Feb. 15, 1927. 1,617,538

R. T. MOWBRAY

ROAD GRADER

Filed Dec. 4, 1925 2 Sheets-Sheet 1

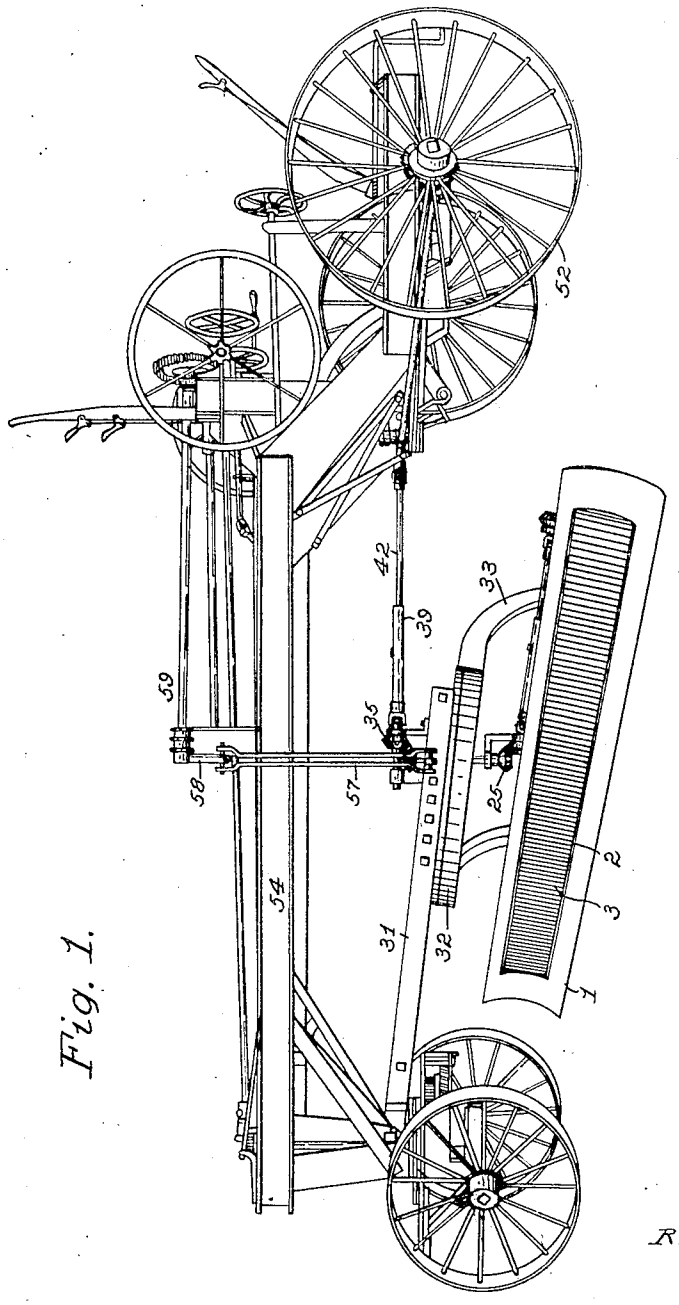

Fig. 1.

