April 9, 1940. H. J. ADLER 2,196,513

FINE GRADING MACHINE

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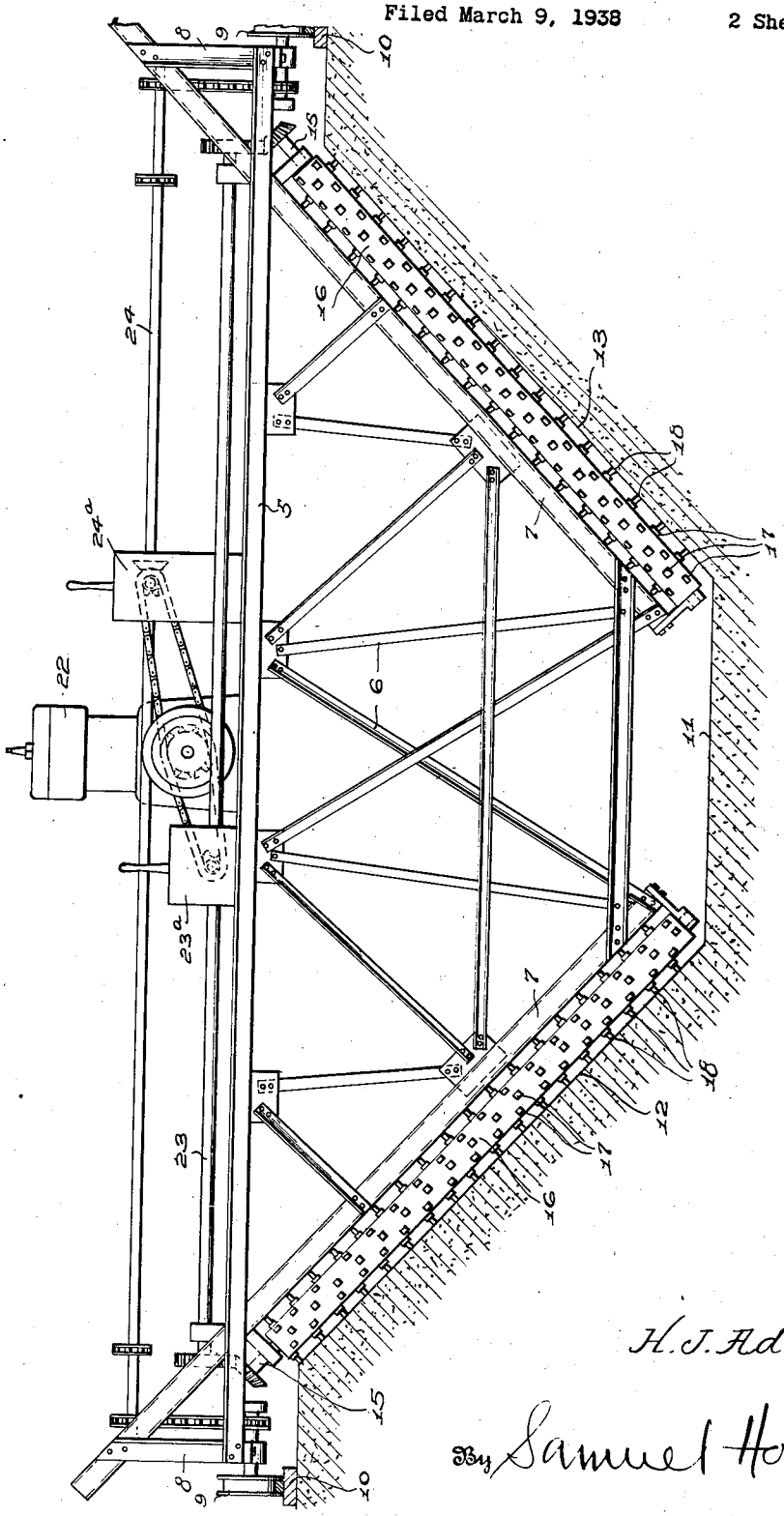


Fig. 1.

