

Feb. 7, 1967

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3,302,316

SCRAPER BOWL FOR EARTH MOVING EQUIPMENT

Filed Jan. 30, 1964

3 Sheets-Sheet 1

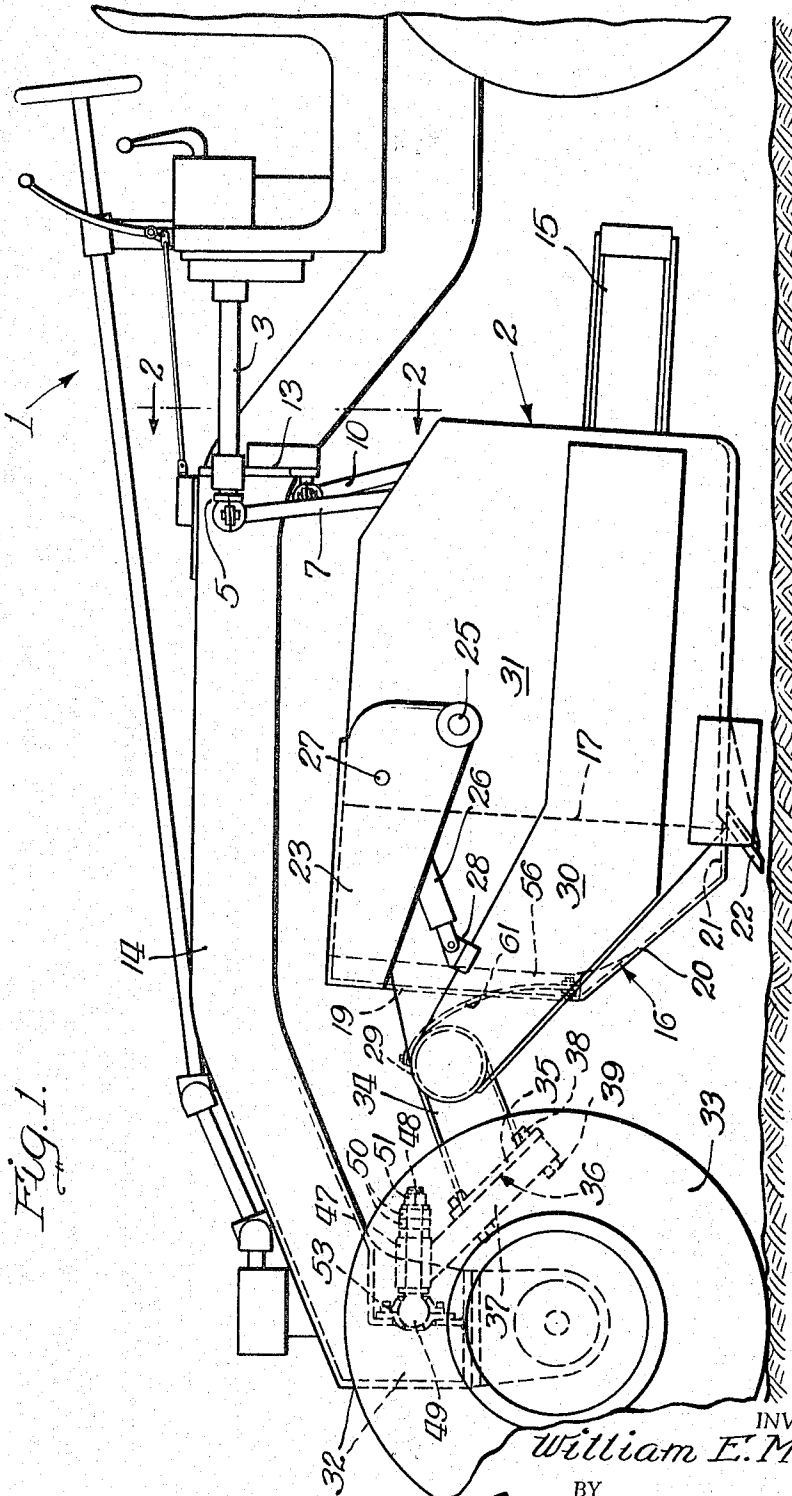


Fig. 1.

