Oct. 18, 1949. S. S. POKORNY 2,485,110

PUSH-OFF HAY STACKER

Filed Oct. 22, 1947 2 Sheets-Sheet 1

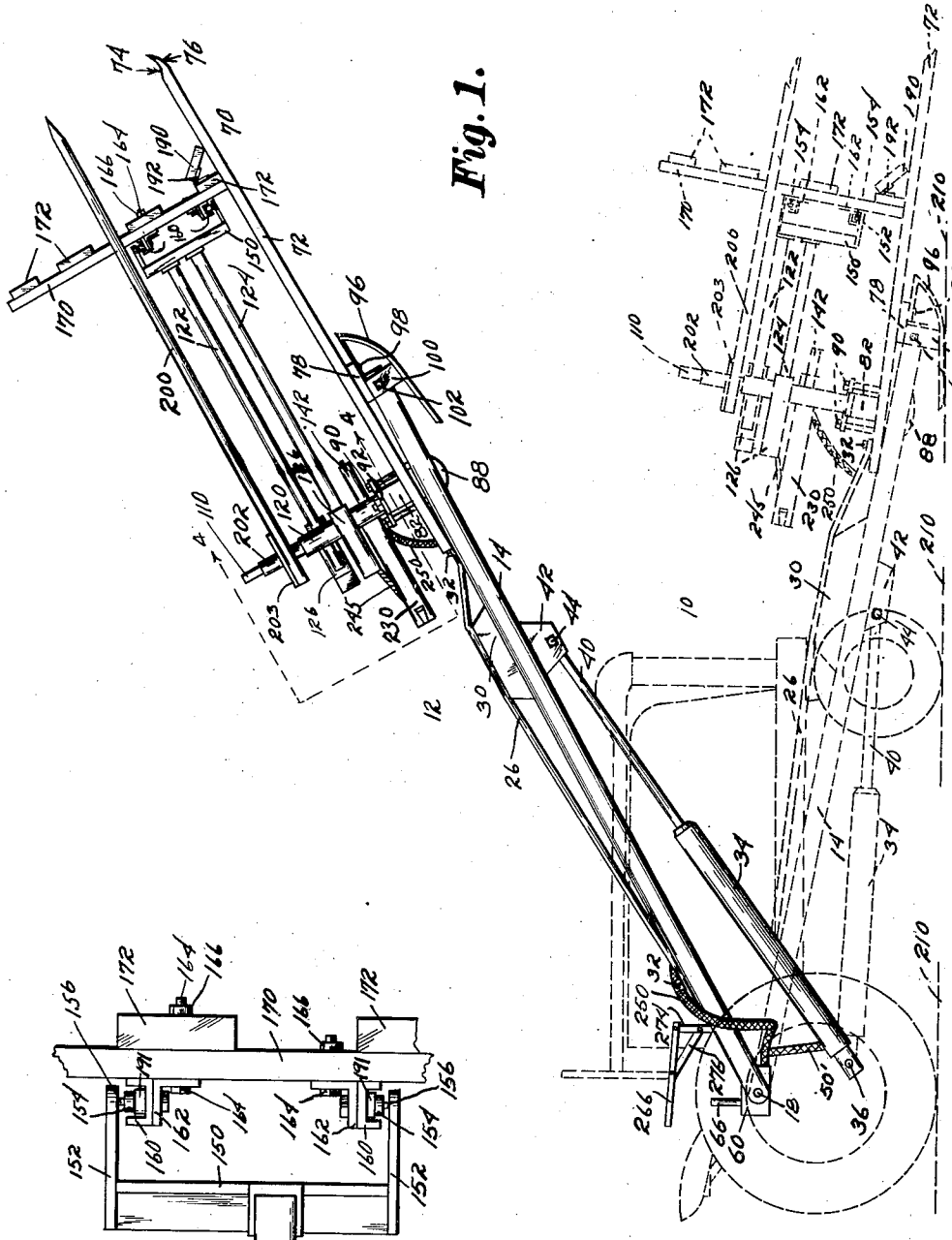


Fig. 1.

Fig. 2.