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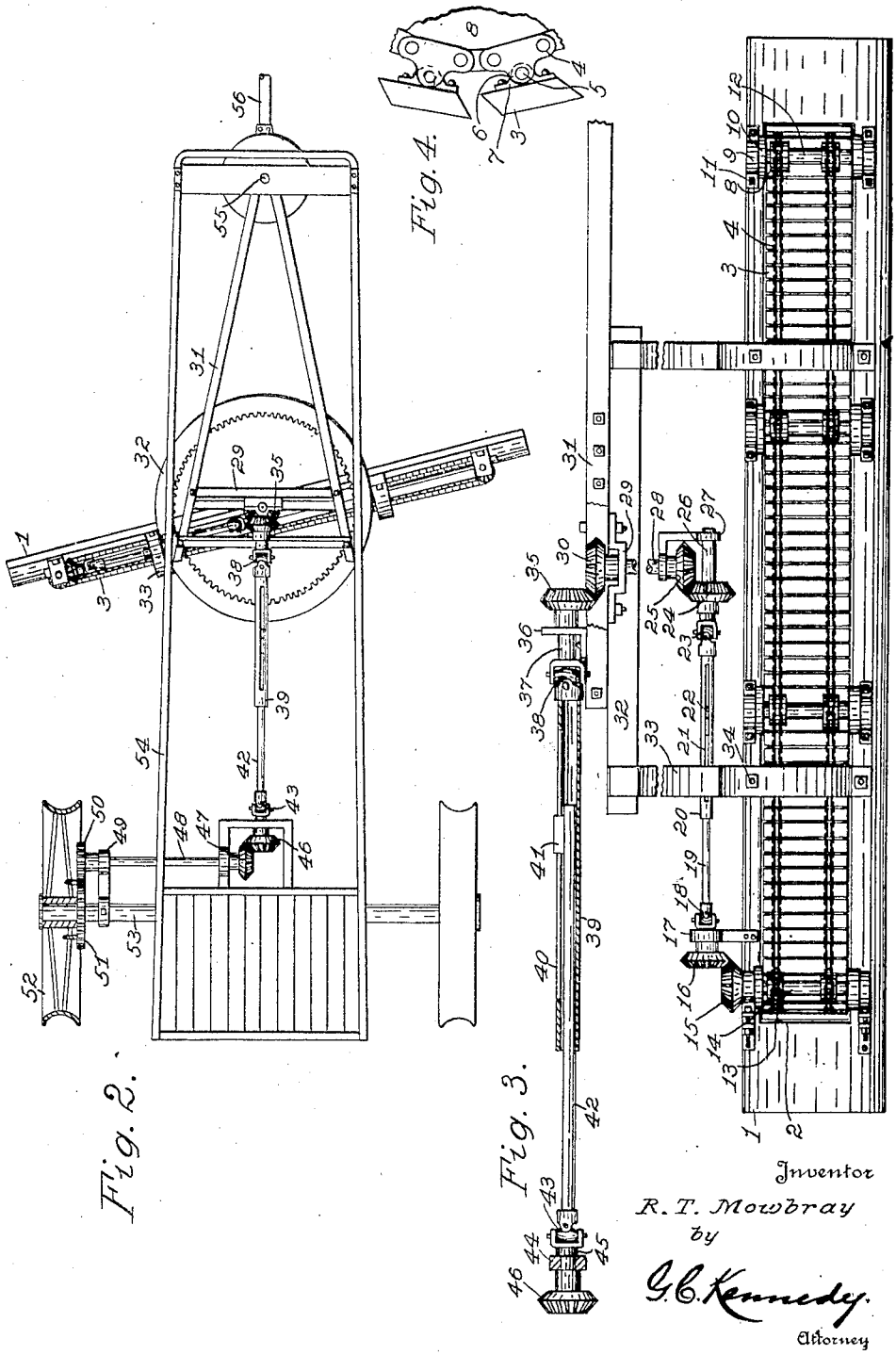

Fig. 2.

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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ROAD GRADER.

Application filed December 4, 1925. Serial No. 73,236.

My invention relates to improvements in road grading apparatus, and the object of my improvement is to associate with the blade of such a device cooperating mechanism adapted and mounted relative to the blade to prevent sticking of soil thereon and to assist in the conveyance of the excavated soil to one end of the blade for deposit.

This object I have accomplished by the means which are hereinafter described and claimed, and which are illustrated in the accompanying drawings, in which Fig. 1 is a perspective side elevation of a road grading machine whose blade is equipped with my auxiliary device. Fig. 2 is a top plan of the frame of such a machine and one pair of traveling wheels only, with the blade and its adjusting means and supports, and my auxiliary device mounted upon the blade and driven by power transmission mechanism connected operatively between it and one of the traveling wheels. Fig. 3 is a rear elevation, on a larger scale, of said blade and my said device operatively mounted thereon, with certain of the elements of the power transmission device connected thereto. Fig. 4 is a detail fragmentary view of part of the driving sprocket, its chain, and the endless slatted apron mounted upon the chain-links.

While my auxiliary soil handling device may be mounted in a similar way upon any description of soil excavating or scraping blades as employed in road or ditch work, whether leveling, cutting and delivering or filling, it is here illustrated and particularly employed as a part of the mechanism of a road grading machine, useful therein for all the varied functions of the machine.

