Feb. 19, 1946. E. W. AUSTIN 2,395,244

EXCAVATOR

Filed May 2, 1944 3 Sheets-Sheet 1

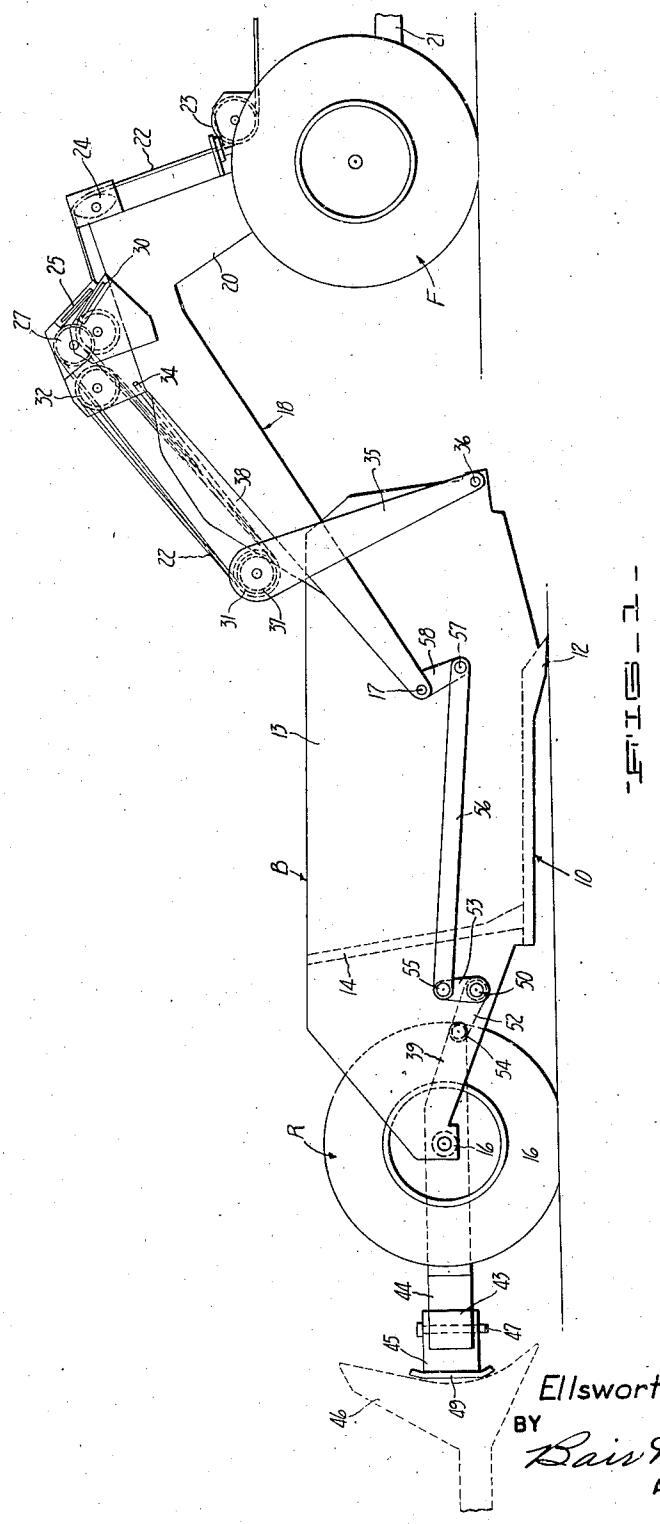


FIG. 1.