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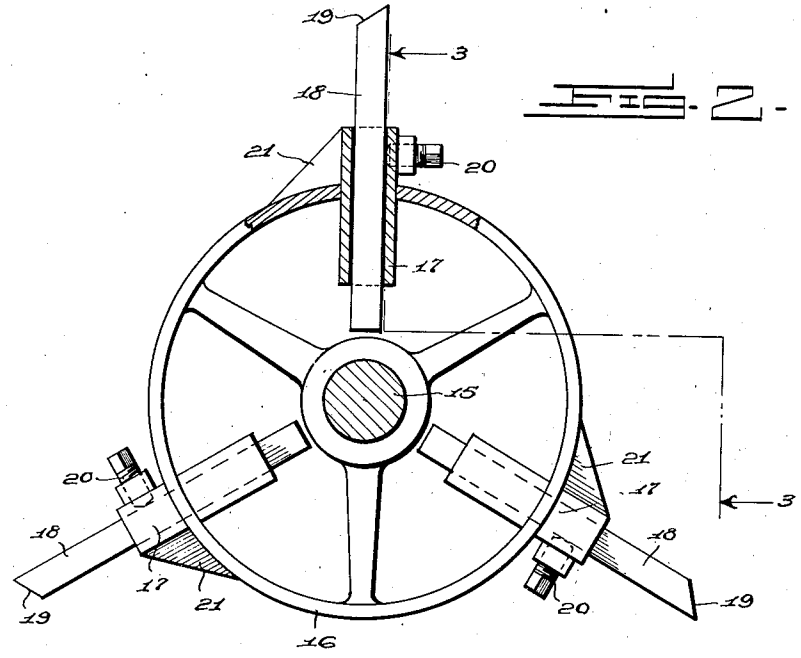
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FIG. 2.



