June 17, 1930. H. FISCHER 1,763,769

EXCAVATING TOOL FOR DITCHING OR DREDGING MACHINES

Filed Feb. 11, 1927

Fig. 1.

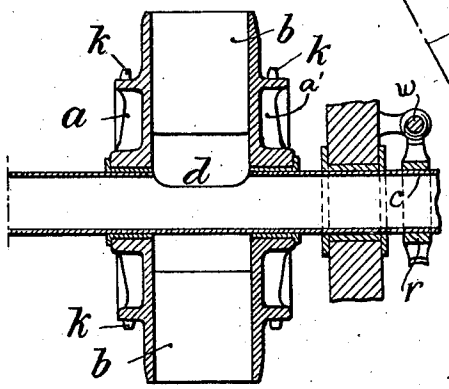
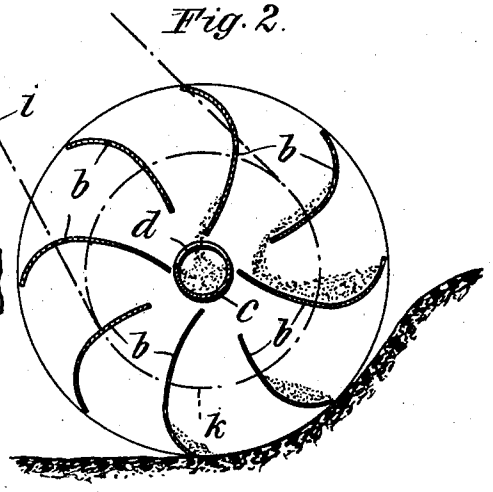


Fig. 2.



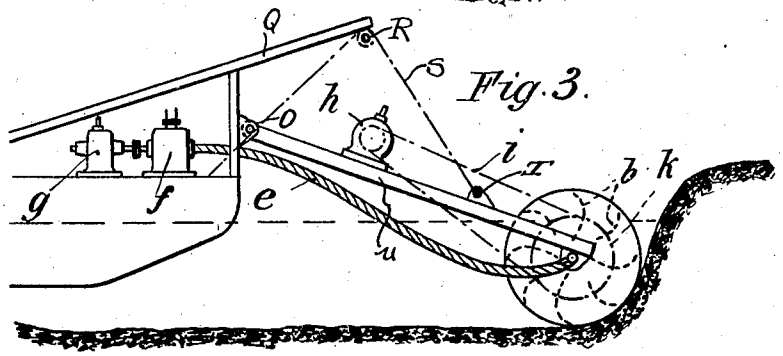


Fig. 3.

Fig. 4.

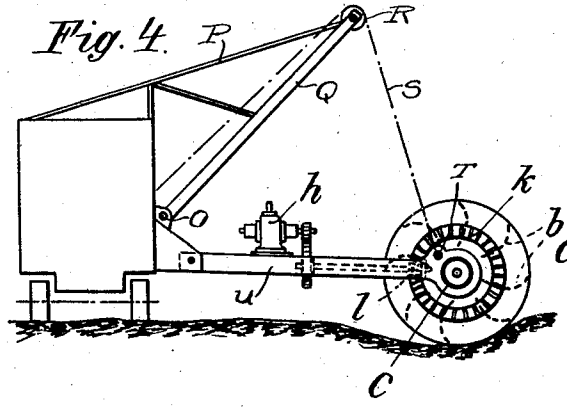
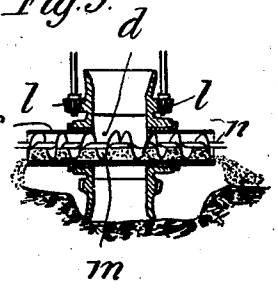


Fig. 5.



H. Fischer INVENTOR

By: Marks & Clerk Attys

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UNITED STATES PATENT OFFICE

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EXCAVATING TOOL FOR DITCHING OR DREDGING MACHINES

Application filed February 11, 1927, Serial No. 167,530, and in Germany December 3, 1925.

