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TRACTOR ATTACHMENT

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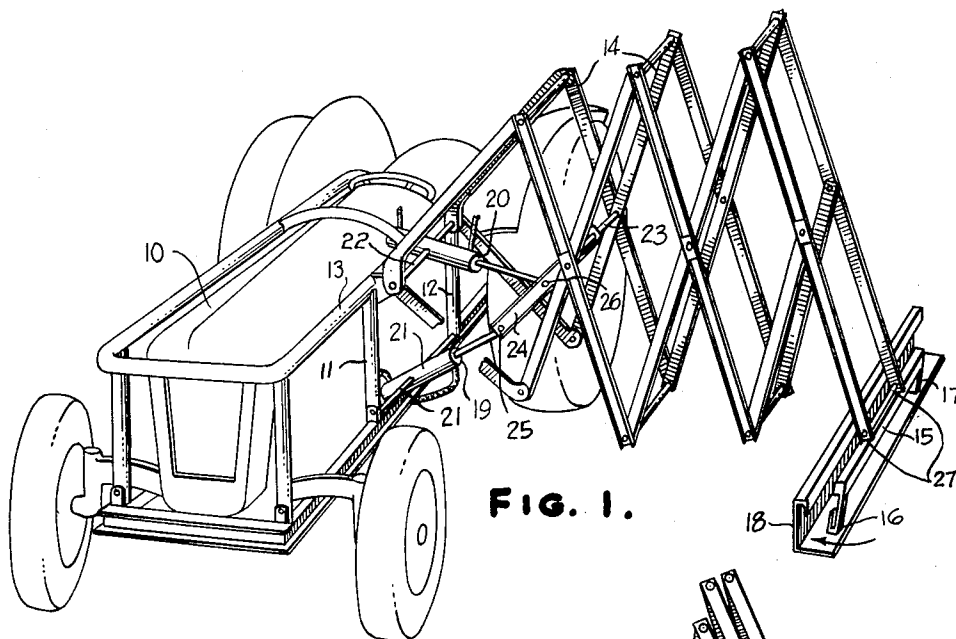


FIG. 1.

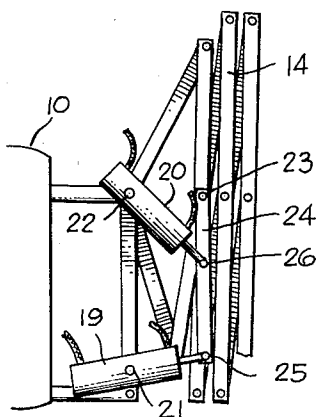


FIG. 2.

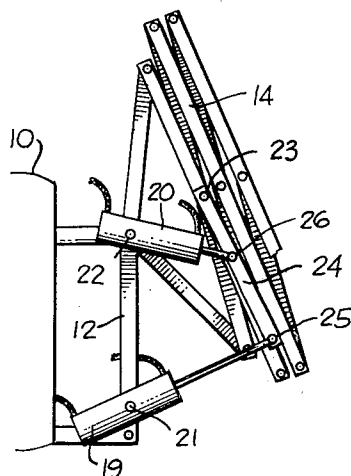


FIG. 3.

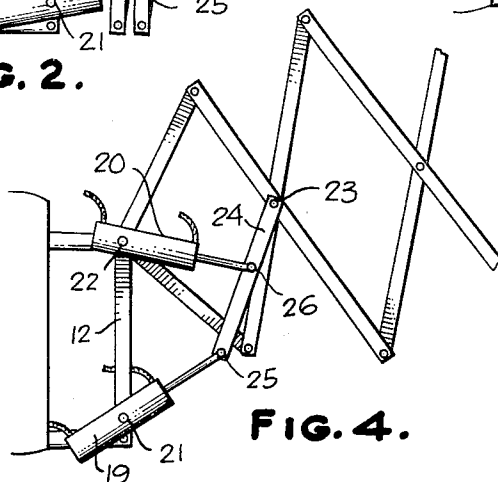


FIG. 4.

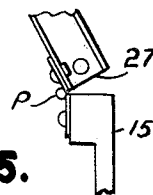


FIG. 5.