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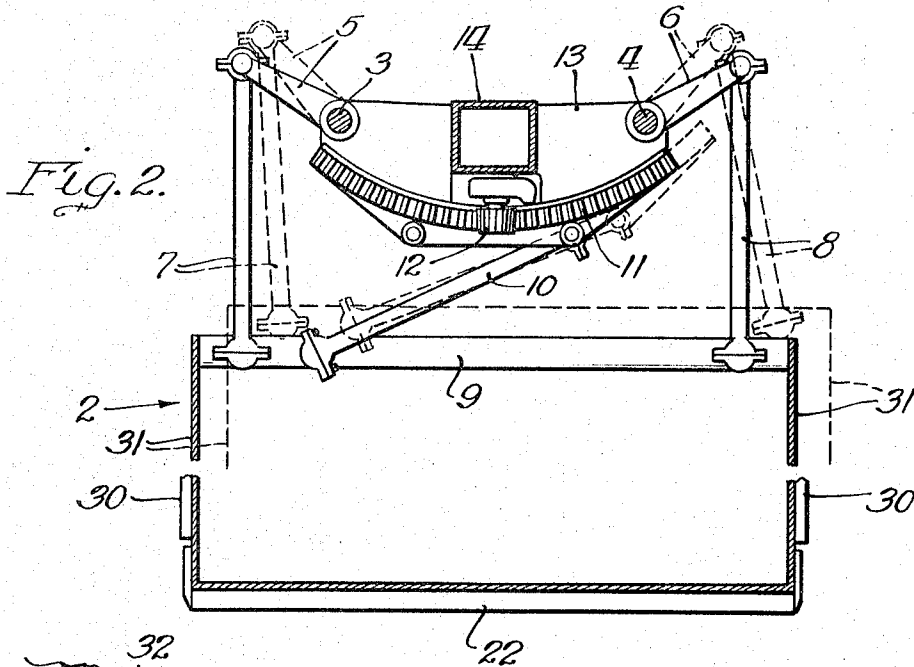
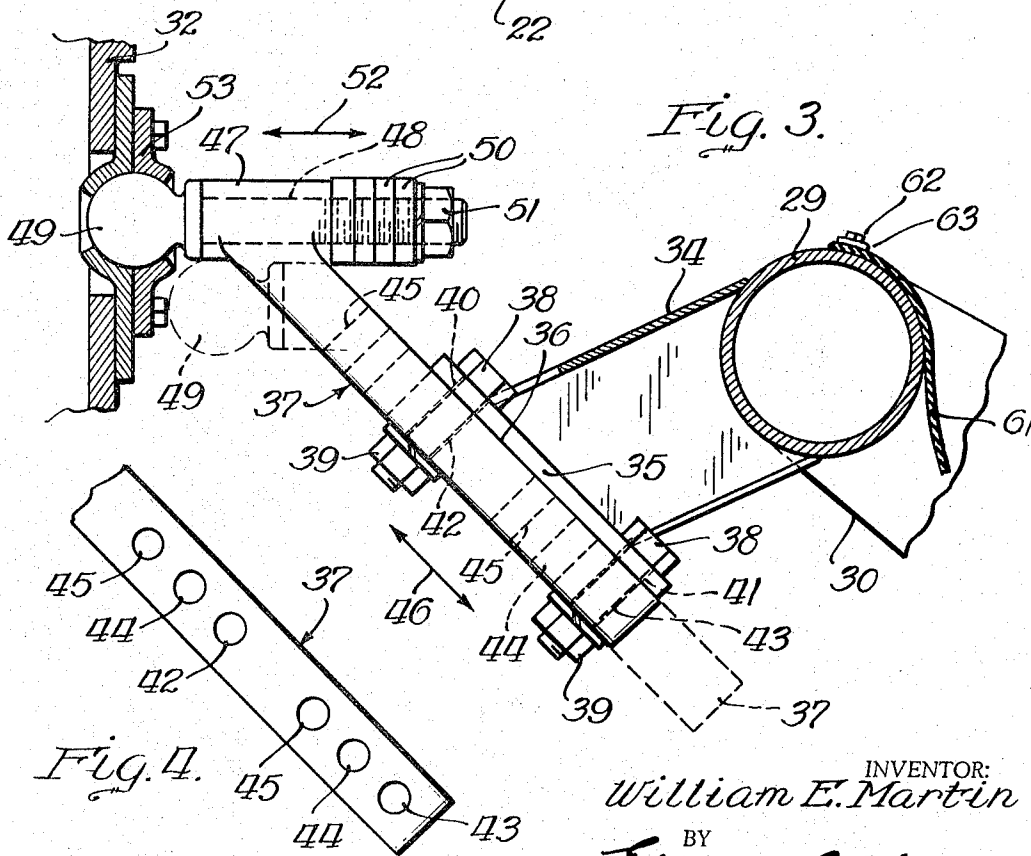
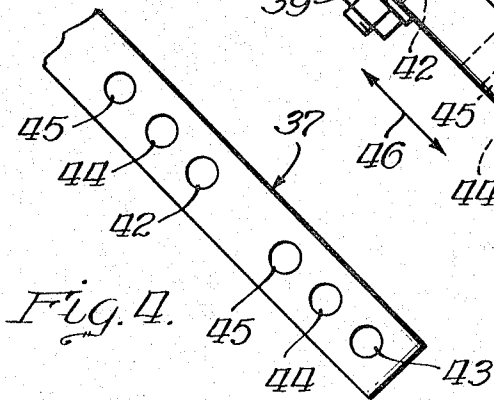
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SCRAPER BOWL FOR EARTH MOVING EQUIPMENT

