Oct. 25, 1938. G. S. ALLIN ET AL 2,134,019

BULLDOZER

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Fig. 7

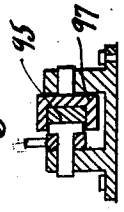


Fig. 6

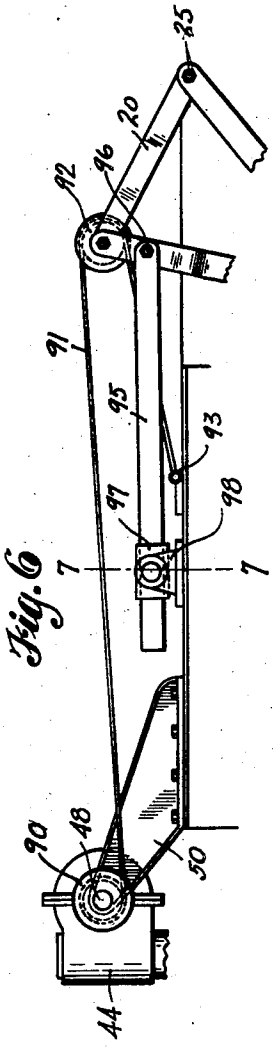
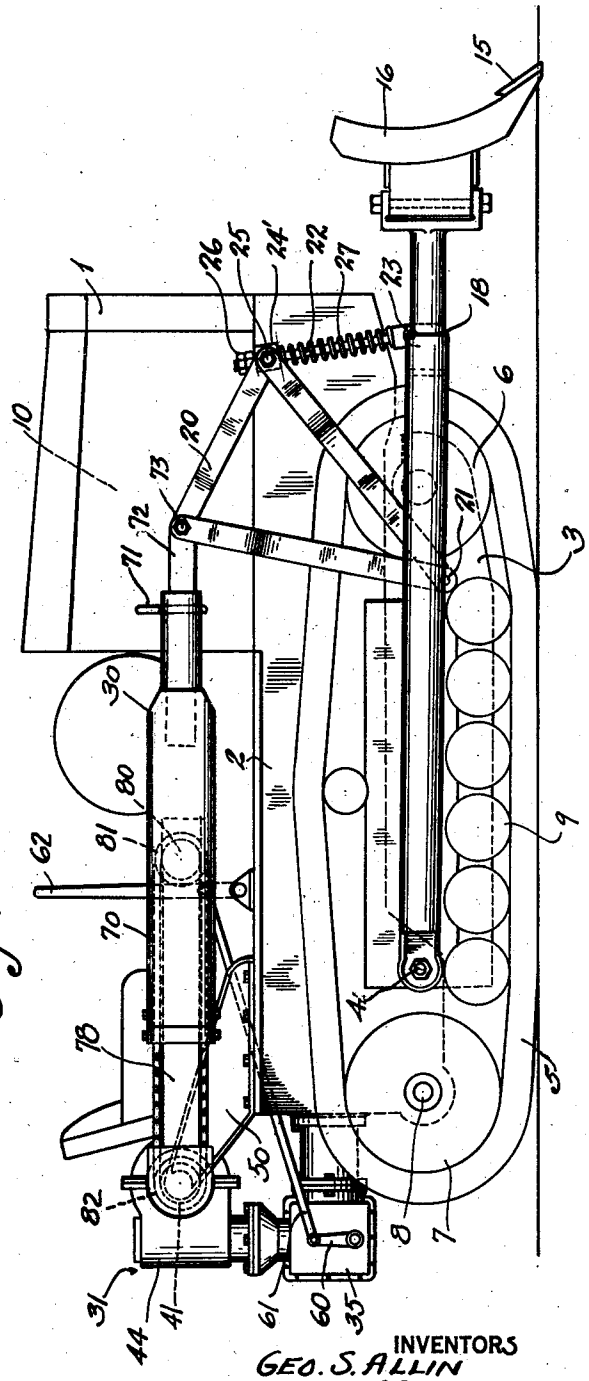