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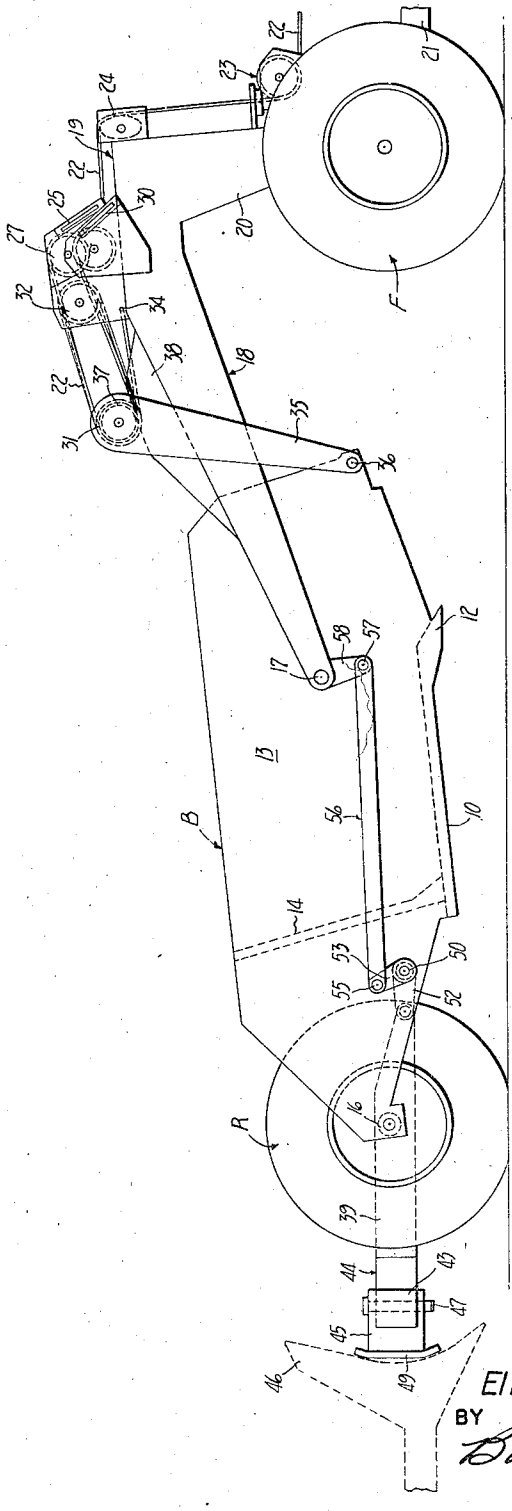


FIG. 2.

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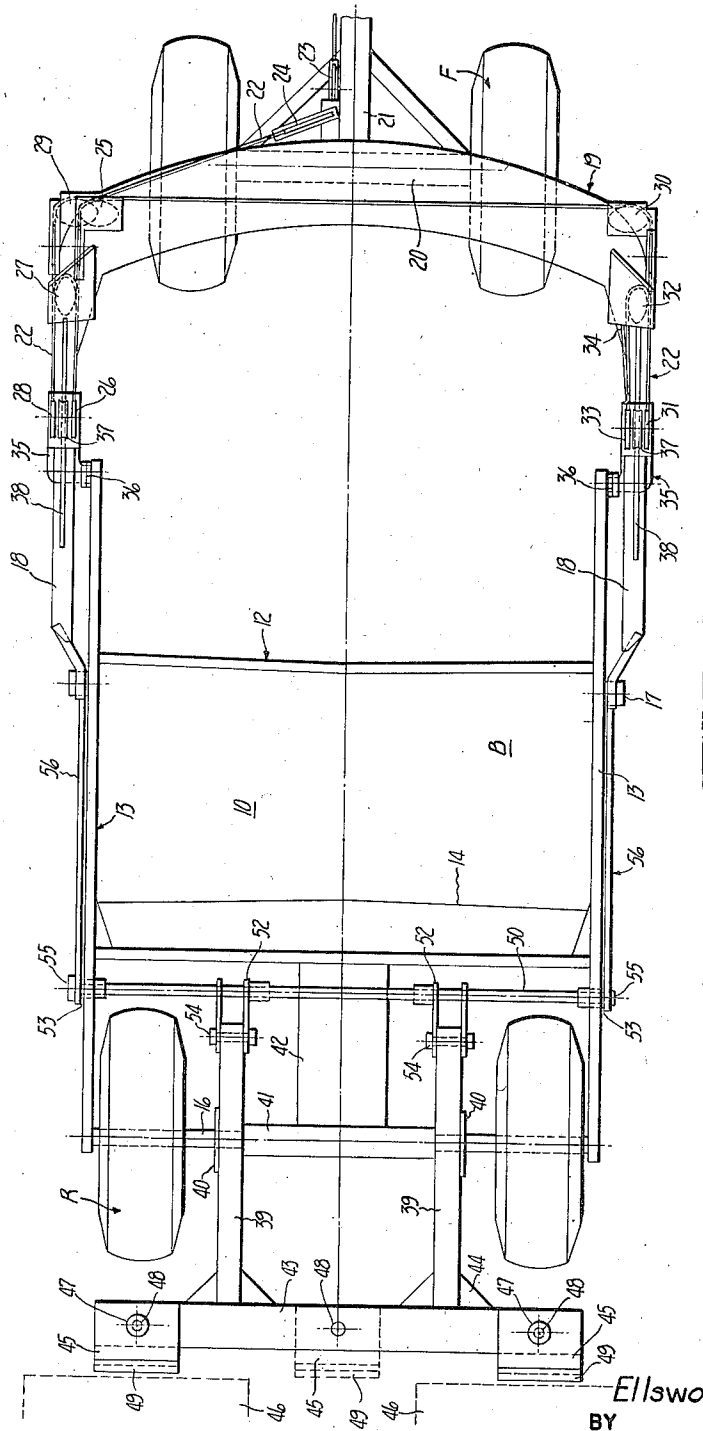