Filed Jan. 30, 1964

3 Sheets-Sheet 2



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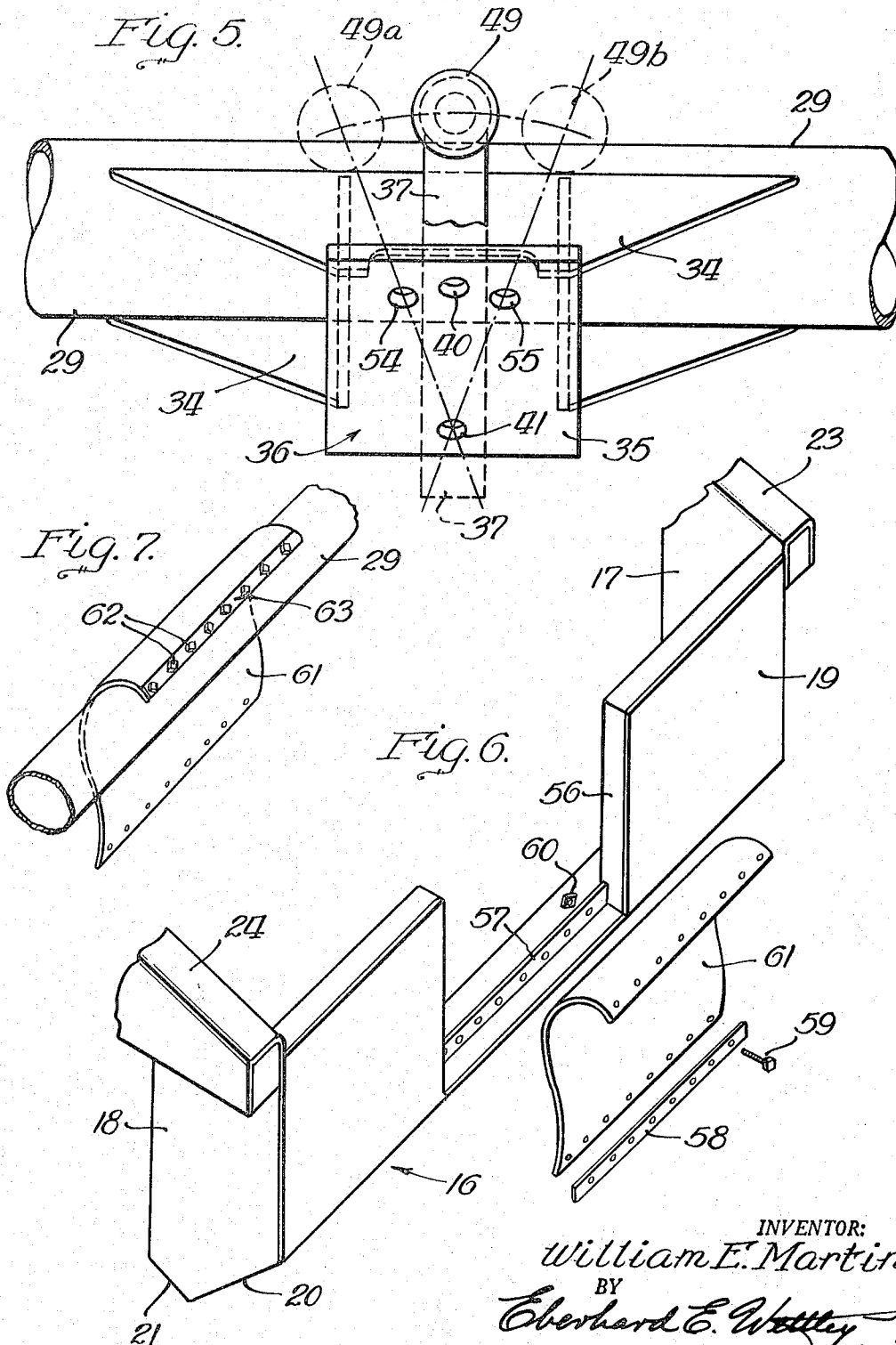
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SCRAPER BOWL FOR EARTH MOVING EQUIPMENT

