H. J. BENTSON.

GRADING DEVICE.

APPLICATION FILED JULY 26, 1915.

1,237,260. Patented Aug. 14, 1917.

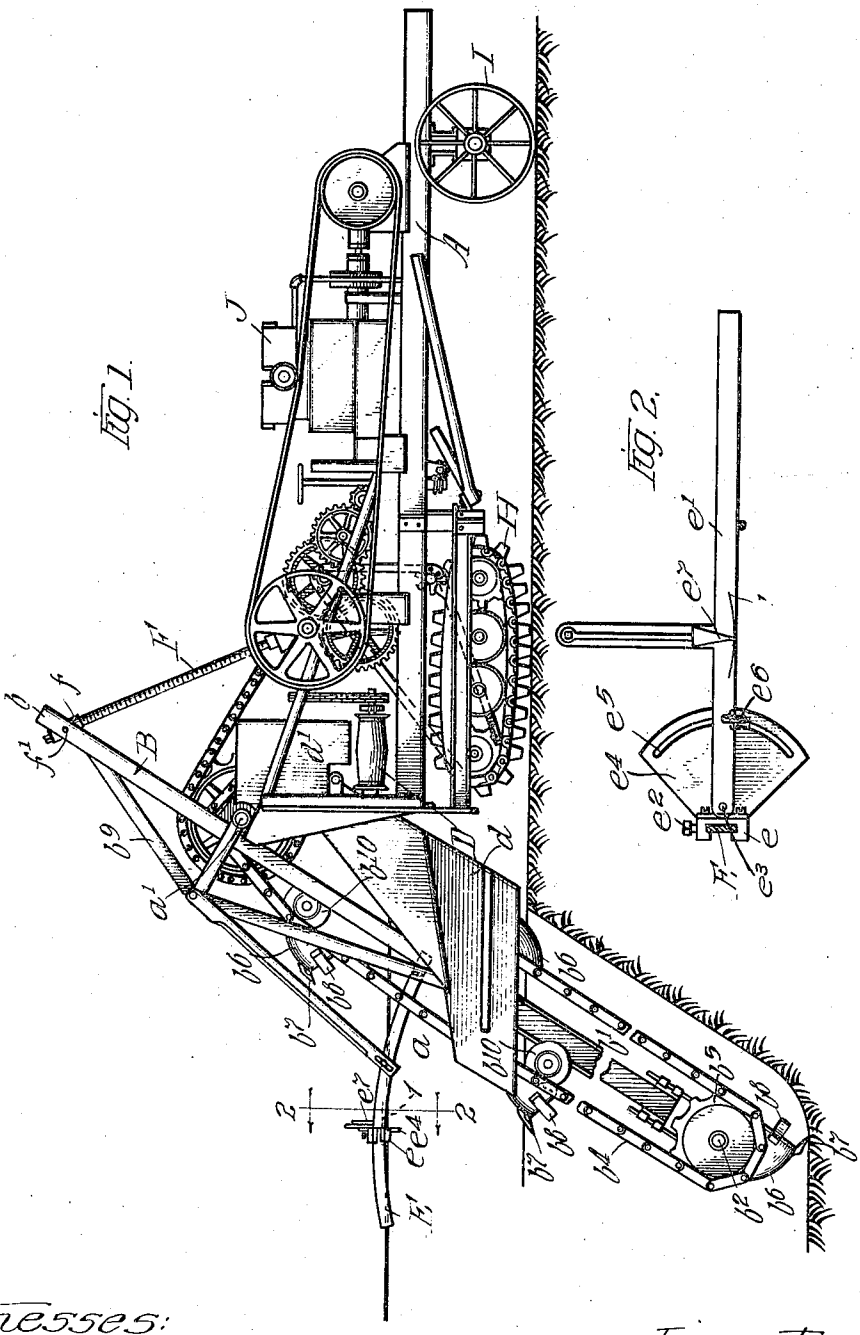

Fig. 1.

Fig. 2.

Witnesses:
Robert H. Weir
Stephen Rebora

Inventor
Hans J. Bentson
By Arthur F. Durand
Atty.

UNITED STATES PATENT OFFICE.

HANS J. BENTSON, OF IMPERIAL, CALIFORNIA, ASSIGNOR TO FREDERICK C. AUSTIN, OF CHICAGO, ILLINOIS.

GRADING DEVICE.

1,237,260. Specification of Letters Patent. Patented Aug. 14, 1917.

Original application filed January 10, 1913, Serial No. 741,207. Divided and this application filed July 26, 1915. Serial No. 41,856.