My invention relates to an excavating tool for use in ditching or dredging machines or apparatus and more particularly to a tool in the shape of a blade-wheel adapted to be driven by power so as to revolve about a horizontal axis and which is specially useful for cutting ditches and performing similar work either above or below the level of water.

I am aware of the fact that apparatus including a bladewheel for ditching or excavating purposes have been suggested heretofore. Now the object of my invention is to provide a power-driven blade-wheel for the purpose above indicated which will not only serve as an excavating tool but also act at the same time to convey and discharge or deliver the excavated material to a certain place or places.

My invention will be best understood by reference to the following description when taken in connection with the accompanying illustration showing two specific embodiments thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings,—Figure 1 shows in sectional elevation an excavating wheel embodying one form of my invention; Figure 2 is a sectional side view thereof; Figure 3 shows in side elevation the wheel in connection with its operating and driving elements; Figure 4 is a view similar to Figure 3, showing the other embodiment of my invention, and Figure 5 is a sectional view of the blade-wheel illustrated in Figure 4.

Referring to the embodiment shown in Figures 1 to 3 I have there illustrated my invention as applied to a boat or a similar floating structure supporting the necessary operating and driving means. It will be seen, that the blade-wheel comprises two lateral disks *a* and *a'* with a number of preferably curved blades *b* inserted therebetween and rigidly connected therewith so that the disks and the blades form a rigid digging or excavating unit. The blades *b* are arranged in radial relationship between the two lateral disks and their free or peripheral edges may be sharpened or provided with teeth. The periphery of the two disks may likewise be sharpened or provided with teeth to ensure a ready cutting action when rolling over the comparatively soft or yielding ground to be excavated and the teeth of the two disks may be shaped to bring the loosened soil to or in front of the blades.

The described structure or wheel is loosely mounted on a stationary or adjustable hollow shaft *c* so as to be freely revoluble thereabout. The horizontal shaft *c* is provided with a longitudinal opening *d* and to this end the top part thereof is cut away to the full length between the two disks *a* and *a'*, as will be clearly seen in Figure 1. The operation is as follows:

The blade-wheel is driven in the usual manner on or over the ground with the aid of any appropriate driving means and the revolving motion imparted to the wheel will cause each blade to loosen and lift a certain portion of soil and drop the same through the opening *d* into the hollow shaft *c*, as will be readily understood on inspection of Figure 2, means being provided for continuously removing the soil from the hollow shaft so that the same cannot unduly pile up in or choke up the hollow shaft, as will be explained more in detail hereinbelow.

As shown in the several figures of the drawings the free peripheral edges of the digging blades *b* are located approximately in alinement with the peripheral edges of the two disks *a* and *a'* or, in other words, they lie in the cylindrical surface of the two parallel disks. It goes without saying, however, that the two disks may be sized to project beyond the edges of the blades so that the edges of the disks will cut into the ground to produce parallel cuts therein and the blades thus will be capable of more readily removing the soil between such two parallel cuts.

During each full rotation of the wheel the single blades are raised or rise, from a vertical lowermost or digging position to an uppermost vertical position, over and above the opening of the hollow shaft so that the soil lifted and carried along with the blade will slide off and drop into the hollow shaft, and even any sticky soil of loamy or clayey nature will readily be discharged from the blade and drop into the opening of the hollow shaft when the blade passes beyond its upper-

most vertical position on its way to the lowermost or digging position, as will be clearly understood upon inspection of Figure 2. The shaft is supported in suitable bearings and adapted to be adjusted as regards the angle of operation, that is to say so as to occupy a position at which the opening *d* will have the best possible location with relation to the revolving blades as regards the reception of the soil to be discharged from the blades turned to an upright position in the upper part of the wheel.

In connection with the adjustability of the shaft *c*, it is to be noted that there is connected to the bearing which supports the said shaft, a screw shaft or worm *w* which engages with a worm wheel *r* secured on the hollow shaft *d*. The worm *w* may be turned by hand or in any other suitable manner whereby an adjustment of the shaft *c* is effected.