Filed Jan. 30, 1964

3 Sheets-Sheet 3



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3,302,316 SCRAPER BOWL FOR EARTH MOVING EQUIPMENT

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Filed Jan. 30, 1964, Ser. No. 341,332
12 Claims. (Cl. 37—124)

This invention relates to a scraper bowl construction adapted for connection with a structural part of a motorgrader and for manipulation by said motorgrader power mechanism.

More specifically, the invention is directed to the ball and socket support and suspension arrangements associated with the scraper bowl for the manipulation of such a bowl to accommodate the bowl to various conditions of operation during the earth moving functions thereof.

One of the objects of this invention is to provide a scraper bowl having a gooseneck hitch adapted for towing connection with a structural part of a motorgrader, for example, such as the frame thereof, and wherein adjustable universal mechanism is interposed between the motorgrader frame and the scraper bowl to provide means for the relative adjustment of the bowl hitch with respect to the frame mentioned.

Another object is to establish an adjustable apparatus for the hitch of the scraper bowl at the towing or blade end of the bowl whereby such apparatus is adapted to change the elevation of the supported towing end of the bowl both vertically and horizontally in relation to the operative path of travel of the bowl and with respect to the motorgrader frame.

A still further object is to incorporate a shiftable means into the adjustable apparatus to permit lateral displacement of the adjacent end of the bowl in relation to the point of support on the motorgrader frame structure, so that the front end of the bowl may be displaced bodily laterally with respect to the longitudinal median plane of the motorgrader whenever earth working conditions require that such a shift be made of the open earth working end of the bowl.

Another object is to provide earth or road material retaining means at the forward end of the bowl in the notched portion of the movable hood means at the bowl mouth to counteract material discharge from the bowl and in the direction of the adjustable supporting means of the bowl hitch arrangement.

As a further object the adjustable support means include an adjustable ball and socket attachment unit between the hitch or towing member of the bowl and the grader frame, whereby the fore and aft position of the adjustable support means may be bodily changed in relation to the ball and socket location on the grader frame thus changing the forward bowl end location in respect to the ball and socket location.

Other objects and advantages relating to the scraper bowl of the present invention shall hereinafter appear in or become evident from the following detailed description having reference to the accompanying drawings forming a part of this specification.