FIG. 3.

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Patented Feb. 19, 1946 2,395,244

UNITED STATES PATENT OFFICE

2,395,244

EXCAVATOR

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Application May 2, 1944, Serial No. 533,750

18 Claims. (Cl. 37—126)

My present invention relates to an excavator of the carrier scraper type and has to do particularly with a push beam for the scraper which is automatically adjusted as a result of raising and lowering of the scraper bowl to maintain substantially the same height above the ground surface for all positions of the bowl. Carrier type scrapers are ordinarily designed to be pulled by a tractor, either of the track type or rubber tired wheel type; and during the digging operation or in transporting the load through soft going, it is customary to use a pusher tractor to apply additional power for the scraping operation, or to prevent the scraper from becoming mired, as the case may be. Seldom is loading carried on where up grades are encountered, although this is conceivable. Invariably the loading is down grade, which still requires a pusher, especially with the high speed rubber tired tractors; and then the haul may be for a mile across a fairly level stretch to a fill, which may be soft and again require a pusher. For this purpose push beams can be extended rearwardly from the scraper to be engaged by bulldozer blades or other types of push plates on one or more tractors behind the scraper.

Carrier type scrapers such as the kind shown in my Patent No. 2,275,601, issued March 10, 1942, have a bowl which tips upwardly and downwardly during the scraping, loading and carrying operations and accordingly if a push beam is rigidly secured thereto and projects rearwardly from the pivot point (which is usually the back axle) its elevation is changed during these operations and therefore is unsatisfactory as an element against which push may be applied.

The prime object of my present invention is therefore to compensate the push beam for changes in the position of the scraper bowl and maintain the rear end of the push beam at substantially the same height above the ground for all positions of the scraper bowl.

Another object is to provide a carrier-type scraper having a push beam structure suitably arranged to be engaged by one or more tractors at the rear, simultaneously where more than one is provided, thereby permitting the application of the desired or necessary power for scraping, digging, loading or transporting operations of the scraper.

Still another object is to provide a push beam arrangement having provision for attaching one or more pusher blocks thereto at a plurality of positions depending upon the requirements as to number and position of the tractors pushing the scraper.

A further object is to provide a compensating means for the position of the push beam and the push blocks which may be simply fabricated and hooked up with operating parts of the scraper, particularly a frame which connects the front wheels to the scraper bowl and is pivoted to the bowl.

Still a further and more specific object is to provide a rock shaft, link and arm connection between the frame and the push beam to accomplish the position compensating function.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a carrier type scraper equipped with a compensating push beam arrangement of the type embodying my present invention, the scraper being shown in digging position.

