July 24, 1956 H. V. BANNISTER 2,755,573

CRANE ATTACHMENT

Filed March 5, 1951 2 Sheets-Sheet 1

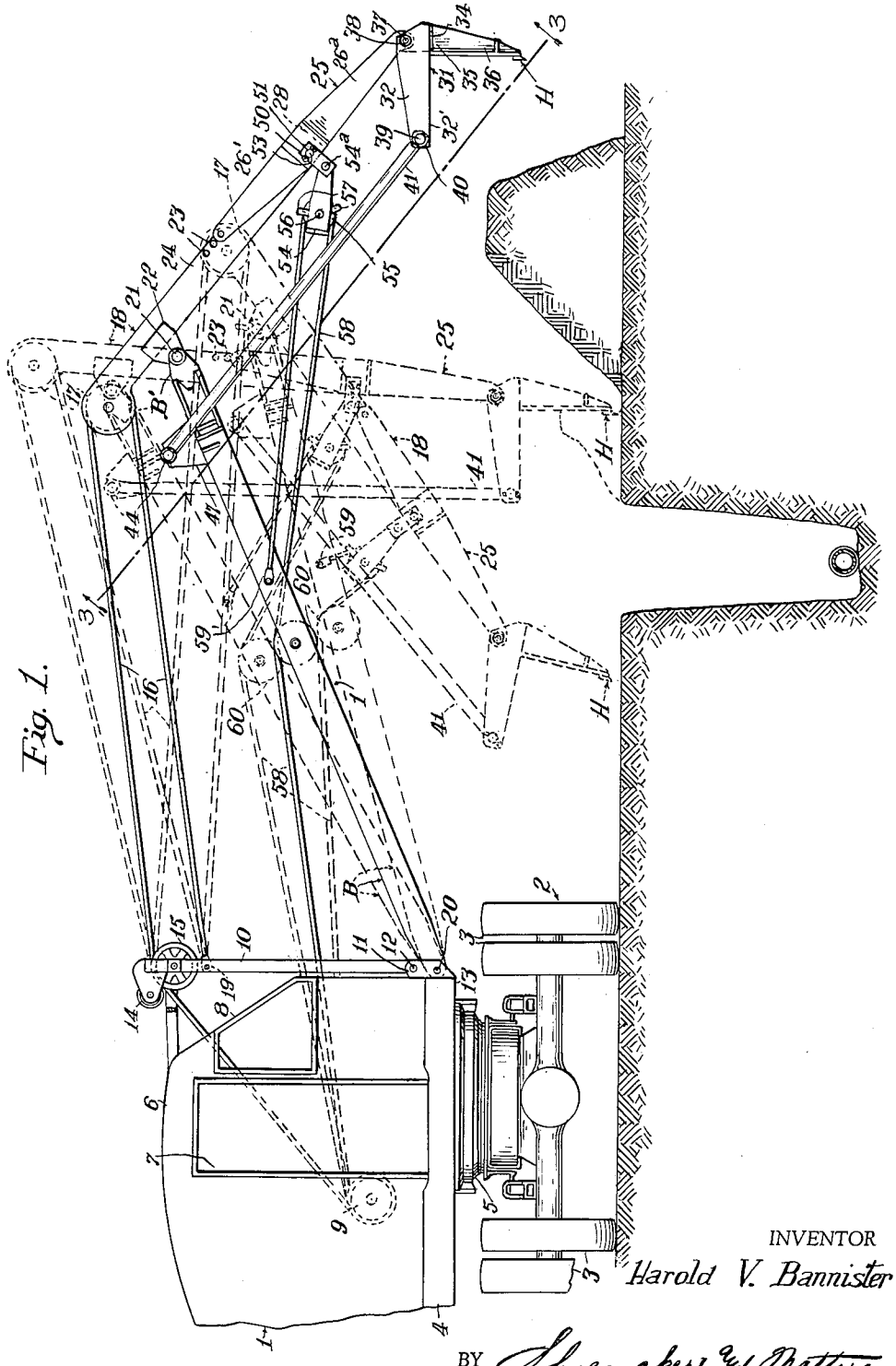


Fig. 1.