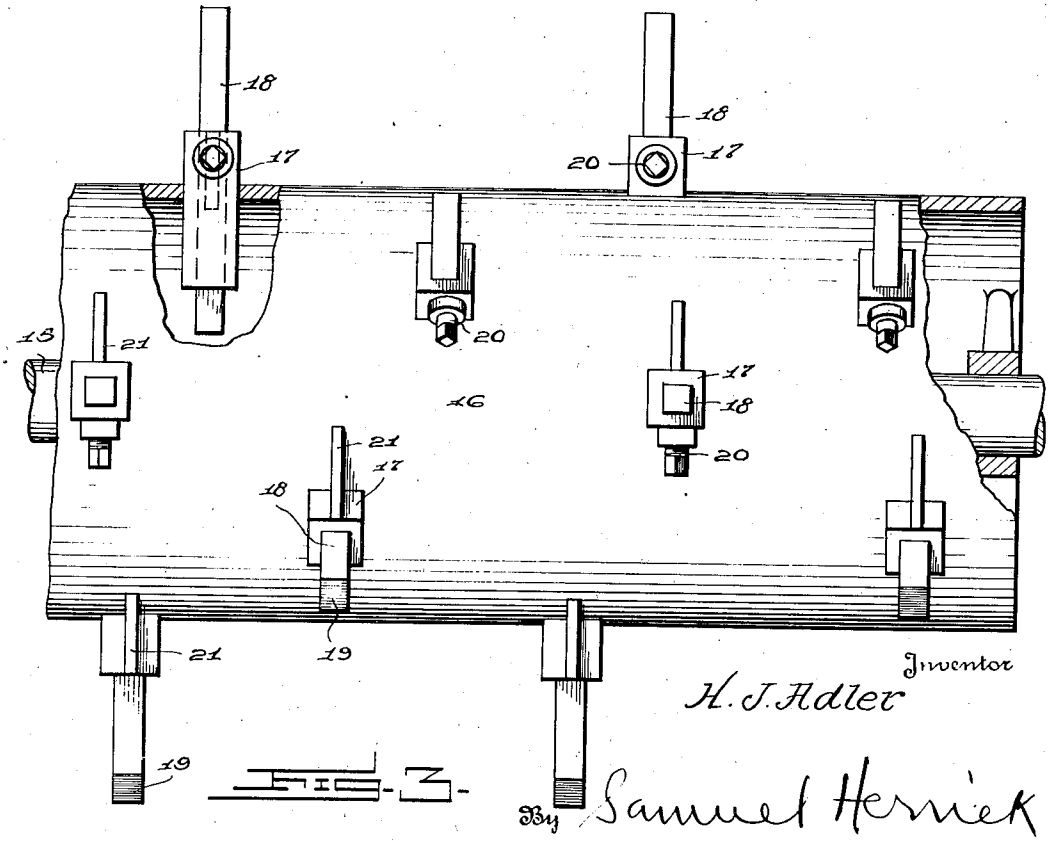


FIG. 3.

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Patented Apr. 9, 1940 2,196,513

UNITED STATES PATENT OFFICE

2,196,513

FINE GRADING MACHINE

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Application March 9, 1938, Serial No. 194,979

2 Claims. (Cl. 37—80)

The purpose of the present invention is to provide a machine for effecting fine or finish grading. While the machine is adapted for use in many different relations, as will be hereinafter set forth, it is particularly intended to rapidly and accurately shape and grade the inclined sides of irrigation ditches. Further objects and advantages of the invention will be set forth in the detailed description which follows.

In the accompanying drawings:

Figure 1 is a rear elevation of the machine, showing the same in position to grade the opposed sides of an irrigation ditch;

Fig. 2 is a view partly in end elevation and partly in section of one of the toothed or spiked cylinders, and

Fig. 3 is a view partly in side elevation and partly in section of a portion of one of said cylinders.

Like numerals designate corresponding parts throughout the several figures of the drawings.

The particular form of frame employed is immaterial, since it is manifest that the frame may be constructed in many different ways. In the particular embodiment of the invention which I have chosen for purposes of illustration, the frame is composed of structural steel members, such as conventional channel and I-beams, and comprises horizontal top rails 5, suitable braces 6, and the inclined rails 7, which serve to support the spiked cylinders 16, hereinafter described.

The top rails 5 extend outwardly beyond the inclined rails 7 and are suitably attached at their outer ends to side rails 8. Track wheels 9 support the side rails 8 and are adapted to travel upon track rails 10, disposed along the opposite sides of the irrigation ditch, the bottom of which is indicated at 11 and the inclined sides of which are indicated at 12 and 13.

Mounted in bearings 14, supported from the under sides of the inclined rails 7, are the shafts 15 of the spiked cylinders 16. These cylinders carry a multiplicity of sockets 17, adapted to receive teeth 18, formed of square bar steel, beveled at their ends as indicated at 19. These teeth may be held in adjusted position by set screws 20.

The sockets are preferably braced against the thrust of the teeth under the working action of the machine by suitable braces 21, which are welded to the cylinder and to the respective braces. Many ways may be resorted to of mounting these teeth in the cylinder, and it is to be understood that the invention is to be broadly construed in this respect.

The sockets 17 are so located as to dispose the teeth 18 spirally around the cylinders. Any suitable motor, such as an internal combustion engine indicated at 22 may be utilized to drive the spiked cylinders 16 through the medium of any suitable interposed gearing, indicated in a general way at 23, and including a clutch 23a.

The machine of the present invention is intended to be used after the heavy excavation of the irrigation ditch has been completed. When the machine is used, the motor 22 is caused to turn the cylinders forwardly against the ditch bank, loosening the soil as the machine proceeds

By employing this spiral placement of the tools and effecting rotation of the cylinders independently of the rate of forward movement of the machine as a whole, the entire surface of the ground can be covered to just the extent and in just the way desired.

It is clear that by varying the rate of speed of the cylinders with respect to the rate of travel of the machine as a whole, varying effects in the feeding of the dirt endwise of the cylinders may be had to take care of the varying conditions under which the machine may be operated. It is this capability of the cylinders to be driven at rates of speed which are independent of the rate of speed of travel of the machine as a whole which adapts this machine to perform the function of effecting a fine or finish grading, because with the machine traveling relatively slowly, for example, and the cylinders traveling much faster, it follows that the surface of the ground may be pulverized to a much greater extent than would be the case if the cylinder travel was in such relation to the forward movement of the machine as to give only one raking of the teeth through the earth during the passage of the cylinder over a given point. Where a given point is traversed a number of times by the teeth during the passage of the machine, the soil is made sufficiently fine that a fine, finish grade may be imparted to the inclined banks of irrigation ditches.