In the drawings:

FIG. 1 is a fragmentary side elevational view of a motorgrader to which is connected the scraper bowl of the present invention;

FIG. 2 is a diagrammatic fragmentary rear sectional view of the support means of the motorgrader as seen on line 2—2 in FIG. 1 and as such means are employed to carry and manipulate the rear portion of the scraper bowl;

FIG. 3 is an enlarged fragmentary view in side elevation with portions shown in section to illustrate the hitch mechanism of the scraper bowl and the adjustable

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means associated with this ball and socket arrangement on the bowl;

FIG. 4 is a fragmentary face view of the draw bar element of the hitch mechanism;

FIG. 5 is a front view of bracket element employed in cooperation with the draw bar element of the hitch mechanism;

FIG. 6 is a diagrammatic expanded perspective view of the hood unit for the open forward end of the scraper bowl with a flexible closure apron associated therewith; and

FIG. 7 is another detailed perspective view to illustrate the attachment of a flexible closure apron to the transverse hitch member of the bowl hitch mechanism.

A conventional motorgrader 1 is shown in FIG. 1 for the support and manipulation of an attachable scraper bowl 2 of the present invention. The rear portion of the bowl can be raised or lowered as a unit or either side can be independently raised or lowered as needed, while the rear portion may also be laterally shifted as needed by the means illustrated in FIG. 2. Power driven rock shafts 3 and 4 carry cranks 5 and 6 and links 7 and 8 are universally connected with the cranks and with a cross channel 9 on the bowl 2. A third link 10 is universally connected with a movable rack 11 and with channel 9 to be driven by a pinion 12 that actuates the rack 11, this mechanism being supported on a bracket 13 secured to the main frame 14 of the grader 1.

The scraper bowl includes hydraulic means 15 to actuate a blade within the bowl and a swingable hood 16 is used to open or close the front end of the bowl 2. The hood 16 has side wings 17 and 18 with front wall portions 19, 20 and 21 with the latter wall abutting the bowl blade 22 with the hood closed. Side arm units 23 and 24 in FIGS. 1 and 6 are pivoted on the bowl, one pivot 25 being shown in FIG. 1. Hydraulic cylinders 26 are connected with each arm unit as at 27 and with the bowl 2 at 28 to swing the hood 16 up or down.

A tubular bowl hitch 29 is connected with structural side arms such as 30 that are connected to the lateral sides 31 of the bowl and hitch 29 extends transversely across the bowl 2 and spaced outwardly forwardly thereof and with respect to the bowl hood 16.

A hitch mechanism is connected between the bowl tube 29 and frame 14 extension 32 to provide for the universal support of the forward portion of the bowl 2 and which incorporates adjustable means to selectively change the relation of the forward portion of the bowl with respect to the grader frame extension 32 and with respect to the wheels 33 at the forward end of the motorgrader.

The hitch mechanism comprises a bracket 34 fixed to the bowl tube 29 and carrying a plate 35 that provides an inclined surface 36 that slopes forwardly upwardly as shown in FIGS. 1 and 3. A draw bar 37 is provided with a flat side to abut the surface 36 of plate 35, while at least two fastening means secure these two members 35 and 37 rigidly together. The fastening means here used are the bolts and nuts 38 and 39 that pass through spaced apertures 40 and 41 in the plate and 42 and 43 in the draw bar 37.

As shown in FIG. 4, additional sets of apertures such as 44—44 and 45—45 are provided in the draw bar 37 so that the plate 35 and draw bar 37 may be adjusted relatively with respect to each other along the inclined surface 36 of plate 35 and in the direction of the direction symbol 46.

In this respect it should be observed that the slope of surface 36 is selected at forty-five degrees and when parts 35 and 37 are adjusted with respect to each other, the bowl is simultaneously moved vertically and longitudinally.

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The upper outer end of the draw bar 37 terminates with a generally horizontally arranged sleeve 47 which accommodates the threaded stem 48 of a hitch ball 49. A plurality of spacers 50 are provided between the sleeve 47 and the securing nut 51 on the ball stem 48 so that it is feasible to adjust the position of the ball horizontally with respect to the sleeve in the direction of the arrow 52. This is done by switching one or more spacers 50 from the rear end of sleeve 47 and placing them between the ball 49 and the forward end of the sleeve.