To all whom it may concern:

Be it known that I, HANS J. BENTSON, a citizen of the United States of America, and resident of Imperial, Imperial county, California, where I am now living and receive mail, have invented a certain new and useful Improvement in Grading Devices, of which the following is a specification.

This is a division of my application No. 741,207, filed January 10, 1913, for improvement in trenching machines.

My invention relates to excavators having devices for maintaining the proper grade line for trenches and ditches.

The object of my invention is to provide a device of this character having means for properly adjusting the same when the machine tilts to one side or the other as it travels along in the direction desired for the trench or ditch.

It is also an object to provide certain features of construction and combinations tending to increase the general efficiency and serviceability of an excavating machine having a grading device of this particular character.

To the foregoing and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings—

Figure 1 is a side elevation of a trenching machine embodying the principles of my invention, showing a portion of the bucket beam and the sprocket chains thereof broken away for convenience of illustration, it being understood that the said beam or support is of any suitable or desired length.

Fig. 2 is an enlarged detail vertical section on line 2—2 in Fig. 1, showing the adjustable finger for preserving the grade line of the trench, and the pendulum indicator which is mounted upon said finger, said indicator serving as a means for enabling the operator or attendant to know when the machine is not in working position, so far as the lateral tilting or listing of the machine to either side is concerned.

As thus illustrated, it will be seen that my invention comprises a body A having a frame or superstructure a at the rear thereof, the top of said frame being provided with a transverse shaft a^1. The swinging beam or bucket support B is suitably mounted upon the said shaft, being composed of an upper section b, which is relatively wide, and a lower section b^1, which is relatively narrow. A shaft b^2 is provided at the lower end of said support B, and this shaft is provided with a pair of sprocket wheels b^3 for the parallel sprocket chains b^4. Similar sprocket wheels b^5 are provided for said chains and mounted upon the shaft a^1, whereby a rotation of the shaft a^1 will cause the said sprocket chains to travel up and down the said support. The buckets b^6 are secured at intervals to the said sprocket chains, each bucket being rigid with two parallel links of said chains, and each bucket being open at either side and being tapered toward its rear end, the said chains being spaced apart. Each bucket has its cutting edge or lip provided with teeth b^7, and its sides provided with similar teeth b^8, whereby the trench cut by the buckets is wider than the combined width of said sprocket chains. As the buckets travel upwardly and move around the upper sprocket wheels, their rear ends are tilted away from the sprocket chains, so as to bring their open inner sides downward, thereby discharging the load; but while each bucket is traveling upward in a straight line, the position thereof is such that it will carry the load. The buckets pass between the sides of the upper section b of the supporting beam or element B, and the said support has a truss b^9 disposed at the rear side of the upper section thereof, whereby the tilting bucket support is stiffened. Idlers b^{10} are provided on the support B, in the manner shown, for supporting the downwardly traveling portions of the link belts on which the buckets are mounted.

The buckets are caused to discharge upon the transverse belt or conveyer D, which latter is disposed at the rear of the machine and directly below the dumping position of the buckets. The buckets, while traveling upward above ground, are inclosed by a shield or guard d, whereby in falling the dirt will be directed back into the trench; and the discharge from each bucket is received by a hood d^1 disposed immediately above the said belt or conveyer. It will be understood that the said belt or conveyer D extends laterally from the machine, whereby the spoil bank is formed at one side of the trench.

The beam or supporting element B can be tilted about the shaft a^1 to change the

angle of the excavating apparatus, and to thereby raise and lower the lower end of the same, causing the buckets to work at any desired depth. In order to maintain the grade line for the bottom of the trench, a curved bar E is secured to the support B, said bar being curved about the axis of the shaft b^2 and provided with an adjustable block e having a laterally extending finger or indicator e^1 adapted to travel along the wire or line 1 at the side of the trench. By the adjustment of the block e along the bar E, the finger e^1 can be maintained directly above the shaft b^1, regardless of the angle at which the buckets are working. Suppose, however, that the front of the machine suddenly drops down, owing to unevenness in the surface of the ground over which the machine is traveling. In such case the support B will be thrown upward, and should the machine be allowed to remain in this condition, the depth of the trench at this point would not be sufficient—that is to say, the grade line would not be maintained. If this happens, the finger e^1 will rise above the line or wire 1, and the operator or attendant, observing this indication, will immediately tilt or change the angle of the support B to an extent to bring the finger e^1 downward and into the plane of the said wire or line, and thus restore the buckets to the proper working depth. The said screw e^2 is then loosened to permit the block e to be moved toward the buckets, so that the finger e^2 will be restored to a position directly above the shaft b^2, and if by this adjustment the finger is brought above the wire or line 1, as will likely be the case, the beam or support B is then further adjusted, and the finger also re-adjusted, until the said finger when directly above the shaft b^2 is exactly in the plane of the said wire or line. It is also possible to raise and lower the finger e^1, as this is found expedient and desirable in certain cases, and for this purpose the said finger is pivoted at e^3, and the block e is provided with a plate e^4 having a curved slot e^5 for the fastening device e^6 by which the finger may be secured at any position after being swung up or down about its pivot. In addition, the said finger or indicator is provided with a pendulum e^7 which swings in a direction to indicate a lateral tilting or listing of the machine to either side. Thus, and by these indicating devices, the attendant or operator may know the exact condition of the machine, and can judge as to what re-adjustments are necessary in order to keep the buckets working at the proper depth and in the proper manner.