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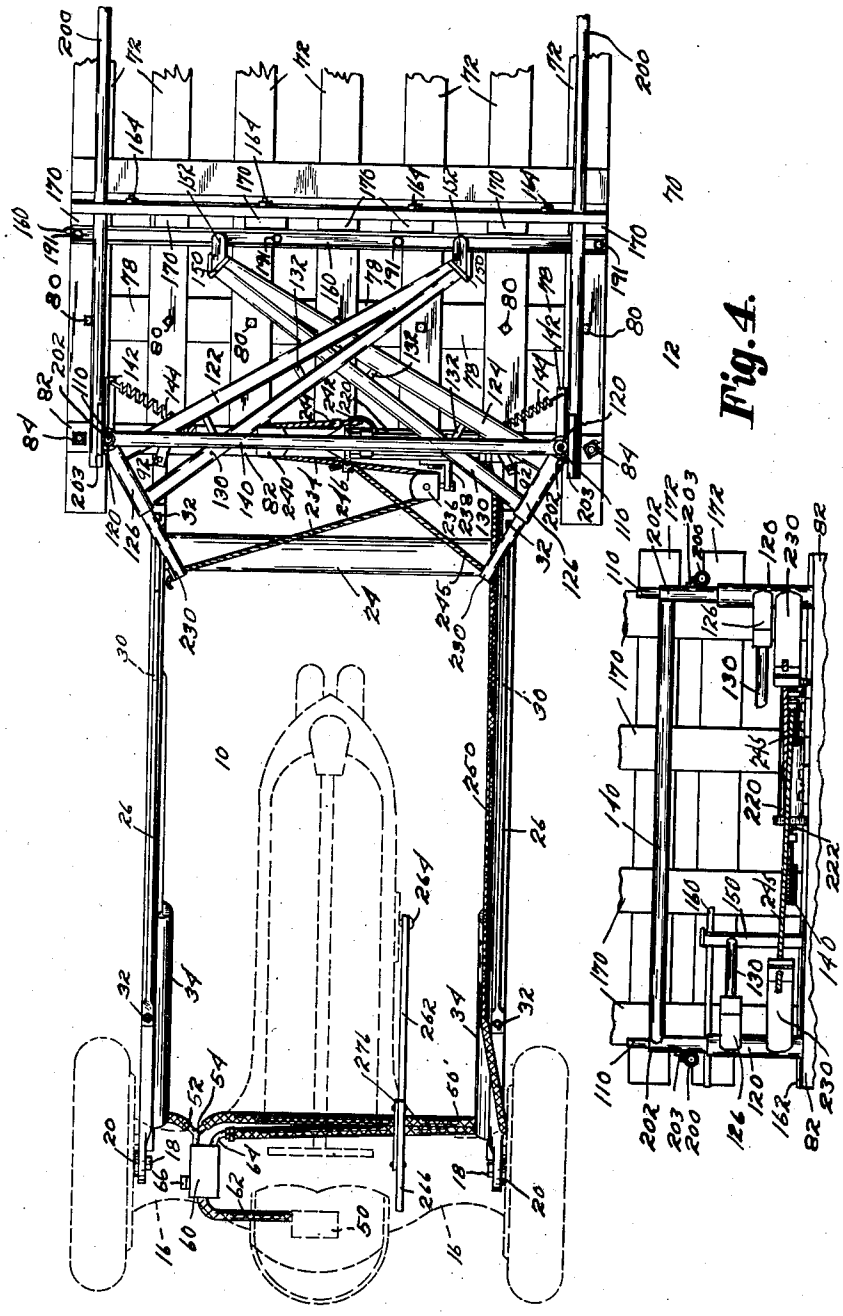


Fig. 4.

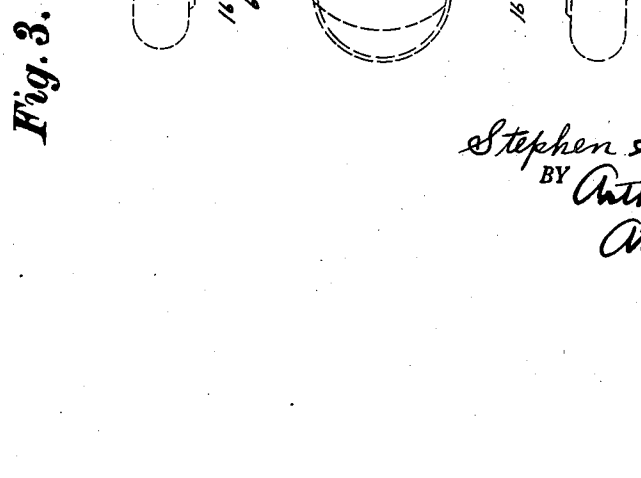


Fig. 3.

