May 14, 1929. W. M. TAYLOR 1,712,853

MOLDBOARD FOR ROAD MAKING MACHINES

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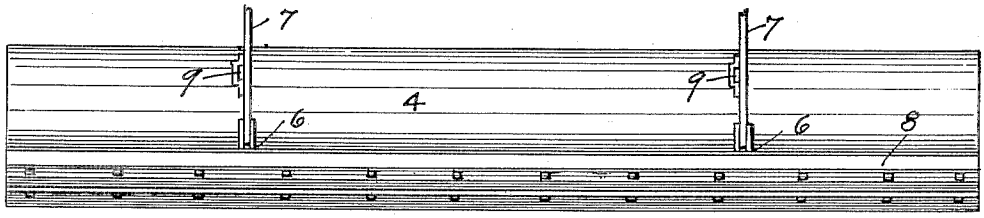


Fig. 1.

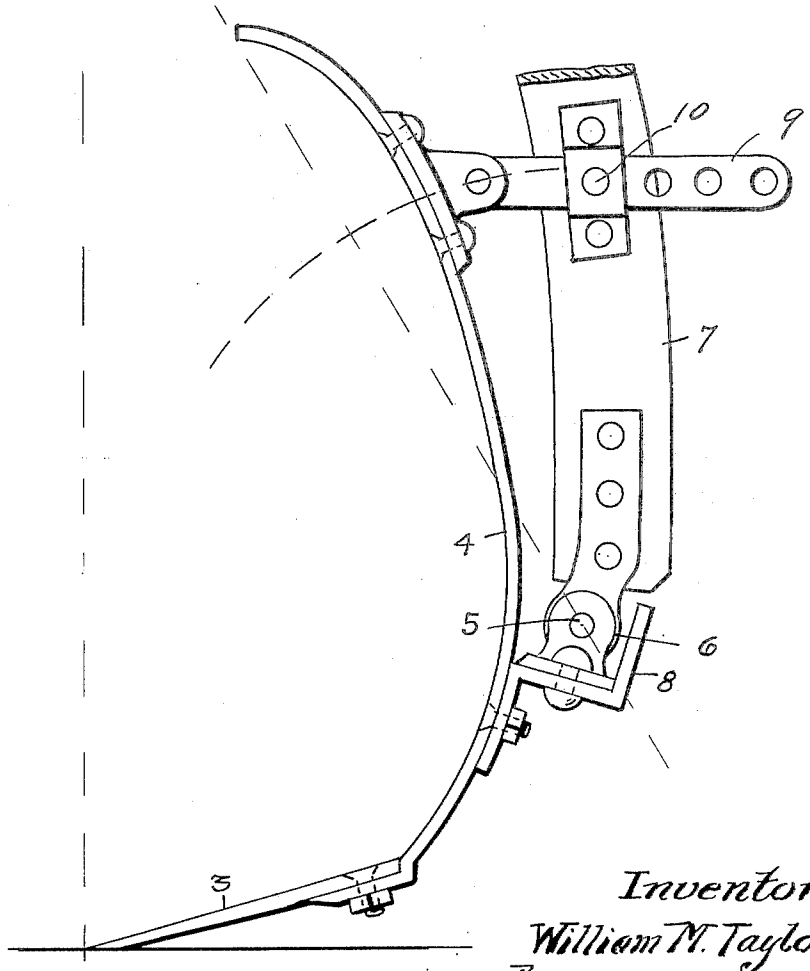


Fig. 2.

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UNITED STATES PATENT OFFICE.

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MOLDBOARD FOR ROAD-MAKING MACHINES.

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This invention relates to improvements in the cross sectional shape of mold boards for road making machines, including the cutting plate.

The object is to split the earth apart by a wedge-like action of the cutting plate then break it into suitable small particles and finally roll the earth thus loosened and comminuted over and over against the mold-board in a continuous progress to the high end of the mold-board for discharge there, instead of initially scraping it loose and scraping or dragging it along the mold-board, until discharged.

A further object is to provide means for changing the angular relation of the cutting plane to the road surface to produce a scraping action when that is desirable as in filling depressions.

I accomplish the above, and other objects which will hereinafter appear by the mechanism illustrated in the accompanying drawing, in which—

Fig. 1, is a rear elevation of a mold-board, embodying my invention; and,

Fig. 2, is an end view of same on a larger scale.

The mold-boards used on grading machines up to this time have been curved with a single radius and the cutting plate, which is bolted to the mold board, is likewise curved. The curve of the mold board and the curve of the cutting plate on these machines have the same radius. There is only one radius of curvature and this applies both to the mold board and the cutting plate.

The cutting plate 3 of my mold board has no curvature, being perfectly flat on top. The mold board 4 to which this cutting plate is attached is made with two or more radii of curvature. That is, the sectional shape of the cutting plate is without curvature and the sectional shape of the mold board has two or more radii. The number described herein is three, but conditions might make it desirable to increase or decrease this number, and therefore I am not limiting this invention to any particular number of radii.