Fig. 1



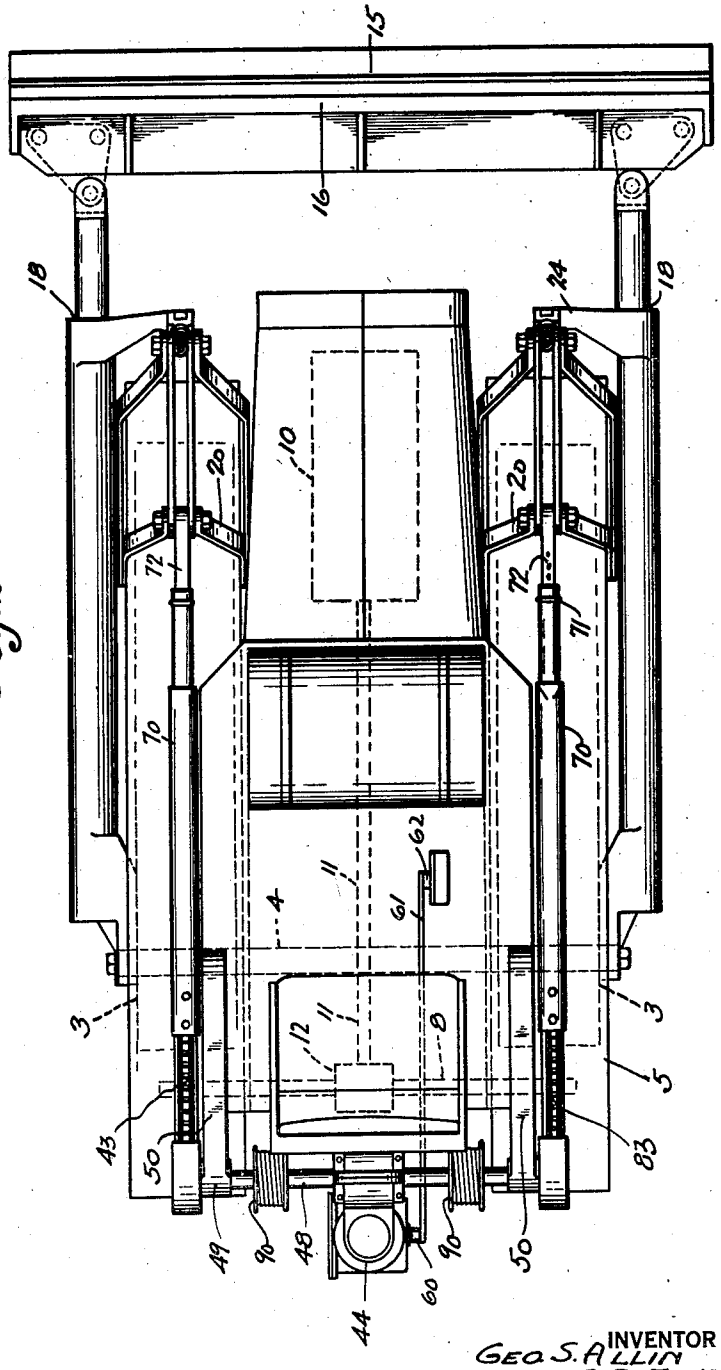
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BULLDOZER

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Fig. 2



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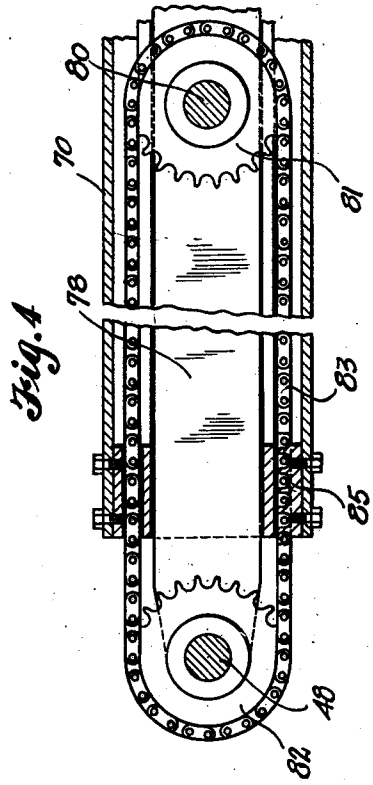