Fig. 1 shows a typical machine of this class. It possesses a raised metallic frame of skeleton type 54 mounted on pivoted forward wheels and having rear traveling wheels 52 rotatably mounted on axle-spindles as usual. The machine may be propelled by means of a tractor not shown, and has the necessary connections for a freely movable and adjustable blade 1, with devices for the adjustment thereof, or the lifting or lowering or tilting thereof, not particularly described here, being well known to those skilled in the art.

The blade 1 is of the kind which is shallowly troughed forwardly longitudinally, and I have removed therefrom its middle portion longitudinally in such wise as to leave an elongated rectangular opening 2 somewhat nearer its upper edge than its lower, the latter and exposed part sufficing to fulfill the usual purposes of the blade in scraping and excavating with its lower longitudinal advanced cutting edge.

The blade 1 may be swung around to present either vertical cutting edge at its ends as the advancing end, for use in excavating soil, particularly when the blade is adjusted in its longitudinal inclination to the soil so as to cut and excavate soil at one side of the machine, as in ditching operations. It will be noticed that a relatively wide surface area is provided at the ends of the blade to carry the excavated soil thrown up by the advancing cutting end of the blade and deliver it upon the full width vertically of the travelling apron in the rear, the latter carrying the soil rearwardly, and upwardly also, according to the inclination of the blade. In Fig. 3, at the left hand end of the blade and said apron, a pair of adjustable connections are shown between the blade and the apron shaft at that end, comprising an angle plate fastened on the blade in each case, whose flange is apertured to receive the threaded stem of a bolt which also traverses a flange on another angle plate carried by said shaft, and a nut on the said stem is used to adjust the two angle plates together to thus keep the apron taut longitudinally.

This blade 1 is mounted for rearwardly tilting adjustments on bolts 34 traversing depending heavy shanks 33 whose upper ends are fixed to opposite parts of a large horizontal gear 32. The gear 32 is rotatably mounted upon divergent rigidly connected arms 31 whose forward ends are pivotally mounted in the frame with connection to the tongue 56 whereby laterally swinging movements of the tongue in changing direction of the machine is communicated to the gear 32 and also to the blade 1 to keep the latter in the desired angular relation to the way traversed.

As shown in Fig. 1, links 57 may be connected to the arms 31 and to cranks 58 on a shaft 59, the latter rotated by hand-wheels to thus lift or lower the arms and blade or to tilt them laterally.

A short vertically disposed rotary shaft 13 back of one end of the blade 1 and across the opening 2 has its ends rotatably mounted in longitudinally adjustable bearing-boxes connected to the blade, and idler shafts 12 are arranged at equal distances apart across said

opening with their ends rotatable in bearing-boxes 9 secured by adjusting-nuts and bolts 11 so that the boxes may be adjusted to and from the blade as found necessary.

Upon all the shafts 13 and 12 in alinement are sprockets 14 and 8 respectively of like size and spaced apart on the shafts and from the ends thereof. These sprockets carry sprocket-chains 4 meshed with the teeth thereof, and each chain carries an end part of a transversely slatted endless belt or traveling apron made up of relatively narrow overlapping slats 3 which may be of any desired cross sectional shape. Each slat 3 carries a spaced pair of apertured lugs 7 which are pivotally connected by pintles 5 to apertured bosses 6 on opposite outer edges of opposite outer links 4.

The endless slatted apron is to be so positioned that its forward reach stands within the opening 2 to virtually continue the forward surface of the blade thereby, although the face of the apron is substantially flat instead of partaking of the curvilinear troughing of the blade. The shaft 13 is the driving shaft for the apron and is to be rotated usually to carry the forward reach of the apron to the left of the machine. The shaft 13 may be rotated by any desired kind of power transmission device and motive power, and I do not wish to be specifically limited to those devices shown, which are merely illustrative.

