

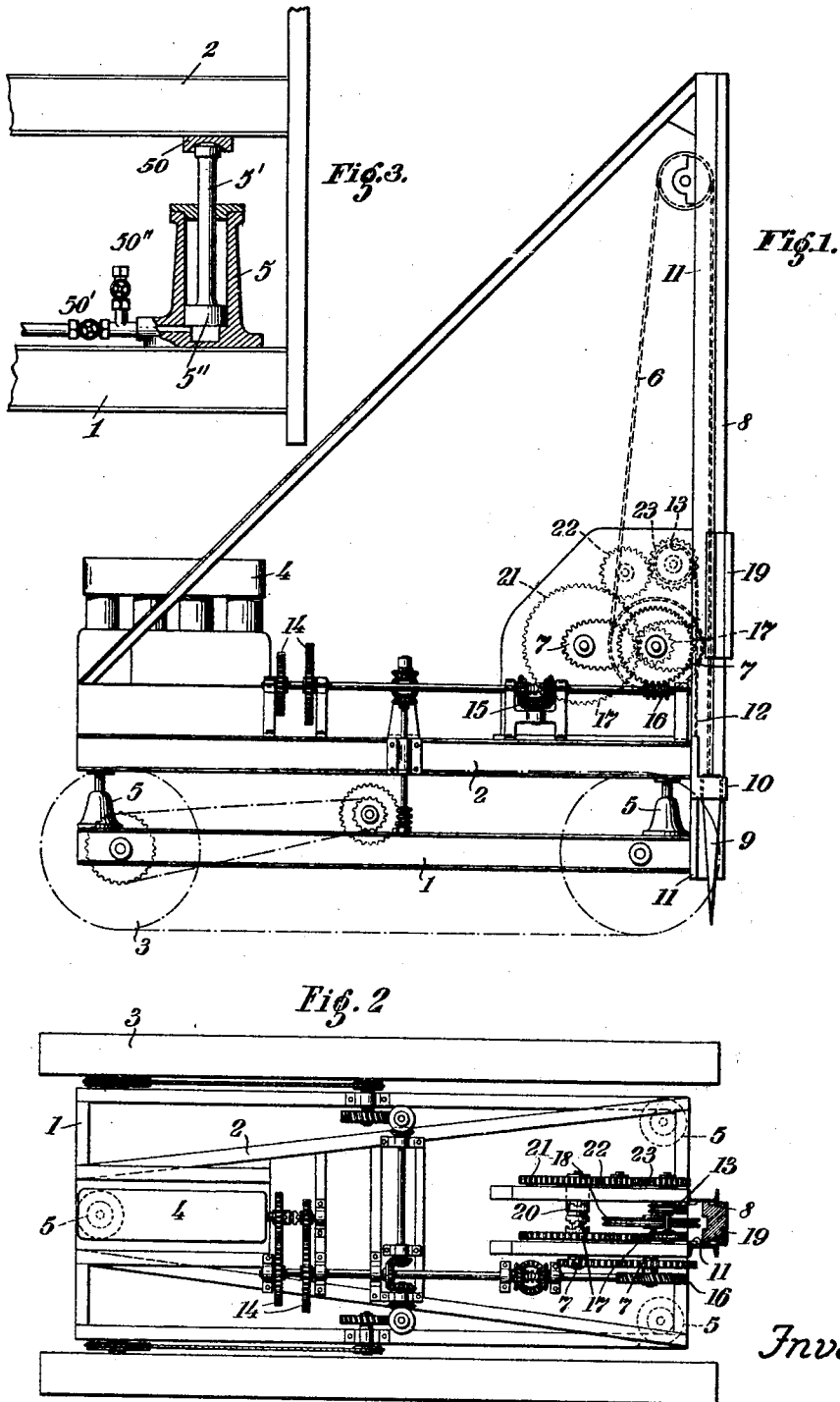
May 5, 1931.

F. W. GRUPE

1,803,902

DEVICE FOR SPLITTING STUMPS IN THE GROUND

Filed May 27, 1929



Inventor:

Friedrich Wilhelm Grupe
By *Lune Grunighe*
Attorney.

UNITED STATES PATENT OFFICE

FRIEDRICH WILHELM GRUPE, OF BERLIN, GERMANY

DEVICE FOR SPLITTING STUMPS IN THE GROUND

Application filed May 27, 1929, Serial No. 366,276, and in Germany May 10, 1928.

My invention relates to improvements in devices for splitting stumps in the ground.

My invention consists in the novel arrangement and mode of operation of the wedge or blade for splitting the stump. Such splitters have been employed heretofore, but they were driven into the stump and withdrawn during each stroke of the driving piston, so that the splitter was handled in the manner of an axe, while in my device the splitter is driven into the stump by a number of blows and then withdrawn, when the splitter has reached the desired depth.

The drawing affixed hereto illustrates diagrammatically an embodiment of my invention. In the drawing:—

Fig. 1 is a side view of the machine.

Fig. 2 is a plan view, and

Fig. 3 is a sectional view of a pneumatic adjustable support.