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PUSH-OFF HAY STACKER

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4 Claims. (Cl. 214—82)

1

This invention relates to material handling and moving machinery and more particularly to material moving mechanisms designed for attachment to power vehicles.

Heretofore material lifting and moving mechanisms of the instant type have been constructed in a manner whereby the cradle or scoop thereof trips for dumping the entire load at one time.

To place a quantity of straw less than a full load in a desired place it has been necessary to pick up only that amount, returning the cradle frequently to pick up more straw. It has thus been impossible to build a hay or straw stack in an accurate manner without loss of time with partial-load scoops.

It is therefor an object of this invention to provide a new material handling mechanism by means of which partial amounts of a larger load may be dumped at a selected point.

Another object of the invention is to provide a material lifting mechanism by means of which material may be stacked or piled more accurately and efficiently than heretofore.

Still another object of the invention resides in the provision of a device as described having a particularly efficient manually controlled means for moving a selected part of a larger load from a cradle or scoop.

Yet another object of the invention is to provide a device as described employing a pressure-operated jack to supply load dumping power.

Other and still further objects and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof.

In the drawings:

Figure 1 is a side elevation of the partial load dumping mechanism of the invention, shown as attached in an up position to a tractor, the latter as well as the down position of said mechanism being shown in dotted lines, and the ends of the tines of the hay-cradle being broken away;

Figure 2 is a detailed side elevation of the sliding connection between a moving cradle back and a back-moving arm employed, adjacent portions of the latter two elements being broken away;

Figure 3 is a top plan view of the dumping mechanism and tractor as shown in Figure 1; and

Figure 4 is a view-in-section taken along the line 4—4 of Figure 1, portions of the two channel-iron tracks on a cradle-back and a portion of one of the cradle-back moving arms employed not being shown.

The material loading and moving mechanism of this invention is for attachment to a tractor, generally indicated at 10 in dotted lines in Figures 1 and 3.

The loading mechanism is itself generally indidated at 12 in Figures 1 and 3 and includes two parallel like booms 14 extending forwardly from a

2

position adjacent the rear axle housing 16 of the tractor 10.

The booms 14 are pivotally secured by means of suitable bolts 18 to mounting brackets 20, and the latter are themselves suitably attached to the upper side of and at opposite ends of the axle housing 16.

The booms 14 are disposed in parallel alignment as seen in side elevation in Figure 1 and are interconnected at their forward ends by means of a suitable rear bracing member 24, the latter extending transversely of the tractor 10. The booms 14 are maintained rigid and braced in a longitudinal plane by means of struts 26 which extend along the upper sides of the boom 14. The struts 26 are maintained spaced apart from the longitudinal center portions of the booms 14 by means of suitable wings 30, and the struts 26 are secured to the booms 14 by bolts 32, disposed at either end of the struts 26.

Means are provided for raising and lowering the booms 14 and such means include a pair of hydraulic jacks having jack cylinders 34 one disposed beneath each one of the booms 14. The jack cylinders 34 are pivotally mounted at their rearward ends by means of pins 36 to a suitable mounting bracket secured to the frame of the tractor 10. The points of pivotal connection formed by the pins 36 are each disposed beneath and preferably slightly forwardly of the pivotal connections formed by the bolts 18 at the rearward ends of the booms 14.

The jack pistons 40 are slidably mounted at their lower ends in the respective jack cylinders 34. At their upper ends, the piston rods 40 are secured to the lower side of their respective booms 14 by means of connection plates 42 and bolts 44.

The rearward ends of the jack cylinders 34 are in communication with the hydraulic pump 50 of the tractor 10, which on the illustrated tractor is best seen beneath the seat thereof in Figure 3. The connection between the lower ends of the jack cylinders 34 and the pump 50 is accomplished by means now to be described.