I shall now proceed to describe by way of exemplification, the means for continuously removing the soil from the hollow shaft. As will be seen in Figure 3 the blade-wheel is employed for cutting a ditch and it will be understood that the water in the ditch has free access to the hollow shaft of the wheel. The shaft is closed at its two ends and the one end thereof is connected with a pump *f* of any appropriate construction by means of a suitable conduit such as a hose *e*. Supposing the pump is at work and the wheel is revolving in the bottom of the ditch in anti-clockwise direction to remove soil in front thereof, the loosened soil will be conveyed by the blades to the hollow shaft in the manner above described and at the same time water will flow through the opening *d* into the hollow shaft so that the pump will act to remove from the hollow shaft a mixture of water and soil in order to discharge and deposit the mixture at any appropriate place.

The pump *f* is driven by any suitable source of power such as the motor *g* which may be utilized at the same time to drive the blade-wheel with the aid of any appropriate connecting means. In the embodiment shown in Figure 3, however, a separate motor *h* is employed for driving the blade-wheel through the agency of chains *i* running over chain wheels, such as *k*, provided on the blade-wheel and on the shaft of the motor *h*, as will be readily understood by a person versed in the art.

In the embodiment illustrated in Figures 4 and 5 the digging wheel is intended for cutting a dry ditch or performing similar dry work. As will be seen the wheel is provided with two lateral bevel-wheels preferably integral with the two disks, respectively, and engaging with bevel gear wheels 1 on shafts journaled in suitable bearings and adapted to be driven by a motor *h* through the agency of an appropriate spur-gear system. Obviously, however, any other suitable mechanism for driving the digging wheel from a source of power may be substituted for the driving mechanism shown in Figures 4 and 5.

The soil received by the blades is thrown through the opening *d* of the hollow shaft *c* into the latter, as described with reference to Figure 2. The shaft *c* is open at one or both ends and a screw conveyor *m* is mounted in the hollow shaft. The screw is composed, in case that both ends of the hollow shaft *c* are open as shown, of two discharging halves the one half discharging the soil in the one direction and the other half in the other direction when or as the shaft *n* of the conveyor is caused to rotate. Any suitable means (not shown) for driving the shaft *n* may be employed. Apparently a screw conveyor adapted to discharge the soil from the hollow shaft *c* at one end thereof only may be used and in this case the other end of the shaft *c* may be closed. Further, the conveyor may be of any other appropriate construction known to persons skilled in the art.

Means for raising and lowering the blade wheel is provided for preferably in the form of an upwardly extending beam Q secured to the dredging machine at O. This beam is made rigid by a frame work P bracing it preferably to the roof of the dredging machine. A pulley R is mounted at the end of the beam Q and has trained thereabout a cable S, one end of the cable being attached at T to the main supporting arm U of the blade wheel. By exerting a pull on the other end of the cable it is seen that the arm U may be raised or lowered to desired position.

In general I have not attempted to explain and show all of the minute details of the construction of the apparatus, for it will be understood by those to whom this specification is addressed, that the parts will necessarily be of the usual construction, the proper size and relationship and will be properly mounted and supported according to the tenets of machine construction; nor have I attempted to illustrate the parts or details in their exact sizes and dimensions as many of the parts are conventionally shown.

It does not seem necessary to burden this specification with an exposition of the advantages which the invention possesses for they will be apparent to those skilled in the art to which this invention relates.

What I claim is:—

A power-driven excavating tool of the character set forth, comprising a wheel having two parallel disks and a number of radial digging blades between and rigidly connected with the said two disks, said disks and blades being coextensive in the radial direction of the wheel, a stationary hollow shaft for said wheel to rotate thereabout, an opening in the said hollow shaft between the disks for the

blades to discharge therein the excavated material, and means for continuously discharging the material from the said hollow shaft, the latter being adjustable with relation to the wheel, in order to properly position the said opening in accordance with the angular position of the excavated material discharged by the blades into the hollow shaft.

In testimony whereof I affix my signature.

DR. HINKO FISCHER.