June 27, 1950 R. B. BOURNE 2,513,231

PLOW ELEVATING MECHANISM

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Fig. 1

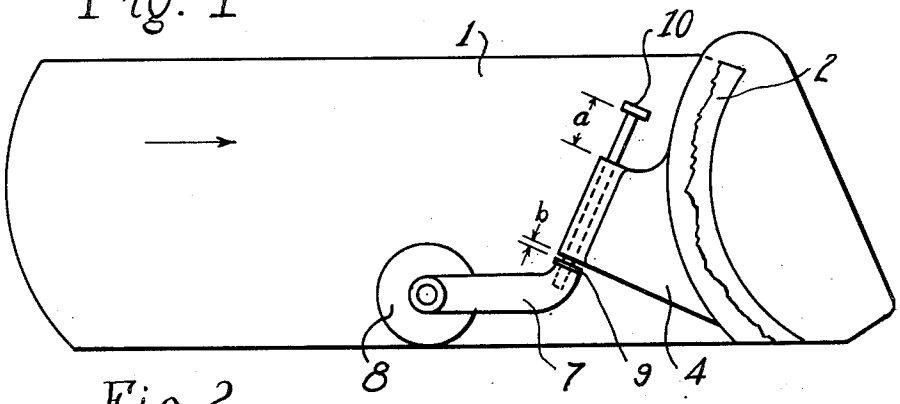



Fig. 2

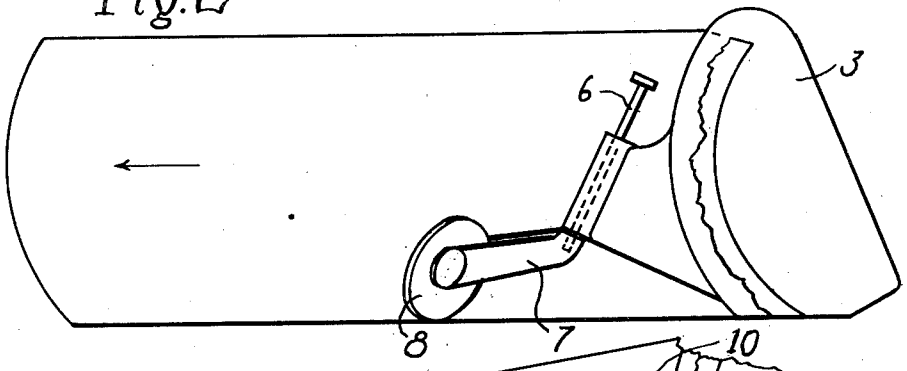
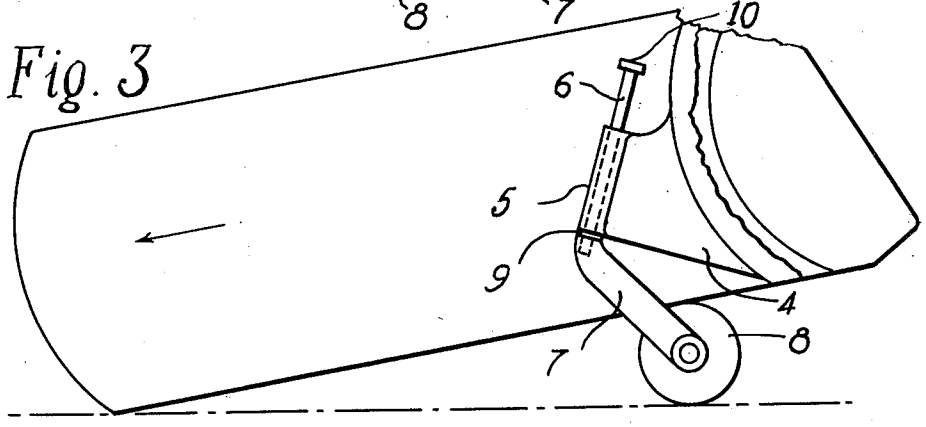