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Fig. 2.

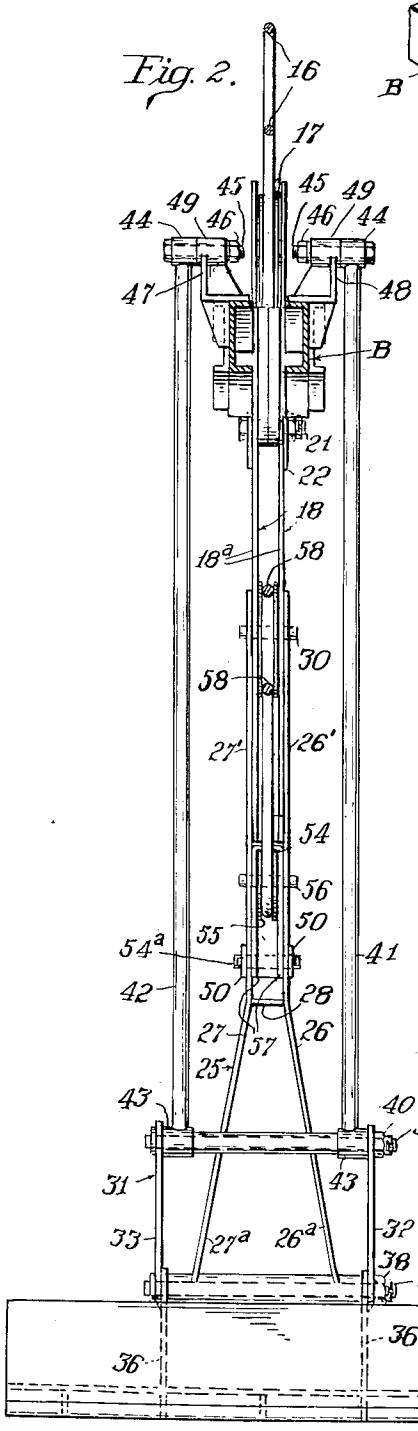
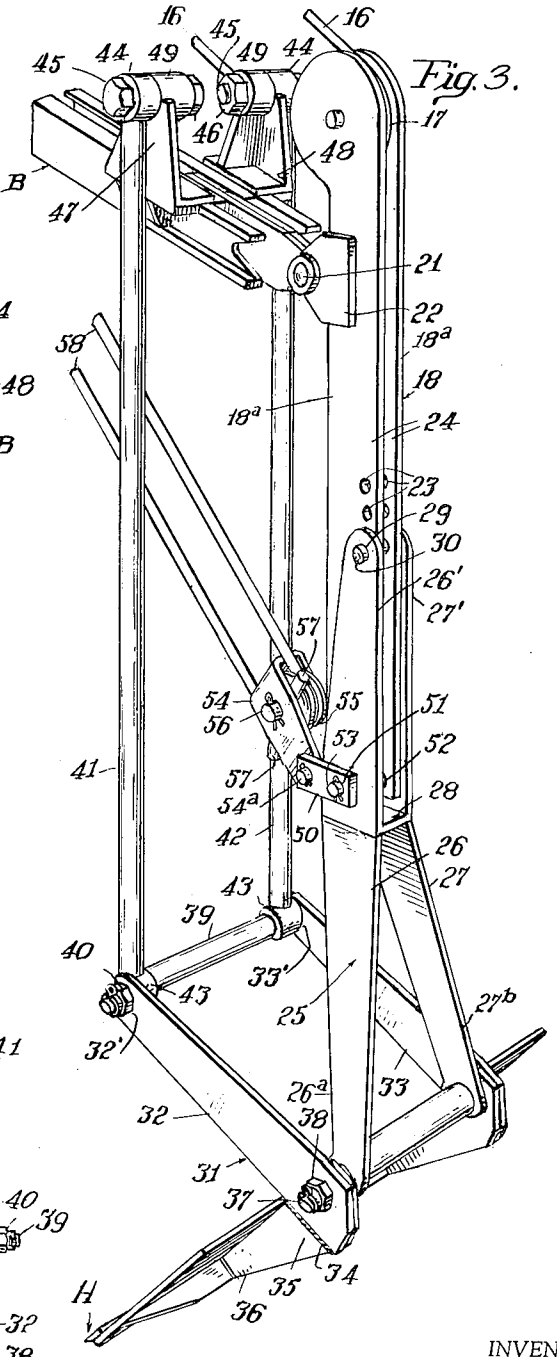