A pair of hose lines 50' and 52 are connected respectively to the jack cylinders 34. The other ends of the hose lines 50' and 52 are connected to a T or Y joint 54 and the latter is in communication at its other port with one outlet port or a multiple port control valve 60.

The multiple port control valve 60 is in communication with the pump 50 through a conduit 62, and the valve 60 is provided with a second outlet port and fitting 64, which latter is in communication with a load dumping or pushing jack to be later described. The control valve 60 may be hand-operated by means of a suitable handle 66 which is disposed within a convenient reach of the driver of the tractor 10.

The material carrying portion of the mecha-

nism of this invention includes a cradle generally indicated at 70. The latter is provided with a bed having a plurality of parallel spaced apart elongated tines 72.

The tines 72 are each preferably provided with pointed, forward ends having downwardly inclined upper edges 74 adjacent the forward extremities of the tines 72. The lower sides of the forward extremities of the tines are upwardly inclined as indicated at 76. The latter inclination is for the purpose of minimizing the tendency of the tines 72 to dig into the ground during certain later described motions of the material moving mechanism.

The cradle 70 is further provided with a cross-piece 78 which latter is disposed beneath and at a right-angle to the tines 72. The cross-piece 78 is preferably disposed rearwardly of the center of the tines 72 and is secured thereto by means of suitable bolts 80.

At the rearward end of the tines 72, a cross-brace 82 is provided and the latter is preferably formed of a four-by-four disposed above the rearward ends of the tines 72 and secured thereto by means of suitable bolts 84. The four-by-four 82 is in turn secured to a forward bracing member 86, not shown, by means of a pair of U-bolts 88. The forward bracing member 86, not shown in the drawings, is disposed between and attached to the booms 14 at a point spaced from but adjacent the upper end of the boom 14.

The U-bolts 88 are disposed around the forward bracing member 86 and the opposite sides thereof extend upwardly on opposite sides of the cross-brace 82. There the said ends are secured to the cross-brace 82 by means of suitable nuts 90 and an attachment plate 92. As thus described, the cradle 70 is rigidly secured to the booms 14.

At the forward extremities of the booms 14, each of the latter are secured to one of a pair of skids 96 having curved forward surfaces for slideable engagement with the ground. The skids 96 are provided with an upper end section disposed in parallelism with the tines 72 and the end sections are each secured to the cross-piece 78 by means of suitable bolts 98.

The rearward ends of the skids 96 are disposed in approximate parallelism with the tines 72 and are attached to the forward ends of their respective booms 14 by means of attachment plates 100 and bolts 102. The attachment plates 100 also serve to connect the booms 14 to opposite ends of the cross-piece 78 so that the cradle 70 is rigidly secured to the booms 14.

A pair of pivot posts 110 are mounted at opposite sides of the rearward end of the cradle 70, being secured to the upper side of the cross-brace 82. The posts 110 are preferably disposed at a right-angle with respect to the cross-bar 82 as well as at a right-angle with respect to the tines 72.

The pivot posts 110 are respectively disposed through sleeve portions 120 of a pair of arms 122 and 124. The said arms are each disposed in planes in parallelism with the tines 72 and are secured to the sleeves 120 by means of leg pieces 126. The latter are welded or otherwise secured to both the arms 122 and 124 and the sleeves 120 and are each disposed at a right angle with respect to the said arms and sleeves.

Each of the arms 122 and 124 is provided with a reinforcing strut 130, which latter are each secured to their respective arm at the forward end of the latter; and at the rearward ends of

the arms, the reinforcing struts 130 are welded or otherwise suitably secured to the legs 126 at points spaced apart from the rearward ends of the arms 122 and 124.

Additional strength may be added to the arms 122 and 124 by providing spaced apart spacers 132 disposed transversely between and attached to the arms 122 and 124 and their respective reinforcing struts 130.

Between the upper ends of the pivot posts 110 a cross-post or bracing member 140 is provided and the latter is rigidly secured to the upper ends of the posts 110.

A pair of levers 142 are attached to the sleeves 120 on those sides of the latter, substantially opposite the sides of the sleeves 120 to which the legs 126 are secured; and a pair of tension springs 144 are each attached to the forward end of the respective one of the lever 142 at one of the ends of each spring and are anchored at their other or normally rearward ends to the cross-bar 82, the said anchoring being at points inwardly disposed from their respective posts 110.