Fig. 4

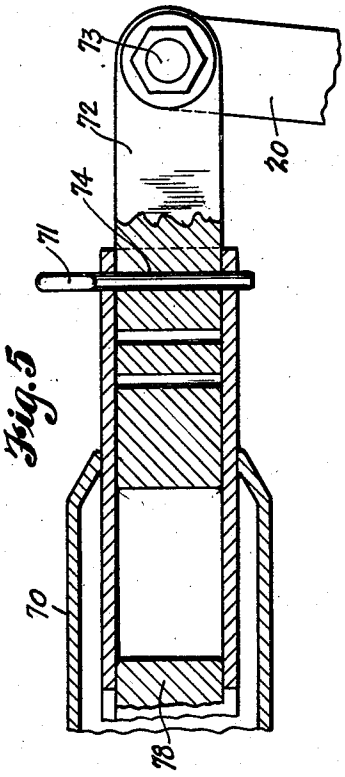


Fig. 5

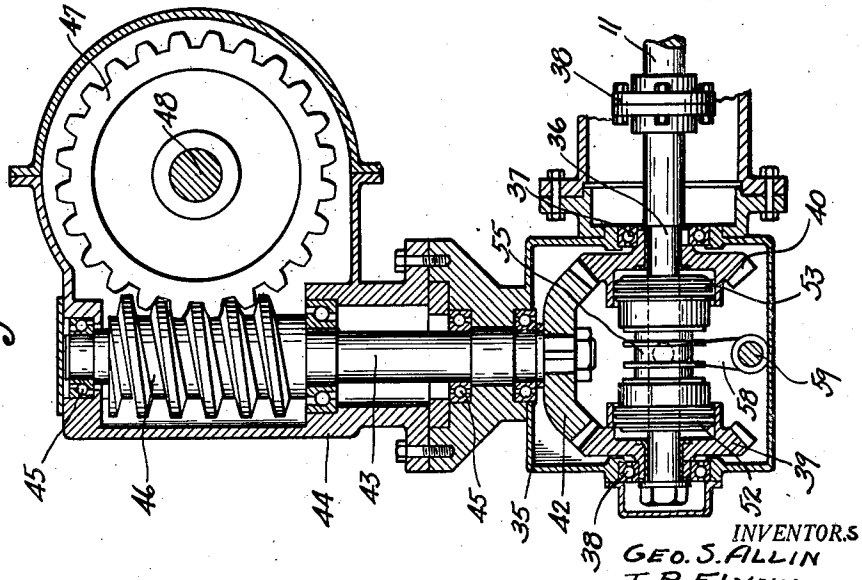


Fig. 3

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BULLDOZER

George S. Allin, Seattle, Wash., and Theodore Patrick Flynn, Portland, Oreg.

Application June 15, 1936, Serial No. 85,218

4 Claims. (Cl. 37—144)

This invention relates to bulldozers and the like, and it has reference more particularly to the novel features residing in a blade supporting and adjusting mechanism as applied to bulldozers; it being the principal object of this invention to provide a "power take-off" from the tractor engine for actuating, under manual control, mechanisms whereby adjustments in the working elevation of the bulldozer blade may be quickly and readily made.

More specifically stated, the present invention resides in the "power take-off" means as associated with the telescopically arranged parts of a connecting link between the "power take-off" and the blade supporting thrust beams. Also, in the novel construction of a mechanical means for making adjustment of the telescopic connection under a controlled application of power applied from "take-off", thereby to adjust the thrust beams to change the elevation of the blade that is supported thereby.

Other objects of the invention reside in the special details of construction, in the combination of parts, and in their mode of operation, as will hereinafter be fully described.

In accompalishing these and other objects of the invention, we have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevation of a bulldozer that is equipped with "power take-off" and blade control means embodied by the present invention.

Fig. 2 is a plan view of the same.

Fig. 3 is a vertical, sectional view of the "power take-off" mechanism.

Fig. 4 is a longitudinal, sectional view of the telescopic beam construction and its adjusting means.

Fig. 5 is a sectional detail showing construction of the forward end portion of the telescopic beam.

Fig. 6 is a view in side elevation of an alternative form of connection between the "power take-off" means and the blade supporting thrust beam.

Fig. 7 is an enlarged sectional detail taken on the line 7—7 in Fig. 6.

Referring more in detail to the drawings—

1 designates what may be a tractor of a type now generally in use and commonly referred to as a track laying tractor. It comprises a main frame structure 2 and track frames 3—3 at opposite sides and longitudinally of the main frame and pivotally mounted at their rearward ends upon the extended, opposite end portions of a cross shaft, or dead axle 4 that is fixed in the rear end portion of the main frame. At their forward ends, the track frames are permitted vertical movement relative to the main frame to compensate for variations or roughness of the road surface; and spring suspension means of any suitable type, but not herein illustrated, is interposed between the forward ends of the track frames and the main frame to support the latter.

Endless track belts 5 operate about belt guide wheels 6 at the forward ends of the track frames and also about driving wheels 7 that are fixed rearwardly of the track frames on the ends of track driving shafts 8 extended to opposite sides of the main frame from the rear end portion thereof. Intermediate the driving wheel 7 and the front wheels 6 a series of idlers 9 are mounted on the track frames to engage the lower run of the track.