Fig. 3.



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CRANE ATTACHMENT

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3 Claims. (Cl. 37—144)

This invention relates to a crane attachment.

The invention is more particularly directed to an attachment for a crane whereby ditches may be filled, and the ground surface leveled or scraped in a very efficient manner. This attachment for accomplishing the filling of ditches may be referred to as a back filling attachment for cranes and, of course, is also adaptable for use in leveling and scraping a ground surface, as aforesaid, and the crane, of course, is of the mobile type and the crane structure being conventional.

The type of crane to which I refer is disclosed in Fig. 1 of the drawings in application Serial No. 171,082, filed June 29, 1950, now Patent No. 2,681,205 of January 15, 1954, or in the patents to Schield, 2,402,299, June 18, 1946, and 2,405,981, August 20, 1946.

In sewer and pipe line work, the earth excavated from ditches running parallel to the curb in a street is usually piled on the sidewalk or on adjacent lawns. Replacing the excavated earth into the ditch that has been dug in connection with sewer and pipe line and similar work creates quite a problem with present day cranes in utilizing buckets and other such devices cooperatively associated with the boom of the crane. The present attachment provides a very simple means of quite effectively and rapidly moving the excavated and piled earth back into the ditch without injuring lawns adjacent to the ditch and from the opposite side of the ditch from the piled earth. In other words, the mobile crane may be positioned on the street parallel to but spaced from the curb and ditch and if the excavated earth is piled on a lawn or sidewalk adjacent to the ditch, then the backfilling attachment as embodied in this application serves to rapidly and effectively replace or backfill this excavated earth into the ditch, and in doing so, the piled earth is worked on from the top of the pile until all of the excavated earth is replaced in the ditch and the hoe which is an adjunct of the attachment, in its novel movement, in backfilling the earth into the ditch, serves not only this purpose but to smooth the ground or earth adjacent to and over the ditch.

The utility of the backfilling attachment for cranes is not limited to replacing the earth in a ditch or the like but the hoe that is an adjunct of the attachment may be utilized for leveling and scraping purposes.

Another advantage and feature of the present backfilling mechanism for cranes is that the same is adapted to any hoe or trench attachment for the cranes and these attachments are readily removable and replaceable or interchangeable so that the crane may be changed over quickly for either trench digging or backfilling or scraping or leveling purposes.

In view of the foregoing, it is an object of the invention to provide a readily removable and replaceable and interchangeable backfilling means that is operatively associated and connected with a boom and dipper stick of a conventional crane or earth moving and handling machine.

Another object of the invention is to provide a relatively simple backfilling attachment as an adjunct or attachment to a crane of the mobile type so that the crane proper and the boom and dipper stick associated therewith will allow for ready manipulation of the said boom and dipper stick and control of the backfilling attachment in order that the piled earth may be replaced in a trench or ditch by the movement of the attachment in a controlled plane toward the crane proper, meaning that the attachment results in an engagement with the removed and piled earth and a movement toward the crane and between which the trench or ditch is located.

Another object of the invention is to provide a highly mobile crane that is adapted to have attached thereto a backfilling mechanism which is associated with the dipper stick, the latter being pivotally mounted on and carried by the boom of the crane and which attachment and dipper stick are operated by the conventional drag cable and hoist cable of the crane so that the attachment on the dipper stick properly engages the excavated earth and pushes it, so to speak, from a point removed from the ditch or trench into the trench and serves also to level this removed earth both over and adjacent to the ditch.