The ball 49 is rockably carried in a suitable socket 53 mounted on the frame end 32 of frame 14 to permit the bowl to have universal motion freedom at the hitching end thereof. This freedom of motion also allows the FIG. 2 suspension link structures to manipulate the bowl without interference.

There are times when it is desirable to shift the forward end of the bowl bodily laterally with respect to the centerline of the grader. This may be selectively accomplished with the additional laterally placed apertures 54 and 55 shown in plate 35 in FIG. 5. In this case one bolt 38 in hole 41 may be used as a fulcrum to move the draw bar 37 out of vertical alignment with apertures 40 and 41 to shift the ball 49 to either of the two positions 49a or 49b and securing the draw bar with a bolt 38 through either of the apertures 54 or 55 as the case may be. By tightening the draw bar 37 with bolts 38 and nuts 39 in the selected shifted relation, the draw bar and plate are rigidly joined and the front bowl end will be laterally displaced either from the ball 49 position in FIG. 5 to position 49a or to position 49b. Bar 37 is still capable of endwise adjustment along either of the diagonal center lines indicated from hole 41 to 49a or to 49b.

With the bowl 2, the hood 16 is provided with a central clearance notch 56 to prevent contact with frame 14 when the hood is raised. With this forward notch, it is possible to lose some of the bowl material and some of this material will move into the hitch mechanism described. To counteract this material movement out of the bowl, the hood has a perforated flange 57 and a perforated strap 58 to accept bolts 59 for nuts 60 to sandwich one end of a flexible tough rubber closure apron 61 therebetween as will be evident from FIG. 6. This apron rides in the notch 56 vertically and the other upper end thereof is secured to the bowl tube 29 with suitable bolts 62 and a strap member 63. With the hood lowered, the notch 56 in hood 16 is well guarded by apron 61 and little, if any, of the bowl load can move through the notch so that the apron serves to protect the hitching mechanism and its adjustable arrangement as hereinbefore described.

The foregoing description relates to a preferred construction of a scraper bowl of the present invention. Other combinations and substitution of elements are possible without departure from the fundamental concept herein disclosed. Modifications are contemplated which should not be limited excepting by the breadth and scope of the subject matter contained in the appended claims directed to the earth moving scraper bowl of this invention.

What I claim is:

1. In an earth moving scraper for a motorgrader comprising, in combination, a bowl, a structural member on said motorgrader extending over said bowl, support means mounted on said structural member and connected with the bowl, a hitch on the bowl, and adjustable mechanism interposed between the hitch and said structural member comprising relatively movable cooperative support elements, one element being on said hitch and the other element being on said member, together with releasable adjustable attachment means to fixedly secure said relatively movable elements in a rigid selected relation with respect to each other, said adjustable mechanism being provided with a ball and socket unit con-

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nected between said member and said other element respectively to permit universal movement of said hitch in relation to said structural member, said socket of the unit being mounted on said member and said ball being mounted on said other element, and adjustable mechanism is provided for said ball mounting to vary the location of the ball in relation to said other element.

2. In an earth moving scraper, in combination, a frame, a bowl, support means on said frame connected with said bowl to carry one portion of said bowl, and a hitch mechanism connected with said bowl and with said frame to support another portion of said bowl, said hitch mechanism providing the bowl towing means and comprising a bracket connected with said bowl terminating with an inclined surface, a draw bar mounted adjacent to the inclined surface of said bracket and extending toward the frame, a ball connected with said draw bar, a socket on said frame to receive said ball, and adjustable attachment means to mount the draw bar in a given adjusted relation with respect to the inclined surface of said bracket whereby the hitch end of said bowl may be selectively positioned in relation to the ball and socket means and with respect to said frame.

3. The combination of claim 2 wherein said adjustable attachment means comprises a plurality of apertures in the inclined surface of said bracket, a plurality of apertures in said draw bar and fastening means for matching pairs of said apertures.

4. The combination of claim 3 wherein certain of said inclined surface apertures are located along a given line and the draw bar apertures are aligned so that endwise adjustment of the draw bar is permissible in a linear direction, and wherein said inclined surface includes certain apertures disposed to either side of the aligned apertures whereby one of the fastening means can connect the draw bar with one of the aligned apertures in the inclined surface while another of said fastening means can connect another portion of said draw bar through one of the laterally positioned apertures of said inclined surface to thus shift the bowl into a lateral working position in relation to the ball and socket unit on said frame.