The power plant, or engine, of the tractor is indicated at 10 and this drives a shaft 11 extended rearwardly and operatively connected with the track driving shafts 8; the particular means of connection not being illustrated in detail, but is merely indicated at 12 in Fig. 2.

The bulldozer blade 15 is fixed, in a suitable manner, along the lower edge of a mold board 16 disposed transversely of and forwardly of the tractor. At its opposite ends, the mold board is operatively supported from the forward ends of a pair of thrust beams, 18—18, which at their rearward ends, respectively, are pivotally mounted upon the opposite end portions of the dead axle 4 adjacent the outside of the track frames. While details of construction of the thrust beams 18—18 and the means whereby they are connected with the mold board forms no part of the present invention, it will herein be stated that the thrust beams are of telescopic construction and are connected at their forward ends to the mold board in such manner as to rigidly and operatively support the mold board in any of a number of different angular positions to which the blade may be adjusted through an adjustment of length of the thrust beams. The details of construction of the thrust beams, the blade mounting, and the special means of connection are described and illustrated in a copending application of George S. Allin and Theodore Patrick Flynn, executed on July 11, 1935.

The means for effecting vertical movement of the forward ends of the thrust beams and for holding them at set positions of adjustment comprises, for each beam, a rocker frame 20 of triangular form that is pivotally supported at its

lower end by a pivot bolt 21 from the forward end of the corresponding track frame. A link 22 is pivotally connected at its lower end, as designated at 23 with a laterally and inwardly extending bracket 24 fixed to the thrust beam, and at its upper end this link is slidable through a bearing member 24' that is pivotally fixed, as at 25, to the forward corner of the rocker frame. Nuts 26 on the upper end of the link 22 engage the bearing 24, thereby to support the thrust beam from the rocker frame, and a coiled spring 27 is mounted about the link, between the bearing 24 and the lower end mounting member of the link, to provide for yieldingly resisting upward movement of the thrust beams.

The upper, rearward corner of the rocker frame 20 is connected through the mediacy of a telescopic link, designated in its entirety by reference numeral 30, with a "power take-off" mechanism located at the rear end of the tractor; the "power take-off" mechanism being designated in its entirety, in Fig. 1, by reference numeral 31.

The "power take-off" mechanism, as shown best in Fig. 3, is described as follows: Bolted to the gear housing at the rear end of the main frame of the tractor, and in alinement with the rear end portion of the engine driven shaft 11, is a housing 35 in which is mounted a power transmission shaft 36, revolubly supported in bearings 37 and 38. The forward end of this transmission shaft is connected as at 38' with the rear end of the engine driven shaft 11. Revolubly mounted on the transmission shaft, within the housing 35, are bevel gears 39 and 40 of the same size, spaced apart, and facing each other; each of which gears meshes with a downwardly facing bevel gear 42 that is keyed to the lower end of a worm shaft 43 mounted vertically in a housing 44 that is fixed upon the housing 35. The shaft 43 is revolubly supported at upper and lower ends within antifriction bearings 45, and on its upper end portion is a worm gear 46 in driving mesh with a gear 47 that is fixed on a cross shaft 48, the opposite ends of which are revolubly supported in bearings 49 at the rearward ends of supporting brackets 50 that are fixed to the opposite sides at the rear of the main frame.

Associated with gear wheels 39 and 40, respectively, are clutches 52 and 53 keyed on shaft 36 and adapted, selectively, to be set, thus to drive their corresponding gear wheels. The means for selectively setting either clutch comprises a shift collar 55 that is keyed on the shaft 36 and which may be actuated from a neutral position at which neither of the gears is driven, toward either of the gears, thereby to set the clutch that is associated with that gear. The clutch shifting means comprises a yoke arm 58 fastened to a transverse shaft 59, that is revoluble in and extends from the housing 35, and at its outer end is provided with a lever arm 60 connected by means of a link 61 with a hand lever 62 accessible to the operator. Movement of the hand lever, forwardly or rearwardly from an upright position, correspondingly shifts the clutch collar for driving the shaft 48 in opposite directions for raising or for lowering the blade supporting means.

Each of the telescopic links 30 comprises an outer section 70 of tubular form connected at its forward end by a pin 71 with an extension member 72, which member is pivotally connected at 73 with its corresponding rocker frame 20. The extension 72 is provided with a series of holes 74 at intervals therealong to receive the pin 71 for increasing or decreasing the effective length of the beam. The tubular section 70, at its rearward end, is slidably and telescopically mounted upon a guide bar 78, which, at its rearward end is mounted upon the cross shaft 48 closely adjacent the bearing 49 at that side.