A long threaded rod or screw F is provided for changing the angle of the support B, and for thereby controlling the working depth of the buckets. This screw is engaged with a threaded sleeve f at the upper end thereof, said sleeve being provided with trunnions or pivotal connections f^1, which permit it to tilt as the angle of the screw changes—that is, during the adjustment of the support B to change the position of the buckets. It will be understood, of course, that any suitable known or approved means can be employed for rotating the screw F for adjusting the digging beam to the desired angle.

The rear end of the body A is supported by a traction device of any suitable character, such, for example, as the so-called caterpillar H, the front end of the machine being supported by ordinary steering wheels I, of any suitable character. The machine is operated and driven by an engine or motor J, of any suitable, known or approved character.

It will be understood that any suitable power can be employed for operating the machine, and that the power transmitting connections between the engine or motor and the screw F, as well as between the said engine and the traction device, and also between the engine and the shaft a^1, can be of any suitable or desired character.

Also, any suitable steering gear can be employed for controlling the front steering wheels I to guide the machine in the desired direction.

By the adjustment of the indicator along the curved bar E, in the manner described, the said indicator is maintained in alinement vertically with the axis b^2 of the excavating device. Furthermore, this adjustment retains the axis e^3 in a horizontal position, so that the bar or finger e^1 is adjustable about a horizontal axis, even though the digging device may tilt forward or backward and assume different angles. Again, this adjustment of the indicator along the bar E serves to retain the axis of the pendulum e^7 in a horizontal position, this axis being provided by an ordinary pivot at the upper end of the pendulum, so that the latter will always swing in the vertical plane of the axis b^2 of the digging device.

I do not, of course, limit myself to the exact construction shown and described.

What I claim as my invention is:—

1. A trenching machine comprising a swinging support, movable in a vertical plane to vary the depth below ground of the lower end thereof, an endless belt mounted to travel up and down said support, operated by said shaft, excavating buckets on said belt, said belt having a horizontal axis of operation at the lower end of said support, an adjusting device for changing the angle of said support to vary the depth of the trench, carried on said body, an indicator carried by said support, means whereby said indicator is adjustable to maintain it

in alinement vertically with said axis, and a pendulum mounted on said indicator to swing in the vertical plane of said axis, said pendulum having an axis which is retained horizontal by said adjustment of the indicator.

2. A trenching machine comprising a swinging support, movable in a vertical plane to vary the depth below the ground of the lower end thereof, an endless belt mounted to travel up and down said support, operated by said shaft, excavating buckets on said belt, said belt having a horizontal axis of operation at the lower end of said support, an adjusting device for changing the angle of said support to vary the depth of the trench, carried on said body, a bar carried on said support, movable therewith, curved about said axis, an adjustable finger on said curved bar, projecting laterally therefrom, said finger being movable bodily along said bar, thereby adjustable about said axis, and a pivot whereby the finger is adjustable up and down about an axis extending in the direction of travel of said machine.

3. A trenching machine comprising a swinging support, movable in a vertical plane to vary the depth below the ground of the lower end thereof, an endless belt mounted to travel up and down said support, operated by said shaft, excavating buckets on said belt, said belt having a horizontal axis of operation at the lower end of said support, an adjusting device for changing the angle of said support to vary the depth of the trench, carried on said body, a bar carried on said support, movable therewith, curved about said axis of said belt, a finger projecting laterally from said curved bar, a pendulum mounted on said finger to swing in the vertical plane of said axis, said finger being movable bodily along said bar, thereby adjustable about said axis, and a pivot whereby the finger is adjustable up and down about an axis extending in the direction of travel of said machine, said pivot and the axis of the pendulum being retained horizontal by said adjustment of the finger on said bar.

Signed by me at Imperial Cal. this 12 day of July 1915.

HANS J. BENTSON.