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TRACTOR ATTACHMENT

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4 Claims. (Cl. 214-147)

This invention relates generally to construction tools and more particularly to a tractor attachment for facilitating the construction of road beds.

In the construction of highways, it is conventional practice to position a series of headers in end to end relationship along the sides of the road bed to act as forms while a concrete layer is being poured. Generally, the headers consist of elongated metallic beams, generally L-shaped in cross section, to provide a top rail, a vertical front face and a horizontal base portion. The vertical front face serves to confine concrete within a desired area while it is hardening to form the road or highway. The top rail is used as a track for cement finishing equipment. After the concrete has hardened, the headers are usually removed by cranes or the like and moved into position for an adjacent lane of pavement or transported to the next section of the road bed ready for receiving concrete.

The operations of removing, cleaning and lifting the headers to position them in the next lane or to place them onto a truck for transportation to the next road section is relatively time consuming, not only involving many steps, but also requiring a considerable amount of manual labor.

Bearing the above in mind, the present invention has as its primary object the provision of a simple attachment mechanism which may be secured to a conventional tractor for automatically picking up and moving objects that are located on the ground in laterally spaced relationship with respect to the tractor, such as headers.

More particularly, an object is to provide a tractor attachment for picking up and moving headers to a new position, which may be readily operated by one person whereby the various steps involved in constructing a suitable road bed of concrete are greatly facilitated with attendant reduction in construction time, labor, and expense.

Briefly, these and other objects and advantages of this invention are attained by providing a support means rigidly secured to one side of a conventional type tractor. A toggle frame structure comprising a series of articulated structural members is pivoted at one end to the support means so that it may arcuately swing in a vertical plane. The articulated structural members are so joined together with respect to each other that the entire toggle frame may extend and contract in a horizontal direction to vary its overall length. Suitable engaging means in the form of swinging hooks are provided at the far end of the toggle frame and are designed to enable them to readily engage conventional type headers for removal and shaking.

Separate power means are provided adjacent the near end of the toggle frame and support means for respectively arcuately swinging the frame in a vertical plane and for horizontally extending or contracting the frame so that the engaging means may be moved to a given vertical level, extended in a horizontal direction for a desired distance, and lowered into a position to hook the

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particular header involved preparatory to lifting and moving the header. Since the toggle frame structure is arranged to extend laterally or from the side of the tractor, the tractor may be positioned for travel parallel to the edges of the road bed.

After the header has been lifted from its position, the toggle frame is extended and the header shaken by actuation of the power means to cause horizontal oscillatory movement. Thereafter, the power means are operated to vertically lower and unhook the header on the ground.

A better understanding of the various features and advantages of the invention will be had by referring to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of a conventional tractor employing the tractor attachment of the present invention;

Figure 2 is an enlarged elevational view of the support means and a portion of the near end of the toggle frame showing the toggle frame in retracted position;

Figure 3 is a view similar to Figure 2 illustrating arcuate movement of the toggle frame in a vertical plane upon actuation of one power means preparatory to use of the device;

Figure 4 illustrates horizontal extension of the toggle frame in response to operation of a second power means; and,

Figure 5 is an enlarged fragmentary view of that portion of the toggle frame end structure enclosed within the circular arrow 5 of Figure 1.

Referring to Figure 1, there is shown a tractor 10 provided on one side with a rigid support means comprising a pair of spaced parallel vertical posts 11 and 12 secured to the tractor by support rods such as indicated at 13. The supporting means in turn is arranged to pivotally support a toggle frame, designated generally by the numeral 14, comprising a series of articulated structural members as shown. The toggle frame structure itself is similar to that of a "lazy tongs" and is so well known in the art that it need not be described in detail here.

At the far end of the toggle frame 14 there is provided an engaging means comprising a hook support member 15 horizontally positioned and provided with depending hooks 16 and 17 at each of its ends respectively. The support member 15 is hinged to the extreme end of the toggle frame as by a hinge pin P as best seen in Figure 5 at a point above the center of gravity of the hook support whereby the hooks themselves may swing in a small arc in a pendulum-like manner. As shown in Figure 1, the hook support 15 is in position preparatory to engaging a conventional header or form beam 18 employed in the construction of concrete highways.