Further than this, the mold boards used on present machines operate at a very obtuse angle to the surface of the ground. There is a variation of motion around a horizontal axis but within the limits of motion around this horizontal axis the angle of contact of the edge of the mold board with the ground is not far from a right angle and action of this mold board on the dirt to be moved is a scraping action.

With my invention, the straight or plow-share cutting plate 3 operates at an angle of from ten to twenty-five degrees with the level surface of the ground. Its action is a wedge action splitting the earth apart, and the action of the mold board 4, to which this plow-share plate 3 is attached, rolls the dirt over like a plow instead of scraping it. When once wedged apart, the detached dirt rides on the top of the cutting plate 3, and is rolled up on the mold board 4, and is kept rolling over and over as the action of the mold board carries it up hill to its point of ultimate deposit. In other words, the loose dirt with my mold board is always being rolled over and over by the mold board, the support for this dirt being the plow-share cutting plate 3 and the lower part of the mold board.

With all other machines, operating at an obtuse angle to the ground, the dirt to be moved is scraped along by the more or less vertically held mold board and there is little rolling motion of the dirt in its movement along the mold board toward the side away from the ditch. With my invention, a larger quantity of material can be handled in a given time or with a given power than with the scraping action.

My device is unlike the action of a breaking plow. A breaking plow splits the ground and the resultant downward pressure due to this splitting operation is taken up by the pressure of the plow against the bottom of the furrow. With my device, this downward pressure due to the wedge action of my wedge plow-share cutting plate is taken up by the wheels of the machine carrying the mold board. A sulky plow carries the weight of the detached earth on top of the plow and the weight of this earth is carried by the sulky wheels, but its action is different from my device in the following respect. A sulky plow rolls the earth to the side of the plow the axis of the rotating earth being approximately in the line of travel of the plow. The action of the plow-share cutting plate 3 and mold board

4 with my device is entirely different. The action of the rotating dirt on my device is on an axis parallel to the line of the mold board 4.

A grading machine is built for carrying dirt from ditch or side of the road uphill toward the center of the road. It is therefore very desirable that the earth to be moved should roll on the mold board rather than by sliding it on the ground. On this account, with my device, the plow-share cutting plate 3 and the mold board 4 can take care of a wider furrow with a given power than with machines where the material is not carried on the cutting plate 3 and the mold board.

With my invention, the point of the plow-share cutting plate 3 is always a considerable distance in advance of the top of the mold board 4 when it is in mid-position around a horizontal axis. This cutting plate 3 is set at a very small angle with the ground so that the dirt detached by this cutting plate is always carried on the plow-share cutting plate, and the mold board until deposited toward the high side of the machine. The angle of the plow-share cutting plate can be changed to any desired amount by the rotation of the mold-board and with it, the plow-share cutting plate around a horizontal axis 5 placed back of the mold board, but there is no position in which the point of the plow-share cutting plate is not in advance of the upper edge of the mold board 4.

The axis 5 is in the pins of hinges 6 connecting the holding bars 7 with a mold board stiffening bar 8, bolted to the back of the mold board. Straps 9, hinged to the top of the mold board, have a series of holes through which are bolts 10, connecting the holding bars 7 with the straps, and the angular working position of the mold board 4 may be changed and held by changing the bolts 10 to different holes in the straps.

My adjustment is a great advantage over present machines where in mid-position the top of the mold board is directly above the point of contact of the cutting plate with the ground and on this account, this angle of contact is so obtuse as to make only a scraping action possible and with these machines, there cannot be sufficient motion around a horizontal axis to change this situation materially.

With a straight plow-share cutting plate 3, and a mold board 4 with several radii of curvatures, the progress of the dirt is as follows:—I use three curvatures for illustration although under certain conditions each of the functions set forth below might require more than a curve with a single radius. The material is wedged off by the straight plow-share cutting plate; at the back of this plow-share cutting plate it is attached to the mold board and this mold board at this point is curved to a small radius in order that the material that has reached that point may be turned quickly upward by the pressure from the material coming across the plow-share cutting plate. When the material has reached a position where it is moving vertically, due to this pressure, the radius of the curve of the mold board is made greater (that is the curvature is less), so that there can be a considerable upward movement with only a little relative forward movement. Finally, a curve with a short radius at the top, turning the mold board to an almost horizontal direction forward, so that any material, should it reach that high, will be thrown forward on top of the other material being moved and not allowed to pass over the top of the mold board; the latter being a very serious objection to mold boards which only have a single radius.