Fig. 3




Roland B. Bourne

INVENTOR

BY Edward C. Taylor

ATTORNEY

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## PLOW ELEVATING MECHANISM

Roland B. Bourne, West Hartford, Conn., assignor to The Maxim Silencer Company, Hartford, Conn., a corporation of Connecticut

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1 Claim. (Cl. 37—44)

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In the operation of snow plows, whether of the V or straight blade types, it has long been recognized as desirable to elevate the plow from the ground when it is drawn rearwardly in order not to build up a bank of snow between it and the propelling vehicle which would increase the resistance to rearward motion. Several methods of attacking this problem have been proposed. Where available, the plow can be raised by a hydraulic lifting mechanism, but this is not always possible for plows such as are intended to be coupled to the bumpers of passenger automobiles. A device which does not require the use of power is a shoe mounted on the lower end of one or more arms pivoted on horizontal axes to the moldboard of the plow; the operation being that of a sprag which trails freely as long as the plow is going forwardly but digs in when rearward motion starts. The arms have a limited rotation, so that the plow will be elevated and will then slide along supported by the shoe. With this type of elevator the degree of lifting which can be given to the plow is limited since the arms cannot be too long or the shoe will lose its ability to catch on the ground when drawn backwardly; and the dragging of the shoe over the ground is noisy and causes abrasion of the underlying pavement.

It has likewise been suggested that instead of having the shoe pivoted on a horizontal axis it be pivoted on an axis inclined upwardly and forwardly upon the theory that when the plow was drawn rearwardly the shoe would be forced to swing around and cause elevation of the plow. While this sort of device operates satisfactorily under ideal conditions it also is subject to difficulties which it is one object of the present invention to correct. The degree of lift is small, since the shoe requires that the angle of inclination of the axis from the vertical be kept small in order that in backing the shoe will not merely drag along the ground without turning completely enough to raise the plow from the ground. Some additional lift can be given by increasing the length of the shoe, but not much can be done in this way without causing interference between the shoe and the moldboards. The shoe also requires constant manual adjustment in height, depending upon the direction of travel and the nature of the roadbed. Thus, if the plow is being pushed forwardly on a curve the shoe will be turned partially to one side, and a corresponding lifting of the plow will occur unless the operator turns the adjusting crank to raise the shoe relative to the plow to maintain

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the plow upon the roadbed. As soon as the plow starts again to move in a straight line the adjustment must be reset. A further difficulty is that the friction between the shoe and a hard-packed snow or ice surface is so small that there is always a tendency for the shoe to slide along without taking hold and causing lifting.

In accordance with the present invention the plow is provided with one or more caster-type wheels, each mounted on an arm supported at the lower end of an axle extending upwardly and forwardly at about 15° to the vertical. The axle slides lengthwise in bearings so as to have a very substantial free end play. This end play is essential to the functioning of the elevator for reasons to appear. Considering the plow as set on a flat surface, there must be sufficient play so that the plow can be pushed forwardly on a sharp curve without the axle reaching its limit of upward movement in its bearing. Two things are thus accomplished. First, of course, undesired lifting of the plow during curved forward travel will not occur; and also the caster wheel will be permitted a considerable free rotation around the axle when backing before the latter solidly engages the plow and starts lifting it, a feature which greatly increases the positiveness of action of the device. The end play in a direction permitting the caster wheel to drop below the plane on which the plow sets must be enough to maintain the wheel in contact with the ground irrespective of the curvature or irregularity of the latter. If the caster wheel does not have this latter freedom there will be times when it will be suspended out of engagement with the roadway, and will obviously be incapable of elevating the plow if backward movement is started. By having lost motion in sufficient amount to keep the wheel from becoming suspended a positive and rapid elevation of the plow will occur. It is, however, desirable to have a limit on the amount the axle can drop so that it cannot accidentally become detached from the plow.

One feature of the construction which also has pronounced effect in producing positiveness of action is that the wheel is preferably made of a metal disc. I have discovered that a rolling wheel has much greater resistance to sideways motion than a nonrotating shoe, and the disc type of wheel has still greater resistance to sideways movement. Whereas a shoe of either type referred to above has a strong tendency to chatter when it is moving from its free-trailing to its plow-supporting position, the increased re-

sistance of the wheel to moving sideways causes it to be maintained in rotation and to swing around into a trailing position rapidly and positively.