Fig. 2 is a side elevation of the scraper showing it in carrying position and the push beam in a new position relative to the scraper bowl as caused by the compensating linkage of my invention; and,

Fig. 3 is a plan view of Fig. 2 showing the relative positions of the scraper parts and my push beam and its compensating linkage.

Although my invention may be applied to several different types of scrapers, it is illustrated with a carrier type scraper having a bowl B, a pair of front wheels F and a pair of rear wheels R. The bowl B may comprise a bottom wall 10, a scraper blade 12, a pair of side walls 13 and a rear wall 14, the bowl being open at its front end. The side plates 13 are carried at their rear ends on the rear wheels R by connection to the rear axle 15 so that the bowl is pivoted relative to the rear wheels with the axle 16 as the pivot point.

Pivoted at 17 to each side plate 13 is an arm 18 extending forwardly from the pivot and the two arms are connected together by a cross member 19. A pedestal 20 depends from the cross member 19 and is carried by the front wheels F which may be pivoted thereto for steering movement. The members 18, 19 and 20 constitute a frame for connecting the bowl to the front wheels and the entire scraper structure may be pulled by a tractor or the like at the front through the

medium of a tongue 21. The tongue, of course, is connected to the steerable wheels F so as to guide the scraper as it is pulled by the tractor.

For lowering the bowl B to scraping and loading position as shown in Fig. 1, and for raising it to carrying position as shown in Fig. 2, some means must be provided to cause pivotal movement of the bowl B and the frame 18—19—20 in relation to each other. This may comprise a cable arrangement which will now be briefly described and which is fully disclosed in the copending application of Loiell L. Hyler, Serial No. 537,623, filed May 27, 1944. A flexible cable or wire rope 22 extends from a power driven winch on the tractor that pulls the scraper. The tractor and the winch are not shown as they form no part of my invention.

The cable 22 extends around pulleys 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 and 33 and is then anchored to the frame as at 34. All of the pulleys mentioned are carried by the frame with the exception of the pulleys 26, 28, 31 and 33 which are carried by a pair of lifting links 35 pivoted at 36 to the front end of the bowl B. The lifting links 35 also carry rollers 37 adapted to travel on sloping cam plates 38 attached as by welding to the tops of the arms 18.

In Fig. 1 the rollers 37 are shown low on the slopes of the cams and in Fig. 2 they are higher on the slopes, thereby effecting a raising of the front end of the bowl from the position in Fig. 1 to the Fig. 2 position.

Describing now the push beams which constitute my present invention together with their compensating means, the beams are shown at 39. Two of them are provided and they are pivoted intermediate their ends on the rear axle 16, large plate-like washers 40 being welded to the axle to retain them in proper position. Between the beams a spacer sleeve 41 is provided and it is connected by a suitably braced frame plate 42 to the rear wall 14 of the scraper bowl.

Across the rear ends of the beams 39 a push bar 43 is mounted as by welding and suitable gussets 44 reinforce the parts against distortion. The beams 39 and the bar 43 may be of box-like construction formed of steel plates. Adjustably mounted on the push bar 43 is one or more push blocks 45, two being shown in full lines in Fig. 3 as when two bulldozer blades or the like 46 are used to push the scraper.

These blocks may be retained in position by removable pins 47, the push bar 43 having three or more openings 48 to accommodate the pins. By making the push block 45 adjustable in position, a single tractor may be used at different desired or neecssary points along the push bar. These push blocks may have push plates 49 welded thereto to effect a better fit with the bulldozer blade as shown in Figs. 1 and 2.

It is obvious that if the push beams 39 were rigid with respect to the bowl B they would, if level in Fig. 1, tip downwardly at their rear ends when the bowl is raised to the position of Fig. 2. To compensate for this movement, I have found that linkage connections can be provided between the push beams and the frame arms 18. One type of such linkage is illustrated and comprises a rock shaft journaled in the side plates 13 and having rearwardly extending arms 52 and upwardly extending arms 53. These arms may be welded to the rock shaft and assume the approximate positions illustrated in the drawings.