The operation of this mold board with these various degrees of curvature and with the straight plowshare cutting plate 3 has the following effect. The plowshare cutting plate first takes off the dirt by its wedge action carrying this dirt back to the point where it strikes the portion of the mold board with a small radius. The action of this first curvature is to break up the dirt to the consistency of the ground suitable for roadwork because the dirt is thrown violently upward by the contact with the first curvature of short radius. By reason of this, at the point where this dirt is moving vertically upward, there are no clods or lumps. From this point, where the dirt is moving vertically there is no necessity of further breaking up the dirt and for that reason, the radius of the mold board is increased, so that the curvature is less, the only necessity at this point being to give the mold board sufficient curvature for producing a rolling motion to the dirt as heretofore described. The height of this dirt on the mold board is dependent on the amount of dirt being removed. If this is large, the height of the dirt will reach the upper portion of this second stage of curvature and were it not for the third stage of curvature already described, this dirt might and often does while moving forward pass over the top of the mold board which, as already stated, is not desirable. For this reason, it is necessary that the third curvature of small radius be made at the top of the mold board so that any dirt reaching that point would be thrown downward on top of the other dirt already rolling, instead of passing over the top of the mold board.

Further than this, with the flat cutting plate set at a small angle with the horizontal, the plow-share cutting plate always wears itself sharp instead of dull. Also, on account of the small angle, the cutting plow-share will last much longer than where the cutting edge is more nearly at right angles to the surface of the ground and where the ac-

tion is a scraping action and not a cutting action. There are a few cases in the grading of roads wherein it is desirable that the cutting edge of the mold board should be more nearly vertical such as the filling of depressions, at the same time high spots are being cut down. With this invention of mine, the plow-share cutting plate, and the mold board can be arranged to be tilted on a horizontal axis 5, to an angle proper for this work without destroying any of the desirable features set forth herein. These conditions are rare and only constitute a small portion of the work to be done. The very large percentage of the work is cutting work in which the plow-share cutting plate should work at a small angle with the horizontal.

The weight of the dirt on the plow-share cutting plate, and the mold board and the small angle at which the plow-share cutting plate operates holds the plow-share and the mold board of my machine in the ground while it is working under plowing conditions. The mold board with a single radius is not held in the ground by the dirt it is removing. Where working under conditions by which the road is being surfaced, that is, maintained in repair after being built, this sharp plow-share cutting plate, and the small angle between the plow-share cutting plate and the level of the ground, enables my cutting plate and mold board to cut off the high places and render uniform work. This is not possible if the cutting plate of the mold board were practically at right angle to the road, since with this latter kind of blade, the tendency of the blade is to follow the bumps in the road, up and down.

Further than this, with the type of cutting plate and mold board which is made with the same radius and which is operated at substantially right angles to the road, as are all present blades, there is no opportunity for the blade to scour, which is most essential in good plowing. With my invention, the straight plow-share cutting plate, and the different radii of curvature for the mold board enables the building of a mold board which will scour perfectly and keep itself clean. Different angles can be made so that different soils will scour. In my invention, I have not limited myself to any particular number or lengths of radii, because the number of these radii used and the length of them would depend on the soil to be handled; the intent being to have the relationship of the curve such that the mold board will be made to scour with different soils, and the dirt rolled endwise of the mold board toward the middle of the road. Under normal operative conditions the plate 3 is at an angle of from ten to twenty-five degrees with the horizontal and the plate at all operative positions of the mold board is entirely below a plane including the axis of adjustment of the mold board and the cutting edge of the plate.

The mold board is adjustable vertically as a whole, or either end separately, through the medium of the two bars 7, 7, in the usual manner.

I claim:

1. The combination, with the curved mold board of a road making machine having a shorter radius for the curve of the top portion than for the curved portions below, of a plow-share cutting plate having a straight edge and a straight top surface, said surface being on a chord of the curve of the mold board to form an angle at their junction.

2. In a road making machine, the combination with a mold board curved transversely on a plurality of radii, of a plow-share cutting plate having a straight upper edge attached to the mold board the top of said plate being in a chord of a curve of the mold board.

3. In a road making machine, the combination of a mold board curved transversely on a plurality of radii, a cutter plate attached to the lower edge of the mold board said plate having a straight upper surface, and means for rocking the mold board on a longitudinal axis.

4. In a road making machine, the combination with a mold board curved transversely on a plurality of radii, the curve of the upper edge being on a much shorter radius than any of the other curves, of a cutter plate attached to the lower edge of the mold board, said plate having a straight upper surface, and means for rocking the mold board on a longitudinal axis.

5. In a road making machine, the combination with a mold board curved transversely on a plurality of radii the shortest of which is at the top, of a plow-share cutting plate having a straight top face on a chord of the bottom curve.

6. In a road making machine, the combination with a mold board curved transversely on a plurality of radii the shortest of which is at the top, of a plow-share cutting-plate having a straight top face on a chord of the bottom curve, and means for changing the angular working position of the mold board.

7. A mold board for a road making machine, curved vertically from top to bottom on a plurality of radii of curvature, the curve of shortest radius being at the top.

In testimony whereof I affix my signature.

WILLIAM M. TAYLOR.