The extreme far ends 27 of the toggle frame structural members serve as a stop means limiting the arcuate swing of the hook support member 15 in a counter-clockwise direction as viewed in Figures 1 and 5. By this arrangement, loose concrete clinging to the header 18 may be shaken off by shaking the toggle frame such that the hook support strikes against these stops to jar the header.

Although the hooks 16 and 17 are shown in a position convenient for most header removal operations, it will be appreciated that the construction is such that the hook support member 15 could be turned end to end from the view of Figure 1 such that the hooks 16 and 17 faced outwardly from the tractor 10. With such a reversal of the hook support member 15, the tractor could be positioned on the opposite side of the headers being removed.

At the inner or near end of the toggle frame 14 adjacent the point to which it is connected to the support means, there are provided a pair of power units in the form of hydraulic cylinders 19 and 20, spaced with re-

spect to each other and connected between the support means and the toggle frame. The cylinders 19 and 20 are in turn secured to and arranged to rotate with a pair of pivot rods 21 and 22 respectively pivoted between the lower and upper ends of the vertical posts. As shown, suitable hydraulic hoses are provided for passing fluid to the cylinders 19 and 20.

The pistons associated with the first and second hydraulic cylinders 19 and 20 are pivoted at their free ends to a T-frame structure comprising a horizontal cross T member 23 pivoted between a pair of the articulated structural members to assume a position substantially parallel and in spaced relationship with respect to the upper and lower pivot bars 22 and 21. The vertical member 24 of the T-frame has its lowermost end pivoted to the piston associated with the cylinder 19 as at 25, and an intermediate portion pivoted to the end of the piston associated with the cylinder 20 as at 26. The arrangement is such that the T-frame operatively links the action of the cylinders 19 and 20 to the toggle frame 14 through the medium of the cross T-frame member 23. The manner in which this linking action is effected will be clear by referring to Figures 2, 3 and 4.

In Figure 2, the toggle frame 14 is illustrated in collapsed position against the side of the tractor 10. In this position, the pistons associated with the cylinders 19 and 20 are fully retracted within the cylinders. The first cylinder 19 is arranged upon actuation by hydraulic fluid to arcuately swing the toggle frame 14 about the pivot rod 22 generally in a vertical plane. For example, as illustrated in Figure 3, the piston associated with cylinder 19 is fully extended whereby the toggle frame 14 has assumed an angulated position.

If now the second cylinder 20 is actuated to extend its associated piston rod, the latter end of the piston rod will bear at the pivot point 26 against the vertical member 24 of the T-frame thereby causing the articulated structural members of the toggle frame 14 to extend substantially in a horizontal direction as indicated in Figure 4. Slight retraction of the piston associated with the cylinder 19 will cause rotation of the vertical member 24 about the pivot point 26 thereby lowering slightly the toggle frame structure so that the extreme end of the frame structure may be spaced at different vertical levels above the ground. Similarly, the horizontal extent to which the extreme end of the toggle frame may be positioned may be readily varied by the position assumed by the piston associated with the cylinder 20.

In operation, after a section of road bed concrete has hardened and it is desired to remove the headers positioned along the sides, the tractor 10 is driven along the concrete slab or adjacent road bed, and the toggle frame 14 horizontally extended until the extreme end thereof is positioned above the header. Referring again to Figure 1, for example, the horizontal extent is such as to move the hook support 15 slightly past the top edge of the header. Operation of the hydraulic cylinder 21 to retract its piston slightly will then serve to lower the toggle frame by arcuately swinging the same about the pivot rod 22 so that the depending hooks 16 and 17 on the hook support 15 will be positioned below the top edge of the header 18. By effecting a slight horizontal contraction of the toggle frame 14 as by action of the cylinder 20 retracting its associated piston rod, the hooks 16 and 17 may be made to engage the underside of the top flange of the header 18. Preferably, the center of gravity of the hook support 15 is below the hinge point of the hook support to the end of the toggle frame. Therefore, the hooks 16 and 17 will always be depending downwardly in proper position to engage the underside of the upper edge of the header 18. After the hooks 16 and 17 have been properly positioned for engagement with the header, the toggle frame is arcuately swung upwardly to lift the hook support 15 and the header a few feet above the ground. The frame is then

rapidly horizontally extended and contracted to cause the hook support and header to swing back and forth so that the support 15 will strike the stops 27 at the extreme end of the toggle frame to jar loose any concrete clinging to the header.