The arms 52 are loosely pivoted to the front ends of the beams 39 as by bolts 54 in enlarged or slotted openings of the elements 39 and 52 and the upwardly extending arms 53 are pivotally connected as at 55 to a pair of links 56. The front ends of the links are pivoted at 57 to downwardly extending arms 58 welded to the frame arms 18. The arms 52 may be located between the bowl sides in alignment with the beams 39 while the arms 53 and 58 and the links 56 are located exterior of the side plates of the bowl. By providing the proper lengths of the arms and positioning them properly, the beams 39 may be kept level throughout the entire range of movement of the bowl B.

The motion for this compensation is derived from the relative motion of the bowl and frame arms 18. For instance as the bowl is raised from the Fig. 1 position, the arms 58 would swing clockwise thus rocking the rock shaft 50 counterclockwise and lowering the front ends of the push beams 39 so that the rear ends of the push beams are thereby raised in relation to the bowl itself. In relation to the ground surface, however, the elevation of the push blocks 45 is maintained substantially constant. This eliminates considerable variation in the elevation of the push block during changes in the position of the bowl, as experienced with push beams solidly welded to the bowl. For instance when the scraper is digging, the push bar would usually be too high for most effective operation and when the bowl is raised for carrying operation, the push block would be too low for most effective contact to be made by the auxiliary pusher or tractor.

To overcome such a discrepancy in the desirable location for the push block under all the various conditions encountered, I provide a compensating arrangement which is very simple to construct and connect up with operating parts of the bowl so as to perform its function automatically without any attention on the part of the operator. The relative throws of the arms determine suitable leverage arrangements that can be utilized to bring about a condition wherein the pusher beam remains constant under all conditions in respect to its elevation above the ground.

Regardless of the operation under which the scraper is functioning, the push beam at its rear end automatically assumes a position for most effective contact by a pusher tractor so that the loading or transporting of the machine through extreme hard going may be had when desired or when operations call for additional power over and above that possible of delivery by a tractor pulling the scraper. Likewise when it is not feasible to have a plurality of tractors in tandem to pull the scraper, one or more tractors may be used to push it and may be quickly connected or disconnected relative to the scraper by driving against the push blocks 45 of disengaging therefrom. This is particularly a convenience where a pusher tractor is desired for loading operations but unnecessary for carrying operations and one pusher tractor may therefore serve several carrier scrapers.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope without sacrificing any of the advantages thereof.

I claim as my invention:

1. An excavator comprising a scraper bowl, wheels for carrying the rear end thereof, wheels

for carrying the front end thereof, a connection from said front wheels to the front end of said scraper bowl comprising a frame mounted at its front end on said front wheels and pivoted at its rear end to said scraper bowl, means for effecting pivotal movement of said frame and bowl relative to each other to lower and raise the scraper bowl, a push beam pivoted relative to said scraper bowl, and means for maintaining the rear end of said push beam at substantially the same elevation in all positions of said bowl comprising a linkage connection extending from said frame to said push beam.

2. In an excavator, a scraper bowl, wheels and a frame for carrying said scraper bowl, said frame being pivoted to said scraper bowl, means for effecting pivotal movement of said frame and bowl relative to each other to lower and raise the bowl for loading and carrying operations, a push beam extending rearwardly from said scraper bowl and pivoted thereto, and means for maintaining the engaged end of said push beam substantially the same height above the ground surface in all positions of said bowl comprising an operative connection between it and said frame.

3. In an excavator, a scraper bowl, wheels and a frame for carrying said scraper bowl, said frame being pivotally related to said scraper bowl, means for effecting pivotal movement of said frame and bowl relative to each other to lower and raise the bowl for loading and carrying operations, a push beam pivoted to said bowl, and an operative connection between said push beam and said frame comprising a pair of bearings, a rock shaft journaled therein to raise and lower the push beam relative to the scraper bowl, said rock shaft being connected with said frame to be rocked thereby as said bowl pivots relative to said frame.