In many cases, these ditches are built under contracts which require that they be left so uniformly and smoothly graded as to be ready for the laying of concrete aprons thereon, and one of the functions of the present machine is to grade ditches having inclined banks in so fine, true and uniform a way as to render it possible to lay a straight and true bed of concrete thereon without further grading.

I am aware of the fact that it has been proposed to use machines having toothed cylinders

operating in water for the purpose of clearing old ditches of accumulated debris, and wherein the matter released by the cylinders is carried off in fluid form through pumps. I claim no such arrangement, but upon the contrary claim these inclined cylinders only when so correlated, arranged, and driven as to fine grade the dry banks of newly formed ditches.

While I have chosen to show teeth formed of square stock, I wish to make it clear that the invention contemplates the use of teeth of varying shapes according to the work to be done. Further, even when employing teeth square in cross section, these may be set to cut to varying depths or at any desired inclination, it being clear that this would be determined by the setting of the sockets with respect to the cylinders. The capability of the machine to drive the spiked cylinders independently of the forward movement of the machine has the added advantage that it permits the operator to hold the cylinders in operation longer upon a hard clay bank, for example, than would be necessary upon a soft earth portion of the ditch. By virtue of this capability, the machine is adapted to accurately shape ditches to a fine graded finish, ready for the application of a cement apron thereon, at minimum expense.

The shafts 15 may be mounted at any desired inclination with respect to the main frame of the machine to adapt the cylinders to act upon earth banks of other inclinations than those illustrated in the drawings. By individually mounting the teeth or tools for removal in the sockets as shown, it is possible, by merely loosening the set screws, to remove the tools for sharpening or for the complete substitution of other tools when desired.

While I prefer to drive the cylinders independently of the rate of travel of the machine, the machine may be actuated by the same source of power which drives the cylinders, and the whole may be caused to operate in unison. In that case, the rate of speed of the whole machine would be in determined relation to the rate of rotation of the cylinders. To indicate that this may be done, I have indicated gearing 24 between the motor and one pair of the track wheels, including a conventional clutch 24a.

While this machine is of primary utility in the final grading of irrigation ditches, it will also be found to be of utility in many other relations. Therefore, it is to be understood that the invention is not limited to the precise construction and arrangement shown, but that it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described my invention, what I claim is:

1. A machine of the character described comprising a supporting frame, a trackway, wheels supporting said frame upon the trackway, an engine upon the frame, a pair of transverse shafts upon the frame, means for driving either of said shafts from the engine independently of the other, gearing between one of said shafts and the supporting wheels of the frame, a pair of cylinders supported one at each side of the frame and at such an angle of inclination as to conform to and shape the side walls of a dry ditch to be cleared, means for driving said cylinders from the other of said shafts, and spiked teeth carried by said cylinders and arranged spirally the independent drive of the cylinders with respect to the driving means of the supporting wheels permitting said cylinders to be driven at such a rate of speed as to pulverize and fine grade the inclined walls of dry ditches.

2. In a machine of the character described, for simultaneously fine grading the opposed sides of dry, V-shaped irrigation ditches, a pair of elongated cylinders, studded with spirally arranged spike-like teeth, said cylinders inclining upwardly and outwardly to conform to the inclination of the walls of the ditch being graded, a frame adapted to span the ditch, means for mounting the cylinders to turn in said frame, said frame holding the cylinders in uniformly spaced relation to each other, a trackway, track wheels upon which the frame is mounted, an engine upon the frame, means for driving the track wheels from said engine, means for driving the spiked cylinders from the engine independently of the drive from the engine to the track wheels, the independent drive of the cylinders with respect to the driving means of the track wheels permitting said cylinders to be driven at such a rate of speed as to pulverize and fine grade the inclined walls of dry ditches.

HENRY J. ADLER.