Another object of the invention is to provide a backfilling attachment for a conventional crane, which attachment is in the form of an elongated blade such as a hoe and which presents a substantially flat perpendicular surface to the excavated earth while the same is being moved toward and into a ditch or trench and, likewise, presents this same flat perpendicular surface to the earth in a leveling or scraping operation.

Another object of the invention is to provide a backfilling attachment for a mobile crane wherein this attachment includes a substantially vertically disposed hoe which engages the earth to be moved and which hoe, due to a certain linkage system, is maintained substantially perpendicular to the ground surface at all times during the movement or handling of the earth.

With the above and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportions, and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Fig. 1 is an elevational view looking from the rear of the crane and partially fragmentary and showing the attachment in full lines and different working positions in broken lines;

Fig. 2 is a view of the attachment in perspective; and

Fig. 3 is a view taken substantially along the line 3—3 of Fig. 1 looking in the direction of the arrows.

Like reference numerals and characters in the several figures of the drawings all denote the same parts.

The invention will be more readily understood by referring to the drawings in detail wherein the conventional crane is indicated generally at 1. The crane may be either of the crawler type or of the dual wheel type as illustrated in Fig. 1. Fig. 1 of the drawings gives an illustration of the actual performance of the backfilling attachment and serves to generally indicate the functioning of this attachment and the manner in which the excavated earth can be moved into a ditch or trench that was previously dug.

The conventional crane 1 includes traction means 2 illustrated as dual wheels 2, or its equivalent, and the usual swing platform 4 that is rotatably mounted on and carried by the usual chassis of the vehicle as denoted

at 5. Ordinarily, the crane includes a cab structure 6 surmounted on the swing platform 4 and with an ingress and egress means in the form of a door 7, or the like. The front 8 thereof may be inclined with respect to the vertical and includes either an open panel or a windshield so that the operator seated within the cab may readily observe the functioning of the backfilling mechanism while operating the usual and conventional controls in connection with the hoist drum 9, mounted within the cab on the platform 4. Additionally, the crane structure includes the conventional A frame structure 10, one vertical leg of which A frame is mounted in a bracket 11 by means of a bolt or other securing means 12 and which bracket is attached to the forward end portion 13 of the swing platform 4. Sheaves 14 and 15 are mounted adjacent the upper end of the A frame and which sheaves serve as a guide for the hoist cable 16, a portion of which cable is trained thereover and also over sheave 17 that is positioned on the upper end of dipper stick 18 and this cable 16 is dead-ended to the A frame as indicated at 19 while the free end of the cable is trained over the hoist drum 9. This hoist drum may be as depicted in my patent of January 15, 1954, hereinbefore referred to.

The crane boom B is pivotally mounted at 20 at its inner end to the bracket 11 carried on the forward part of the swing platform 4. The tip end B' of the boom is pivotally attached at 21 to a fixed bracket 22 on the dipper stick 18 and adjacent the outer end of this dipper stick. This pivotal connection 21 preferably consists of a removable bolt or other such removable or detachable securing means.

The dipper stick 18 is comprised of two substantially flat elongated plates 18*a* that are preferably maintained in slightly spaced relationship with respect to each other so as to provide for rotation of the sheave 17 at one end thereof. Each plate of the dipper stick is provided with a series of openings 23 adjacent the side edges 24 thereof. These openings 23 of the two plates align and serve as a means of attaching an extension or stick frame which carries the hoe thereon and referred to in detail immediately hereinafter.