4. In an excavator, a scraper bowl, wheels for carrying the rear end thereof, wheels for carrying the front end thereof, a connection from said front wheels to said scraper bowl comprising a frame mounted at its front end on said front wheels and pivotally related at its rear end to said scraper bowl, means for effecting pivotal movement of said frame and bowl relative to each other to lower the front end of the bowl for scraping and loading operations and to raise it for carrying operations, a push beam extending rearwardly from said scraper bowl, said push beam being pivoted relative thereto, and an operative connection between the front end of said push beam and said frame for maintaining the push beam substantially level in all positions of said bowl, said operative connection comprising a rock shaft to raise and lower the front end of the push beam relative to the scraper bowl, said rock shaft being journaled on said scraper bowl and having an arm to move forwardly and rearwardly, said frame having an arm to move forwardly and rearwardly, and a link connection between said arms.

5. In an excavator, a scraper bowl, wheels for carrying the rear end thereof, wheels for carrying the front end thereof, a connection from said front wheels to the front end of said scraper bowl comprising a frame mounted at its front end on said front wheels and pivoted at its rear end to said scraper bowl, means for effecting pivotal movement of said frame and bowl relative to each other to lower the front end of the bowl for scraping and loading operations and to raise it for carrying operations, a push beam extending rearwardly from said scraper bowl, said push beam being pivoted relative thereto, and an operative connection between said push beam and said frame for maintaining the push beam substantially level in all positions of said bowl.

6. An excavator of the character disclosed comprising a scraper bowl, front and rear wheels for carrying said scraper bowl, means for raising and lowering said scraper comprising a frame connection between said front wheels and said bowl, said frame being pivoted to said bowl, a pair of push beams extending rearwardly from said bowl and pivoted relative thereto, a push bar connecting said push beams together, push blocks adjustable along said push bar, and means connecting said push beams to said frame for pivoting them relative to said bowl as said frame pivots relative thereto.

7. An excavator of the character disclosed comprising a scraper bowl, wheels for carrying said scraper bowl, said scraper bowl having a scraper blade, means for raising and lowering said scraper bowl and said blade comprising a frame connection betwen certain of said wheels and said bowl, said frame being movable relative to said bowl, a pair of push beams extending rearwardly from said bowl and pivoted relative thereto, an interconnection betwen said push beams and said frame for moving them simultaneously relative to said bowl, a push bar connecting said push beams together and a push block adjustable on said push bar.

8. In an excavator, a scraper bowl, front and rear wheels for carrying said scraper bowl, means for raising and lowering said scraper bowl comprising a frame connection between the front wheels and said bowl, said frame and bowl, being relatively movable, a pair of push beams extending rearwardly from said bowl and pivoted on the axle of said rear wheels, an operative connection between said frame and said push beams for pivoting said arms simultaneously with the relative movement of said frame and bowl, a push bar connecting said push beams together and a plurality of push blocks detachably connected to said push bar.

9. In an excavator structure, front and rear wheels, a scraper bowl pivoted on said rear wheels, a frame pivoted to said scraper bowl and mounted on said front wheels whereby a portion thereof intermediate said front wheels may be raised and lowered, means for effecting such raising and lowering by pivoting said frame relative to said bowl, push means pivoted to said bowl and extending rearwardly to a position back of said rear wheels, a push bar connected therewith and adapted to be engaged at various points along its length by a vehicle to push the scraper bowl, push blocks adjustable along said push bar to be engaged by the pushing vehicle, a rock shaft between said frame and said push means, said rock shaft being journaled in said scraper bowl and having arms, pivotal connection between some of said arms and the front ends of said push means, said frame having arms extending from the pivotal connections thereof to said scraper bowl, and link connections between said other arms of said rock shaft and said arms of said frame.