The forward ends of the arms 122 and 124 are best shown in Figure 2, and are each secured to one of two spreaders 150, the latter having fingers 152 attached to its ends.

The spreader 150 is disposed in parallelism with the posts 110, and at a right angle with respect to the tines 72, and with respect to the arms 122 and 124. The spreader 150 may be welded or otherwise suitably secured to the forward ends of the arms 122 and 124 at points between the fingers 152.

The arms 122 and 124 are attached to their respective sleeves 120 in such positions that the arm 122 will be disposed above the arm 124 throughout all swinging movements of the arms about their respective posts 110. For this reason the arm 122 will join its spreader 150 at a point normally disposed above the point of joinder between the arm 124 and its spreader 150.

As best shown in Figure 2, the fingers 152 are disposed in parallelism with the arms 122 and 124 and with the tines 72. The fingers 152 extend downwardly beyond their respective spreaders 150 and rollers 154 are mounted, one each, on pins 156. The pins 156 are attached to the forward ends of each of the fingers 152, respectively, on the oppositely disposed faces of the latter. The pins 156 extend toward each other at a right-angle to the fingers 152 so that the rollers 154, rotatably mounted on the pins 156, rotate in planes in parallelism with the fingers 152 and with the arms 124.

The purpose of the rollers 154 is to engage in one of two U-shaped channels 160. The latter are disposed in parallelism, their open sides turned away from each other upward and downward respectively. The channels 160 are attached by means of suitable spaced apart angle-irons 162, bolts 164 and nuts 166 to the rearward side of a cradle-back, the latter being composed of interconnected, spaced apart, upstanding members 170 and spaced apart, horizontal members 172. The members 170 and 172 are disposed, respectively, at a right-angle with and parallel to the tines 72.

The channel members 160 are elongated and extend horizontally across the back side of the upstanding members 170. The horizontal cradle-back members 172 preferably extend completely across the tines 72 in a transverse direction.

The lowermost of the horizontal cradle-back members 172 is preferably disposed against the

tines 72 and is adapted to slide thereacross. An elongated apron 190 is provided and is disposed extending in a horizontal direction forwardly of and inclinedly disposed with respect to the lowermost horizontal member 172. The apron 190 is pivotally attached to the lowermost member 172 by means of a hinge 192 in such a manner that the lower edge of the apron 190 will always be disposed forwardly of the lowermost member 172. At times when the cradle-back is disposed at its forwardmost point, as determined by the length of the arms 122 and 124, the lowermost cross-member 172 will stop at the rearward side of the inclined portion 74 and the forward edge of the apron 190 will dip downwardly, during forward motions of the cradle-back across the portion 74, so that the apron 190 will follow the inclination 74 for cleaning hay or straw therefrom.

The cradle-back is prevented from moving excessively forward or rearward by four stops 191 secured to the channels 160 at either end of the paths of the rollers 154.

In order to maintain the straw or hay in position upon the cradle 70, two side-tines 200 are provided on opposite sides of the cradle. The side-tines are welded or otherwise suitably secured to pipe sections 202 and one of two bracing bars 203 are welded to the tines 200 and to the pipe sections 202. The pipe sections 202 are themselves disposed about and rigidly secured to pipe sections 202 and one of two side tines 200 extend forwardly from the posts 110 on opposite sides of the cradle 170 and in parallelism with the bed tines 72.

Means are provided for moving the cradle-back forward by swinging the arms 122 and 124. Such means include a hydraulic jack having a cylinder 220, best seen in Figure 4. A jack-piston 222 is slideably disposed in one end of the jack cylinder 220. The cylinder 220 is anchored to the four-by-four 82 at its other end.

In operation, the new device may be used for scooping hay from the ground or small stacks and for this purpose the load lifting portion 12 thereof is disposed in the dotted line position shown in Figure 1. When in such position, the cradle 70 is supported upon the skids 96 which are in turn disposed in slidable engagement with the surface of the ground 210.