The extension frame is indicated generally at 25 and consists of similarly formed, substantially flat, elongated plates 26 and 27 which are held together by reinforcing and connecting web 28 that is positioned between the same substantially intermediate the ends thereof and is welded or otherwise secured to each of the plates. These plates 26 and 27 at their upper portions 26' and 27' respectively are maintained in substantially spaced parallelism by the reinforcing and connecting web 28 whereas the lower portions thereof 26*a* and 27*b* flare outwardly in a substantially inverted V-shaped form. The end of the dipper stick 18 is adapted to be arranged in parallel substantially contacting relationship with and between the upper portions 26' and 27' of the stick frame and each of these upper portions of this frame is provided with an opening 29 and which openings are in registry with each other and are adapted to be registered with any of the selected aligned openings 23 in the dipper stick. The extension or stick frame 27 is detachably connected with the dipper stick 18 by means of the aforesaid aligned openings and a removable headed pin 30 that passes through these openings and is maintained in place by a suitable cotter pin or other such securing means, not shown.

The hoe or similar blade frame is denoted generally at 31 and the same consists of substantially right-angularly extending arms 32 and 33, which arms at one end thereof are welded or otherwise fixedly or permanently secured as at 34 to the top edge 35 and preferably to a reinforcing rib 36 of the substantially flat, relatively wide hoe or blade H. The blade or hoe frame 31 is initially a complete unit and, as such, is pivotally attached between the diverging or spread ends of the extension frame by means of a pin or bolt 37 which has a reduced threaded end portion on which the nut 38 is engaged to provide a pivotal connection between the diverging ends of the extension frame 25 and the blade or hoe frame 31.

The free ends 32' and 33' of the blade or hoe frame have positioned between the same a pin or bolt 39 similar to the pin or bolt 37 and this bolt 39 is maintained in secured positions by means of a nut or the like 40. The bolt 39 serves as a means of pivotally connecting the pair of guide tubes or links 41 and 42 to the hoe or blade frame 31 or vice versa. The lower ends of the tubes or links are preferably enlarged as at 43 and surround a portion of the bolt 39. Thus, there is provided a pivotal connection between the links or tubes 41 and 42 with the hoe or blade frame 31 along with the aforesaid pivotal connection 37 for the blade frame assembly. The upper ends 44 of these tubes or links 41 and 42 are enlarged similarly to the lower ends thereof 43 and they surround a portion of a pin or bolt 45, which bolt or pin is headed at one end and held in place by a suitable nut or other securing means 46 and this provides a pivotal connection for the said upper ends of these tubes or links 41 and 42. The upper end of the guide tubes or links 41 and 42 are pivotally connected to the fixed spaced brackets 47 and 48 by the bolts 45. The brackets are preferably welded on the top flange of the boom adjacent the tip thereof or may be secured in any other manner. The brackets each has an enlarged hollow bearing 49 and the aforesaid bolts 45, of course, pass through the enlarged end portions 44 of the guide tubes 41 and 42 as well as through the bearing, and this complete assembly comprises the upper pivotal connection for the guide tubes or links 41 and 42.

The extension or stick frame 25 substantially intermediate the ends thereof has on each of the parallelly disposed sections 26' and 27' an outwardly extending rigid strap 50 which constitutes a drag cable sheave bracket. There is an opening 51 in each of these brackets and these openings 51 register with a series of registered openings 52 adjacent the extreme lower end of the dipper stick 18. A removable pin 53 is adapted to be inserted through the registered openings 51 and 52 and serves with the pin 30 as an additional means of securing the extension or stick frame to the dipper stick or vice versa and both of said securing means are removable and replaceable, of course.

The forwardly projecting portion of the brackets 50 serves as a means of pivotally mounting the U-shaped yoke 54, by means of a removable bolt or pin 54*a*, and which yoke has rotatably mounted therein the drag cable sheave 55, and which sheave is rotatably mounted on a suitable pin or the like 56. This sheave yoke 54 may have oppositely extending lugs 57 thereon which prevent the pivoted sheave from too closely contacting either the dipper stick or the extension stick frame and which might interfere with the proper reaving and unreaving of the drag cable 58 which is trained over this sheave 55.