The forward end of the bar 78 terminates within the tubular portion 70 at a distance spaced from the forward end so as to permit the desired longitudinal travel of the part 70 without interference between the forward end of the bar 78 and the rearward end of the extension 72. Mounted within the tubular portion upon a supporting axle 80 that is fixed in the forward end portion of the bar 78 is a sprocket wheel 81. At the rearward end of the bar 78, the similar sprocket wheel 82 is fixed on the shaft 48 for rotation thereby, and a sprocket chain belt 83 extends about the sprocket wheels 81 and 82, and this belt is fixed at one point to the tubular section 70 by a clamping block 85, as shown in Fig. 4. Thus, incident to forward or rearward travel of the lower run of the sprocket chain belt, under the driving action of shaft 48, the tubular portion 70 will be adjusted forwardly or rearwardly on the bar 78 and thus, through its connection with rocker 20 will effect the raising or the lowering of the blade supporting thrust beam 18.

The rocker members 20 at opposite sides of the tractor are actuated in unison through the mediacy of the shaft 48, and the blade may be moved upwardly or downwardly as desired, through manipulation of the clutch mechanisms 52 and 53 under control of the lever 62. It is readily apparent that, whenever the clutch is thrown to neutral position, the blade will be held at the instant position of adjustment by reason of the locking relationship of the gear 47 with the worm 46.

In operation, angular adjustment of the blade is made through the telescopic adjustments of the thrust beams. The inclination of the blade is variable by reason of the provision for varying the effective lengths of the links 30 through the mediacy of the extension parts 72.

In Figs. 6 and 7, there is illustrated a modified form of construction utilizing connecting cables in lieu of the connecting beams 30. For this particular arrangement, cross shaft 48 is equipped at opposite sides of the housing 44 with cable winding drums 90 and cables 91 that are wound on these drums, extended forwardly about sheave wheels 92 mounted on the rocker frames 20, and then the ends of the cables are extended rearwardly and are fixedly attached to the main frame, as shown at 93. The weight of the blade structure moves the blade into the ground, and the structure may be lifted by winding in on the cable. In order that the blade may not lift from the ground in use, a locking brace 95 is provided. This brace is pivotally attached to the frame 20 at its forward end, as seen at 96, and at its rearward end it is slidable through a guide block 97, pivotally mounted in a bracket 98 fixed on the frame. The guide 97 is in the form of a braking clutch which will hold the bar 95 against movement therein when the brake is set.

Having thus described our invention, what we claim as new therein and desire to secure by Letters Patent is:—

1. In a bulldozer comprising a tractor, thrust beams at opposite sides of the tractor with rear ends pivotally fixed thereto and a blade supported by the forward ends of said beams, rocker frames pivotally mounted on the tractor, and having operative connection with the thrust beams for

raising and lowering the blade, a cross shaft mounted on the tractor, means for selectively rotating the cross shaft in opposite directions telescopic beams with ends connected to the rocker frames and other ends mounted on the cross shaft, and means operated by the cross shaft when rotated in opposite directions for extending or contracting the telescopic shafts to functionally actuate said rocker frames.

2. A bulldozer comprising a tractor, an engine driven shaft, thrust beams at opposite sides of the tractor having their rear ends pivotally attached to the tractor, a bulldozer blade mounted by said beams at their forward ends, rocker frames pivotally attached to the tractor at opposite sides, links connecting the rocker frames with corresponding thrust beams to raise and lower the latter, a cross shaft revolubly mounted on the tractor, telescopic links with rear ends pivotally fixed to said cross shaft and opposite ends pivotally fixed to the rocker frames, gearing operatively connecting the cross shaft and engine driven shaft to rotate the cross shaft, and means operable by said cross shaft to extend or shorten the telescopic shafts whereby to lower or raise the said blade.

3. A device as in claim 2 wherein said gearing includes a clutch shiftable from neutral position to different positions for selectively extending or contracting the telescopic links.

4. A device as in claim 2, wherein the rear end member of each of the telescopic links mounts a sprocket wheel at its forward end, and the said cross shaft whereby said members are pivotally mounted has sprocket wheels fixed thereon, and chain belts are extended about the said sprocket wheels on said members and at one point, each chain has fixed connection with the forward member of the telescopic link.

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THEODORE PATRICK FLYNN.