As comparatively little power is necessary to drive this apron, a traveling wheel 52 may be employed to supply the motive power. In this event, a gear-wheel 51 may be concentrically mounted rigidly upon the wheel spokes, in mesh with a pinion 50 on the outer end of a shaft 48 supported in a bearing arm 49. The other end of the shaft 48 may be supported in a bearing in a bracket fixed on the frame body 54 and has an end bevel-gear 47 in mesh with another bevel-pinion 46 on a short longitudinal shaft-section rotatable in another bearing on said bracket. A universal-joint 43 connects the shaft section mentioned with a shaft-section 42 positioned medially longitudinally within said frame 54 and which is slidably non-rotatably mounted in a tubular shaft-section 39. The sections 42 and 39 may be connected as shown by a short spline 41 traversing a longitudinal slot 40 in the section 39. The forward end of the section 39 has a universal joint connection 38 with a short section 37 rotatable in a bearing 36 fixed upon the arms 31 and carrying an end bevel-pinion 35 in mesh with a bevel-gear 30 on a vertical shaft 28 mounted in a bearing body 29 supported across the arms 31. On the lower end of the shaft 28 is loosely mounted a bearing body 27 of angular form whose lower depending end has a bearing to loosely receive an end of a short shaft-section 26. A bevel-pinion 25 is fixed on the lower end of the vertical shaft 28 and in mesh with a bevel-gear 24 fixed on the shaft 26. The shaft 26 has a universal-joint connection at 23 with a tubular shaft-section 20 which slidably non-rotatably seats part of a shaft-section 19 by a slot and spline connection 21—22 like the other one mentioned above. The shaft-section 19 has a universal-joint connection 18 with a short shaft-section mounted in a bearing 17 fixed on the blade 1 and having an end bevel-pinion 16 in mesh with a bevel-gear 15 fixed on the upper end of said apron driving-shaft 13. On all the shafts 13—12 are annular fillets 10 which loosely engage the abutting ends of the slats 3 of the apron to keep the apron supported without sagging or displacements while in motion.

It will be seen that provision for unlimited flexibility has been made in the power transmission device above described, in order to positively drive the apron 3, while allowing the blade to be adjusted in position relative to the machine frame in any way necessary for its functions. According to the kind of machine frame used, any other operative mechanism and power may be connected to the apron to drive it, whether by a motor mounted on the machine or by a driving connection with a prime motor mounted on a tractor for the machine.

When such a machine is working soil of a tenacious sticky nature, the fresh soil sticks to the front of the blade 1 to soon build up thereon and materially hinder the cutting work of the blade and more especially to pile up in front of the blade a large mound of soil which will not slide along the obstructed blade for delivery to an end thereof. This furthermore creates such an increase in the resistance to forward progress of the machine as to require the use of a tractor of maximum power to overcome such resistance. The movable apron 3 receives thereon the excavated soil and positively transports it to the delivery end of the blade, preventing sticking of the soil or mounding thereof before the blade. An even and minimum power supply is therefore all that is required of the tractor, or of the driving means for the apron, so that a lighter tractor may be used, with consequent great economy of plant and operation expense, and expedition in the work performed.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a machine of the character described, a medially longitudinally apertured blade having wide end parts with cutting edges, a lower cutting edge, and an endless apron whose forward reach is movable within the aperture of the blade, substantially continuing its forward surface to propel accumulated soil to a delivery end of the blade.

2. In a machine of the character described,

an end and bottom cutting blade having a longitudinal aperture, an endless apron mounted in said aperture to have its forward reach substantially alined with the forward surface of the blade, and means for tilting said blade and apron in any direction adjustably including the lifting and lowering of the blade.

3. In a machine of the character described, an elongated blade having a medial longitudinal aperture between end edges of the blade and above a bottom edge thereof, shafts rotatably mounted on the rear face of said blade to cross said aperture at the ends and intermediately of the ends thereof, one shaft being positively rotated the other shafts being idly mounted, sprocket-wheels fixed on opposite parts of said shafts spaced from their ends, sprocket-chains around and meshed with said sprocket-wheels, slats crossing said pair of chains to provide an endless apron and rockably connected to links thereof, and annular fillets on the ends of said shafts closely abutting upon the ends of said slats to limit endwise movements of the slats and keep the apron taut along said blade aperture with the front face of the front reach of the apron in substantial alinement with the front face of the blade.

In testimony whereof I affix my signature.

ROBERT T. MOWBRAY.