The toggle frame may then be further extended in a horizontal direction to position the header along the far edge of the adjacent lane, the hardened concrete at the near edge serving as a form.

The tractor may also be used to load headers onto a truck for ready transportation to a subsequent location.

It will be immediately evident that the various operations heretofore necessary in removing and positioning headers may be effected relatively simply and in a minimum period of time.

It will be understood, of course, that the present tractor attachment may be used for other purposes besides moving headers. For example, it may be readily adapted for laying sewer pipes and the like. In fact, any structural member which may be readily engaged by the depending hooks 16 and 17 may be moved about in a relatively simple and rapid manner by means of the toggle frame shown and described.

Therefore, while the invention has been shown and described with respect to the particular operation of road construction, the invention is not to be thought of as limited to the specific details set forth, but rather to encompass all those modifications and improvements as fall within the scope and spirit thereof.

What is claimed is:

1. A tractor attachment for lifting and moving objects from the ground spaced laterally of the tractor, comprising, in combination: a pair of spaced, parallel vertical posts rigidly secured to said tractor side; an upper pivot bar passing between the upper ends of said posts; a toggle frame including articulated structural members adapted to pivot with respect to each other to horizontally extend and contract said frame in overall length; means pivoting the ends of the two end pairs of the articulated structural members to the upper ends of said posts; a lower pivot bar passing between the lower ends of said posts; a T-frame having a horizontal member pivoted between a pair of said articulated structural members to assume a position substantially parallel and in spaced relationship to said upper and lower pivot bars, and a vertical member passing downwardly between said pair of articulated structural members; a first hydraulic cylinder secured to said lower pivot bar at a point substantially midway on said bar and having the free end of its associated piston pivoted to the lower end of said T-frame vertical member; a second hydraulic cylinder secured to said upper pivot bar at a point substantially midway on said bar and having the free end of its associated piston pivoted to an intermediate point on said T-frame vertical member, so that said toggle frame is vertically and horizontally movable in response to movement of said T-frame; and engaging means at the far end of said toggle frame for engaging said object whereby said engaging means may be lifted to a given vertical level, extended in a horizontal direction for a desired distance, and lowered into a position to engage said object preparatory to lifting and moving the same.

2. A tractor attachment according to claim 1, in which said engaging means comprises a horizontal hook support pivoted for free swinging movement to the far end of said frame structure; and hooks depending from the ends of said hook supports, the center of gravity of said hook supports being below the pivoting points thereof whereby said hooks may swing in a small arc to facilitate engagement of said objects.

3. A tractor attachment according to claim 2 including stop means at the far end of said frame structure adjacent said hook support positioned to limit said swinging movement whereby said hook support may strike said stops to jar said hooks.

4. A tractor attachment for picking up and moving objects on the ground spaced from the tractor, comprising, in combination: a support means secured to said tractor; an extendible frame structure pivoted to said support means at one end and terminating in engaging means for said objects at its other end; a first power means secured between said support means and said frame for effecting pivoting movement of said frame structure; and a second power means secured between said support means and said frame in spaced relationship to said first power means for effecting extension and contraction of said frame structure, said engaging means comprising a horizontal hook support hinged for free swinging movement to the far end of said frame structure; hooks depending from the ends of said hook support, the center of gravity of said hooks being below the hinge point of said

horizonteal hook support so that said hooks may swing in a small arc to facilitate engagement of said objects; and stop means at the far end of said frame structure adjacent said horizontal hook support positioned to limit said swinging movement whereby said hook support may strike said stop means to jar said hooks and shake an object hooked thereto.

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