5. In the combination of claim 2 wherein said inclined surface of said bracket slopes upwardly and forwardly in relation to the direction of bowl travel whereby the draw bar is adjustable to said bracket in an upwardly and forwardly direction or in a rearwardly and downwardly direction.

6. In the combination of claim 2 wherein the inclined surface of said bracket is on a forty-five degree slope disposed transversely of the bowl so that relative adjustments between the bracket and the draw bar will adjust the bowl simultaneously vertically and longitudinally.

7. In the combination of claim 2 with the addition of adjustable mounting means to connect said ball with said draw bar comprising a sleeve on said draw bar, a stem with a threaded end on said ball to fit through said sleeve, spacers on said stem selectively movable from one side to the other of said sleeve to endwise shift the ball and stem in a given relation to said sleeve, and a nut for said stem to secure the ball, stem and spacers in fixed relation with respect to said sleeve.

8. A scraper for a mobile wheeled motorgrader comprising a motor grader frame, wheels supporting the forward end of said frame, an earth moving bowl disposed to the rear of and adjacent the forward wheels, power operated link means connected to freely suspend the rear portion of said bowl and to regulate the position of said bowl in relation to the frame and ground, and a hitch mechanism connected with the forward portion of the bowl and with the frame adjacent said front wheels comprising a socket on said frame, a draw bar, a ball on said draw bar to ride in said socket, a bracket on said bowl providing an inclined plate disposed forwardly and upwardly, said draw bar having a flat side thereon to abut said inclined plate, and selective multiple fastening means

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connecting said draw bar and plate whereby to regulate the position of the forward portion of said grader bowl in relation to the exterior peripheries of different sized forward wheels of said motorgrader to thus dispose said bowl in operative working relation with respect to the ground.

9. In a scraper for a mobile wheeled motorgrader as in claim 8, wherein said bowl is provided with a swingable closure hood at its forward end with a notched portion in said hood disposed in line with said hitch mechanism, said notched hood providing a clearance facility to avoid hood contact with the motorgrader frame when the hood is raised, and said bowl includes a transverse towing member disposed beyond the hood location to support the hitch mechanism away from the hood location, and wherein a flexible closure apron is connected at the bottom of the hood notch to extend through said notch and to connect with said transverse towing member to counteract movement of bowl material through said notch toward said hitch mechanism when the hood is closed.

10. In a scraper for a motorgrader comprising a grader frame, an earth moving bowl having a transverse hitch member located forwardly beyond the bowl, link means to support said bowl from said frame and a hitching mechanism with a draw bar to connect the transverse hitch member with said frame, a vertically swingable hood to open and close the forward end of said bowl adjacent said hitching mechanism, said hood having an upwardly open notch centrally thereof, and a flexible closure apron for said hood notch connected with the hood at the notch bottom and connected at its other end with said transverse hitching member to normally retain bowl loaded material within said bowl and out of possible contact with the hitching mechanism of the bowl.

11. In an earth moving scraper for a motorgrader comprising, in combination, a scraper bowl, a structural mem-

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ber on said motorgrader, support means mounted on said structural member and connected with said bowl, a hitch on said bowl and further bowl support means having co-acting universal coupling members mounted in a given fixed operative relation upon said structural member including adjustable positioning mechanism interposed between said coupling members and the hitch of said bowl, said adjustable positioning mechanism comprising cooperative bowl supporting bracket elements, one of said bracket elements being connected with one of said coupling members and the other of said bracket elements being connected with said bowl hitch and releasable attachment means are provided to fixedly secure the aforesaid bracket elements together in a given selected relation with respect to each other to suspend the connected bowl in a predetermined adjusted but freely swingable relation to said structural member from said coupling members.

12. In the combination set forth and defined in claim 11 wherein said universal coupling members comprise ball and socket units carried upon said structural member and on said one bracket element respectively to permit universal motion of said connected bracket elements and the bowl about the fixed point of connection of said coupling members upon said structural member.

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