose within the drum and the others external of said drum, ratchet and pawl mechanism between the internal shaft and the drum for driving the drum in one direction upon oscillation of said shaft, and two other ratchet and pawl mechanisms between the two external shafts and the drum, having a different speed and power ratio with respect to each other and with respect to the first pawl and ratchet mechanism for driving the drum in one direction upon oscillation of either of the external shafts.

4. A pulling device or the like comprising: a shaft, a drum loosely mounted on said shaft, side flanges on said drum, an internal gear on one of said flanges, a pawl mounted on said shaft adjacent the plane of said internal gear, means housed within the flange for transmitting the motion of the pawl to the internal gear, a ratchet adjacent the other flange of the drum and movable in unison with the latter, and a second pawl mounted on said shaft adjacent the plane of said other flange and operating in a direction opposite to that of the first pawl, whereby rotation in the same direction is imparted to the drum during oscillation of the shaft in opposite directions.

5. A pulling device or the like comprising: a shaft, a drum loosely mounted on said shaft, side flanges on said drum, an internal gear on one of said flanges, a pawl mounted on said shaft adjacent the plane of said internal gear, means housed within the flange for transmitting the motion of the pawl to the internal gear, including a gear loosely mounted on the shaft, a ratchet carried by said gear, and a pinion in mesh with the loosely mounted gear and the internal gear, a ratchet adjacent the other flange of the

drum and movable in unison with the latter, and a second pawl mounted on said shaft adjacent the plane of said other flange and operating in a direction opposite to that of the first pawl, whereby rotation in the same direction is imparted to the drum during oscillation of the shaft in opposite directions.

6. A pulling device or the like comprising: a shaft, a drum loosely mounted on said shaft, side flanges on said drum, an internal gear on one of said flanges, a pawl mounted on said shaft adjacent the plane of said internal gear, means housed within the flange for transmitting the motion of the pawl to the internal gear, a ratchet adjacent the other flange of the drum and movable in unison with the latter, a second pawl mounted on said shaft adjacent the plane of said other flange and operating in a direction opposite to that of the first pawl, whereby rotation in the same direction is imparted to the drum during oscillation of the shaft in opposite directions, a ratchet on the exterior of the first named flange, an auxiliary rocking member and a pair of low speed pawls on the auxiliary rocking member for engagement with said ratchet to advance the drum in the same direction during oscillation of the auxiliary rocking member in opposite directions.

7. A pulling device or the like comprising: a shaft, a drum loosely mounted on said shaft, side flanges on said drum, an internal gear on one of said flanges, a pawl mounted on said shaft adjacent the plane of said internal gear, means housed within the flange for transmitting the motion of the pawl to the internal gear, including a gear loosely mounted on the shaft, a ratchet carried by said gear, and a pinion in mesh with the loosely mounted gear and the internal gear, a ratchet adjacent the other flange of the drum and movable in unison with the latter, a second pawl mounted on said shaft adjacent the plane of said other flange and operating in a direction opposite to that of the first pawl, whereby rotation in the same direction is imparted to the drum during oscillation of the shaft in opposite directions, a ratchet on the exterior of the first named flange, an auxiliary rocking member, and a pair of low speed pawls on the auxiliary rocking member for engagement with said ratchet to advance the drum in the same direction during oscillation of the auxiliary rocking member in opposite directions.

8. A pulling device or the like comprising: a shaft, a drum loosely mounted on said shaft, side flanges on said drum, an internal gear on one of said flanges, a pawl mounted on said shaft adjacent the plane of said internal gear, means housed within the flange for transmitting the motion of the pawl to the internal gear, a ratchet adjacent the other flange of the drum and movable in unison with the latter, a second pawl mounted on said shaft adjacent the plane of said other flange and operating in a direction opposite to that of the first pawl, whereby rotation in the same direction is imparted to the drum during oscillation of the shaft in opposite directions, a ratchet on the exterior of the first named flange, an auxiliary rocking member, a pair of low speed pawls on the auxiliary rocking member for engagement with said ratchet to advance the drum in the same direction during oscillation of the auxiliary rocking member in opposite directions, a ratchet on the exterior of the second flange, a second auxiliary rocking member, and a second pair of low speed pawls, having a different speed and power ratio from that of the first pair of low speed pawls, mounted on the second auxiliary member for engagement with the ratchet on the second flange.

Signed at New York city, in the borough of Manhattan, county and State of New York, this 19th day of October, 1922.

JAMES E. SCHOOLFIELD.