The improved device is substantially an automotive pile driver particularly adapted for splitting stumps. It consists of two main parts, viz. the truck 1 and the superstructure 2. The truck consists of a rigid frame mounted on wheels or caterpillars 3 driven by the motor 4. On this truck rests supported at a plurality of points the superstructure 2. The supporting points 5 are adapted to be adjusted vertically and independently by mechanical, hydraulic or pneumatic means driven manually or by the motor. The superstructure and thus the pile driver may thus be adjusted as regards their height and set horizontally to the ground or under any desired angle to it. One form of a supporting means is shown in Fig. 3, which, as an example, is a pneumatic support. As shown, the support 5, comprising the cylinder, is mounted on the truck 1 and supports the superstructure 2. It is, of course, understood that this construction is provided at each of the three supporting points, as shown in Figs. 1 and 2. The support consists of a cylinder in which a piston 5'' is provided having a piston rod 5' thereon. The piston and piston rod are adapted to be adjusted vertically in the cylinder and the piston rod is provided with a spherical head. This head sets in a flat plate 50 which has a corresponding

surface and which is provided on the superstructure 2. At the bottom of the cylinder, that is, under the piston 5'', a channel enters the cylinder which is adapted to provide compressed air thereinto. The installation for conveying compressed air to the cylinder is regulated by means of a valve 50'. If it is desired to raise or adjust the superstructure, the valve 50' is opened, whereby compressed air will enter the cylinder and the piston 5'' will be forced upwardly. In the proper adjustment, this valve is closed, but, if it is desired to lower the superstructure again, the valve 50'' is opened, which will permit the compressed air to leave the cylinder and escape into the atmosphere. The air can be compressed by any means, such as a compressor, not shown, which can be operated from the motor 4 and furthermore, for a pneumatic installation, a compressed air tank, not shown, can be provided between the compressor and the cylinder.

On the superstructure is accommodated the motor with the various gears for operating the drop weight 19 as well as the truck and the other auxiliary devices. The weight 19 is operated by a rope or chain 6, which is driven from the motor through special gears in such a manner, that in order to obtain a rapid sequence of operations the weight is raised at a reduced speed, which can be raised to a maximum during the stroke. In the case illustrated this is, for instance, attained by interposing a pair of meshing elliptical wheels 7 in the gearing, which operates in such a manner, that the start of the lift takes place at the time when the lowest transmission ratio is operative.

The weight is guided between rails 8 in the customary manner and may be manually or automatically released at any time. The splitter 9 is loosely guided in a special holder 10, which is suspended from chains 12 and adapted to slide in rails 11. These chains pass over sprocket wheels 13 adapted to be coupled with the motor through a gearing.

In this embodiment of the invention the motor operates the weight 19 through the change-speed gear 14, the reverse gear 15, worm 16 and worm-wheel on the pair of

elliptical wheels 7, pair of spur wheels 17, sprocket wheel 18, through chain 6 on to the weight 19. Or in the other case after reversing the coupling 20 the motor lifts the splitter 9 through the gear wheels 21, 22 and 23, sprocket wheels 13, and chain 12 acting on the holder 10.

The mode of operation of my improved device is as follows:

10 The weight is raised at a low speed and smoothly by the motor through the peculiar gearing and the speed is highly accelerated during the upward stroke. On reaching the highest point the weight is released from the chain, for instance, by hand, drops down and drives the splitter, wedge or blade into the stump to be split. This operation is repeated until the splitter has reached the desired depth. By reversing the coupling 20 the holder 10 with the splitter 9 is pulled out of the stump by the chains 12 along the guides 11 in such a manner, that again through the agency of the pair of elliptical wheels 7 it is first raised at a low speed and positively withdrawn thereby at a higher speed.

I am aware that splitters have been used before, but such splitters are with their heads guided in the same guides as the drop weight and are connected with the weight by chains. The splitter is thus only able to move in the central axis of the two guides and only short blows can be struck on it as permitted by the chains. The chains cannot be lengthened as longer chains would place themselves between weight and tool during each blow. The dependence of the splitter upon the weight in regard to the direction of motion is a considerable disadvantage as extremely strong secondary strains develop if the tool penetrates into the stump obliquely. These may become so great that the device fails or becomes injured and destroyed. To avoid this risk it is necessary to equip such devices with a circular saw which places a deep saw kerf in the stump prior to the splitting to enable the splitter to be put in axially.

In my device the weight and the splitter are independent of each other. The weight 19 is guided by the rails 8 and raised by the chain 6. The splitter 9 is suspended in a special holder 10, which guided by special rails is suspended from chains 12. The chain 6 operates at each stroke of the weight, but the holder chains 12 are inoperative during the striking of the blows. Not until the deeply driven in tool is to be pulled out of the stump are the chains 12 rendered operative.

60 Owing to this independence between weight and splitter the weight may be given a great drop and powerful blows may be struck, so that the stumps may be smashed up without previous saw kerfs and the like solely by splitting. The holder 10 itself and

also its mode of suspension gives so much play to the splitter, that even if the splitter should take up an inclined position the device is not endangered by secondary strains.

The splitter sits in a kerf prepared by itself naturally much tighter than in one prepared by a saw cut. According to my invention it is adapted to be withdrawn from the stump mechanically by means of the holder and the chain. To enable this to be done a pair of elliptical wheels 7 is interposed in the gearing, which operates to raise the splitter first at a low speed and then to accelerate it strongly as the friction of the splitter in the stump decreases. The pair of elliptical wheels operates in the same manner in regard to the operation of the weight.

Various changes and modifications may be made in my device without departing from the spirit of my invention and the appended claim which should be interpreted in the light of prior knowledge only.

I claim as my invention:—

An automotive piledriver-like device for splitting stumps and the like, comprising a drop weight, a chain for suspending said weight, a splitting tool independent of said weight and located below it, a holder for said tool, a chain for suspending said holder separately, means for guiding said holder separately, said holder being adapted to withdraw said tool from the stump after having been driven in by said weight, and a pair of elliptical wheels in the driving gear for said chains, so that during the pulling out of the splitting tool the holder and during each lift of the weight the said elements are started slowly and only highly accelerated during the stroke.

In testimony whereof I affix my signature.
FRIEDRICH WILHELM GRUPE.