In this position the forward ends of the tines 72 will scoop straw upon the cradle. Since the cradle-back is disposed as close to the post 110 as is possible during loading, and farther to the rearward than shown in dotted lines in Figure 1, a considerable quantity of straw may be loaded upon the cradle.

When the cradle is loaded the latter may be elevated by adjusting the handle 66 on the pump 60 and the handle 266 of the backward and forward control valve, not shown, so that oil will be caused to flow from the pump 50 through the valve 60, and through the hose lines 50' and 52 to the jack cylinder 34. The jack pistons 40 will then be caused to raise the booms 14 and the cradle 70.

The hay or straw may then be transported to a point for dumping by operation of the tractor 10. When this point is reached, the operator may so regulate the valve 66 and the handle 266 of the backward and forward flow valve, not shown, that the oil under pressure is caused to flow from the pump 50, through the valve 60, and through the conduit 32 to the push-off jack

cylinder 220 causing the piston 222 to slide outwardly thereof.

A pair of lever arms 230 are provided, as best shown in Figure 4, and are welded, one each, to the lower ends of the sleeves 120. The lever arms 230 are disposed beneath the leg pieces 126 and rotate with the latter and with the arms 122 and 124. The lever arms 230 extend outwardly from the sleeves 120 in the same radial position as the leg pieces 126; in other words, the lever arms 230 are preferably disposed in parallelism with the leg pieces 126.

A cable 235 is secured at one of its ends to one of the arms 230. From there the cable 234 extends to and is reeved over a pulley 236, which latter is mounted, by means of a suitable bracket 238, on the four-by-four 82. The pulley 236 is disposed rearwardly of the four-by-four cross-piece 82 and is positioned on the opposite side of the cradle 70 from that lever arm 230 to which the cable 234 is attached. The pulley 236 is also disposed on the opposite side of the cradle 70 from the piston rod end of the jack cylinder 220.

From the pully 236, the cable 234 extends to and is reeved over a second pully 240. The latter is secured on the end of the push-off jack piston 222. The second pully 240, the cable 234 extends in a direction substantially in parallelism with that portion of the cable 234 which is between the pullys 236 and 240. In other words, from the pully 240 the cable 234 extends in substantial parallelism with the cross-brace 82 and its end is anchored to the cross-brace 82, adjacent the jack cylinder 220, by means of a suitable U-bolt 242 and a cable clamp 244.

A second cable 245 is secured at one end to the rearward end of the other lever arm 230 and the other end of the second cable 245 extends forwardly onto the opposite side of the cradle 70 and is attached by means of a cable clamp 246 to a portion of the cable 234 which is disposed between the pullys 236 and 240. The particular point of connection between the cables 234 and 245 is disposed so that at times when the pully 240 is urged outwardly by the jack piston 222, the cables 234 and 245 will exert equal forces upon the lever arms 230 and upon the arms 122 and 124, for moving, simultaneously, both sides of the cradle-back forwardly.

Power for the jack cylinder 220 is supplied through a suitable conduit 250 and the latter extends to the outlet port fitting 64 of the multiple port control valve 60.

The flow of oil into and out of the push-off jack cylinder 220, and into or out of the boom raising jack cylinder 34, is controlled by means of a backward or forward flow-valve, not shown, the latter forming a part of the tractor 10. Such valve controls the pumping action of the pump 50 so that the latter either permits oil to return to a reservoir, not shown, from the valve 60 or exerts an oil pressure and flow into the valve 60.

The backward and forward flow valve which is not shown is controlled by means of a lever 262, pivotally attached to the tractor 10 by means of a bolt 264. The lever 262 is provided with a handle 266 disposed above the lever 262, and the handle 266 is attached to the lever 262 by means of an upright standard 274, a brace 276 being disposed between and attached to the handle 266 and the standard 274.

As the piston 222 and the pully 240 move in a direction away from the jack cylinder 220, the cable 234 is drawn through the pullys 240 and 236, pulling on the lever arm 230. This in turn

rotates the sleeve 120 for swinging the arm 122 forwardly. Simultaneously, the lever-arm 230 is caused to rotate the other sleeve 120 and arm 124, since the arm is attached to the cable 245 and to the cable 234 by the clamp 246.