10. An excavator structure comprising front and rear wheels, a scraper bowl pivoted on said rear wheels, a frame in pivotal relation to said scraper bowl and mounted on said front wheels whereby said bowl may be raised and lowered, push means pivoted to said bowl and extending rearwardly to a position back of said wheels, said

push means including a push bar adapted to be engaged at various points along its length by one or more vehicles to push said scraper bowl, push blocks adjustable along said push bar to be engaged by the pushing vehicles, a rock shaft journaled in the sides of said scraper bowl, and arm and link connection from said rock shaft to said push means and said frame.

11. In an excavator structure, front and rear wheels, a scraper bowl and a frame pivoted together and mounted on said wheels whereby a portion of said bowl may be raised and lowered, a push beam pivoted to said bowl and extending rearwardly to a position back of said wheels, and a linkage connection between said push beams and said frame for maintaining the rear ends of said push beams at substantially the same elevation in all relative positions of said bowl and frame.

12. An excavator structure comprising front and rear wheels, a scraper bowl pivoted on said rear wheels, a frame, said scraper bowl and frame being relatively movable and said frame being mounted on said front wheels whereby said bowl may be raised and lowered, push means pivotally related to said bowl and extending rearwardly to a position back of said rear wheels, said push means including a push bar adapted to be engaged at various points along its length by one or more vehicles to push said scraper bowl, and push blocks adjustable along said push bar to be engaged by the pushing vehicles and means for holding said push beams in operative position comprising an interconnection between them and said frame for moving said beam simultaneously with relative movement of said bowl and frame.

13. An excavator of the character disclosed, comprising a scraper bowl, front and rear wheels for carrying said scraper bowl, means for raising and lowering said scraper bowl comprising a frame connection between said front wheels and said bowl, a pair of push beams extending rearwardly from said bowl, a push bar connecting said push beams together, and push blocks adjustable along said push bar.

14. In an excavator structure, front and rear wheels, a scraper bowl carried thereby, a frame pivotally related to said scraper bowl and mounted on said front wheels whereby the digging portion of said scraper bowl intermediate said front and rear wheels may be raised and lowered, means for effecting such raising and lowering by movement of said frame relative to said bowl, push means pivoted to said bowl and extending rearwardly to a position back of said rear wheels, a push bar connected to said push beams and adapted to be engaged by a vehicle to push the scraper bowl, a push block adjustable along said push bar to be engaged by the pushing vehicle, and a link connection between said frame and said push beams to raise said push beams relative to said bowl as the bowl is raised.

15. In an excavator, a scraper bowl, front and rear wheels for carrying said scraper bowl, means for raising and lowering said scraper bowl comprising a frame connection between said front wheels and said bowl, a pair of push beams extending rearwardly from said bowl, a push bar connecting said beams together and a plurality of push blocks detachably connected to said push bar.

16. An excavator comprising a scraper bowl, wheels for carrying the rear end thereof, wheels for carrying the front end thereof, a connection from said front wheels to the front end of said scraper bowl comprising a frame mounted at its front on said front wheels and pivoted at its rear end relative to said scraper bowl, means for effecting pivotal movement of said frame and scraper bowl relative to each other to lower and raise the scraper bowl, a push beam pivoted relative to said scraper bowl, and means comprising an operative connection from said frame to said push beam for maintaining the rear end of said push beam at substantially the same elevation in all positions of said bowl.

17. An excavator of the character disclosed comprising a scraper bowl, front and rear wheels for carrying said scraper bowl, means for raising and lowering said scraper bowl comprising a frame connection movable relative to said bowl, a pair of push beams extending rearwardly from said bowl and pivoted relative thereto, a push bar connecting the rear ends of said push beams and an operative connection from said frame to said push beams for effecting a substantially equal elevation of said push bar in all positions of elevation of said scraper bowl.

18. In an excavator structure, front and rear wheels, a scraper bowl and a frame pivoted together and mounted on said wheels whereby a portion of said bowl may be raised and lowered, a push beam pivoted to said bowl and extending rearwardly to a position back of said rear wheels, and an operative connection between said push beam and said frame for effecting a substantially equal elevation of said rear end of said push beam in all positions of the scraper bowl.

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