It will be seen from the drawings that the drag cable 58 is trained over the sheave 55 and is dead-ended on the boom at 59 and this cable travels over another sheave 60 carried by the boom and the free end thereof is wound onto the drum within the cabin or the crane in the usual manner.

From the foregoing, it will be clearly seen that the pivotal connection of the upper ends of the tubes or links 41 and 42 to the tip end of the boom, the pivotal connection for the lower ends of these tubes or links and the pivotal connection with the lower ends of the extension or stick frame 25 with the blade frame and the rigid connection of the upper ends of the extension frame with the dipper stick and the pivotal connection of the tip end of the boom with the dipper stick are all detachable and replaceable, thus the entire back filling unit may, as such, be connected with or disconnected from

the conventional crane structure. If found desirable, any one or more of these detachable pivotal connections may be disassociated from each other and the backfilling attachment partially associated with or detached from the crane structure.

It is quite obvious that, when the backfilling mechanism as described hereinbefore is utilized in connection with the boom and dipper stick, the bucket and its braces, if previously associated with the crane, must have been removed and, similarly, if other attachments or adjuncts have been attached and utilized in connection with the crane, the same must also have been removed but the present backfilling attachment and the other conventional attachments for the crane are interchangeable with the crane structure and may be readily associated therewith or detached therefrom.

The combination and arrangement of the linkage of boom B, dipper stick **18** with extension frame **25**, blade frame **31** and guide tubes or links **41** and **42**, constitute a substantially parallel linkage system or motion transmitting means for the disposition of the blade or hoe H relative to the earth and which disposition of the said blade being perpendicular to the surface of the earth during the earth moving and handling operations.

The motion and movement of the aforesaid linkage system from the start of a backfilling operation as shown in full lines in Fig. 1 progresses, as illustrated by the broken lines in this figure, so that the blade travels in a substantially perpendicular relationship with respect to the ground and moves the dirt or earth toward the crane and into a ditch or trench, or if the operation is a leveling or scraping one, this same relationship of the blade with respect to the ground level is maintained. The earth is actually pushed ahead of the blade H and, of course, falls into the ditch thus filling the same and this blade passes on over the ditch in a smoothing and leveling action from the full line position of the same as shown in Fig. 1 to the broken line position shown at the left side of the trench illustrated in this figure. It is understood that when the operator reels in the hoist cable **16** the boom B may be raised and lowered and swung, if desired, with the swing platform to meet the requirements as to the height of the beginning of the backfilling operation or the scraping or leveling operation, whatever the case may be, and, of course, as the pile of dirt or earth that is being backfilled is being handled, the boom might have to be lowered and raised according to the prevailing conditions of the pile of earth or dirt.

What is claimed is:

1. A crane including a vertically swingable boom, a dipper stick disposed across the outer end thereof, a pivot coupling between the stick and the boom end, said stick having a substantial portion of its upper end extended above the boom, a hoist cable sheave pivotally mounted on the upper end of the stick, a flat blade member disposed below the lower end of the stick, means pivotally connecting the blade with the lower end of the stick for swinging on an axis paralleling the axis of the said pivot coupling and including a shaft disposed longitudinally of the top edge of the blade, a pair of arms rigidly joined to the top of the blade at the sides thereof and extending in right angular relation to and from the working face thereof, a pair of elongate links each pivotally attached at one end to the free end portion of one of said arms and extending upwardly across a side of the boom and above the top of the latter, bearing means supported on and above the top of the boom at a position inwardly from and above the pivot coupling for the stick, a pivot element carried by each bearing and having the upper end of a link connected thereto to turn on an axis paralleling the pivot coupling for the stick, and means for attaching a drag cable to the dipper stick between the pivot and the blade.

2. The invention according to claim 1, wherein the last named means is adjustable lengthwise of the dipper stick.

3. The invention according to claim 1, wherein the dipper stick comprises an upper section and an elongate lower extension section, said stick sections being in interengaging end overlapping relation, means coupling said overlapping ends for relative lengthwise adjustment and said means for attaching the drag cable being carried by the lower extension section.

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