As the arms 122 and 124 move forwardly at their forward ends, the rollers 154 slide in the channel-irons 160 urging the cradle-back forward. This, in turn forces hay off the forward end of the tines 72. At the end of the forward motion of the cradle-back, the apron 190 pushes the last remaining portions of the load of hay or straw off the tines 72.

If desired, in lieu of dumping the load, all in one place, the cradle-back may be moved only partially forwardly while the tractor is disposed in one position for dumping one portion of the load. The tractor may then be moved to another position and the cradle-back moved farther forwardly for dumping another portion.

In this manner, hay and straw stacks may be built efficiently and without the loss of time which would be required if it were necessary to elevate smaller loads for each individual dumping.

Following dumping, the handle 266 is manipulated for permitting oil to flow back to the oil reservoir of the tractor 10 from the jack cylinder 220. The arms 122 and 124 will then be swung to the rear of the cradle 70 under the urge of the tension springs 144 on the levers 142. The booms 14 are then lowered to the ground, and into the positions shown in dotted lines in Figure 1, by so manipulating the handle 66 of the valve 60 so that oil flows from the boom-jack cylinders 34 back into the oil reservoir of the tractor 10. The booms 14 will then lower by gravity, until the skids 96 are in engagement with the ground.

This invention has provided a material handling mechanism capable of dumping partial amounts of a large load at selected points for accurately and efficiently building hay stacks or straw stacks and the like.

From the foregoing description, it is thought to be obvious that a push-off hay stacker constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason, I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice, except as claimed.

I claim:

1. A hay stacker for attachment to a motor vehicle having a controllable source of freely flowing material under pressure, comprising a cradle bed extending forwardly of said vehicle; controllable lifting means interconnecting said cradle bed and said vehicle for raising and lowering said bed at desired times; a cradle back supported by said bed and extending from side to side of and upwardly from the latter during use, said back being slidable forwardly and rearwardly of said bed; two elongated criss-crossed pushing arms pivotally secured to said bed at points to the rearward end of said bed at one end of each arm, said points being spaced apart sideways of said bed, the other end of each arm being disposed slideably attached to the rearward side of said back; resilient means for swinging the forward ends of said arms rearwardly; and a jack having a cylinder in communication with said source, one end of said jack being anchored to said bed, the other end of said jack being so connected to said arms as to swing the forward ends of said arms forwardly at desired times for moving said back forwardly of said bed.

2. A hay stacker as described in claim 1 in which said cradle is provided with like pointed, forwardly extending tines, said tines having downwardly inclined upper edges near the forward extremities thereof; and in which an apron extends forwardly of said cradle-back and transversely of said tines, said apron being pivotally secured to said cradle-back in a manner whereby said apron is adapted to follow the said inclined edges of said tines for pushing hay therefrom during forward motions of said cradle-back.

3. A hay stacker for attachment to a motor vehicle having a controllable source of freely flowing material under pressure, comprising; a cradle-bed extending forwardly of said vehicle; a controllable lifting means interconnecting said bed and said vehicle for raising and lowering said bed at desired times; a cradle-back supported by said cradle-bed and extending transversely of and upwardly from the latter during use, said cradle-back being slidable forwardly and rearwardly of said cradle-bed; means responsive to the flow of said material and correlated with said cradle-back for moving the latter forwardly on said cradle bed at desired times; other means for causing said cradle-back to move rearwardly of said cradle-bed at other desired times, said cradle having like pointed forwardly extending tines, said tines having downwardly inclined upper edges near the forward extremities thereof; and an apron extending forwardly of said cradle-back and transversely of said tines, said apron being pivotally secured to said cradle-back in a manner whereby said apron is adapted to follow the said inclined upper edges of said tines for pushing hay therefrom during forward motion of said cradle-back.

4. In a hay stacker for attachment to a prime mover having a controllable source of power, a frame, a cradle bed secured to said frame and extending forwardly of said vehicle; a cradle-back slidably disposed on said bed; two spaced apart posts secured to said frame rearwardly of said back; two criss-crossed arms each rotatably secured to a different one of said posts at one end of each arm, the forward ends of said arms slidably engaging the rearward side of said back; two legs each secured to a different one of said arms at an angle with respect to the attached arm; and means movably securing said legs to said power source for causing pivotal movements thereof.

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