The invention will now be described with reference to the accompanying drawings, in which

Fig. 1 is a side elevation of a plow embodying the improved elevator, one moldboard of the plow being broken away to disclose the elevator mechanism;

Fig. 2 is a similar view showing the plow with the elevator in the position it assumes in curved forward motion or in an intermediate stage of rearward motion; and

Fig. 3 is a similar view showing the elevator in lifting position.

The elevator is shown as being applied to a V-shaped plow, but it will be understood that it may equally well be attached to a plow of the single blade type. The V-plow shown is composed of two moldboards 1 and 2 (the latter of which is broken away to show the elevator) secured at their forward ends to a prow 3 and diverging rearwardly. Any desired propelling means for the plow may be provided, but none has been illustrated, it being unnecessary for an understanding of the present invention. A bracket 4 is welded or otherwise secured to the prow 3 and carries a bearing 5 extending upwardly and forwardly at an angle preferably about 15° from the vertical. Sliding in this bearing is an axle 6 bearing at its lower end a bifurcated arm 7 having a caster wheel 8 journaled at its end. The arm 7 is shown in Fig. 1 as being substantially horizontal when the plow is moving forwardly on a flat surface, but while this is convenient in design neither the exact angle which the arm makes with the axle nor the exact angle the axle makes with the vertical are critical. The axle has an abutment 9 which makes contact with the lower end of the bearing 5, and preferably an abutment 10 which makes contact with the upper end of the bearing. The abutment or stop 9 is spaced from the bearing a distance *b* when the plow is moving forwardly on a plane surface and the abutment 10 is spaced from the bearing a distance *a*. The former distance is enough to allow the plow to travel forwardly through a curve without having the abutment contact the bearing; in practice a free swing of about 45° on either side of the mean forward motion position of the arm 7 will be substantially correct. The spacing *a* need not be determined so carefully, but should be large enough so that the wheel 8 will always be in contact with the ground.

During forward movement in a straight line the caster wheel rolls along as in Fig. 1, with the abutments 9 and 10 free of the bearing 5. If the plow moves forwardly on a curve away from the reader the wheel will still roll freely but will keep the arm 7 in line with the direction of motion and will thus be swung over toward one of the moldboards as in Fig. 2. In rearward travel a similar action takes place, the arm 7 seeking to move into line with the direction of motion and thus swinging to one side. Due to the angle of the axle 6 and the fact that the wheel is in constant contact with the ground the axle will be pushed up until abutment 9 strikes the bearing. As stated above, it is desirable to allow the arm 7 to swing about 45° before abutment 9 strikes, since this gives the wheel a chance to turn into a position where it is engaged positively by the ground. If rearward movement of the plow is continued the wheel will be swung gradually to the position of Fig. 3, in which it is below the plane of the plow, so that with the wheel on the ground the front of the plow will be raised completely from the ground.



What I claim is:

An elevating mechanism for snow plows operable automatically to raise the plow on rearward motion thereof comprising a bearing located to the rear of the moldboard of the plow and inclined upwardly and forwardly, a shaft freely rotatable and movable lengthwise in the bearing, an arm secured to the lower end of the shaft and extending at an angle thereto, a caster wheel secured to the arm with its axis offset from the shaft, a stop on the shaft below the bearing normally spaced from the bottom of the bearing an amount sufficient to permit the arm to be turned freely substantially 45° from a position in line with the normal forward motion of the plow when the plow is on level ground, said stop engaging the bearing on further rotation of the arm and acting to support the plow in elevated position when the arm has been rotated 180° from said line of normal forward movement, and a stop on the upper end of the shaft limiting its downward motion in the bearing, said latter stop being normally spaced from the top of the bearing to insure contact between the caster wheel and the ground when the latter is uneven.

ROLAND B. BOURNE.


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