

Dec. 8, 1942.

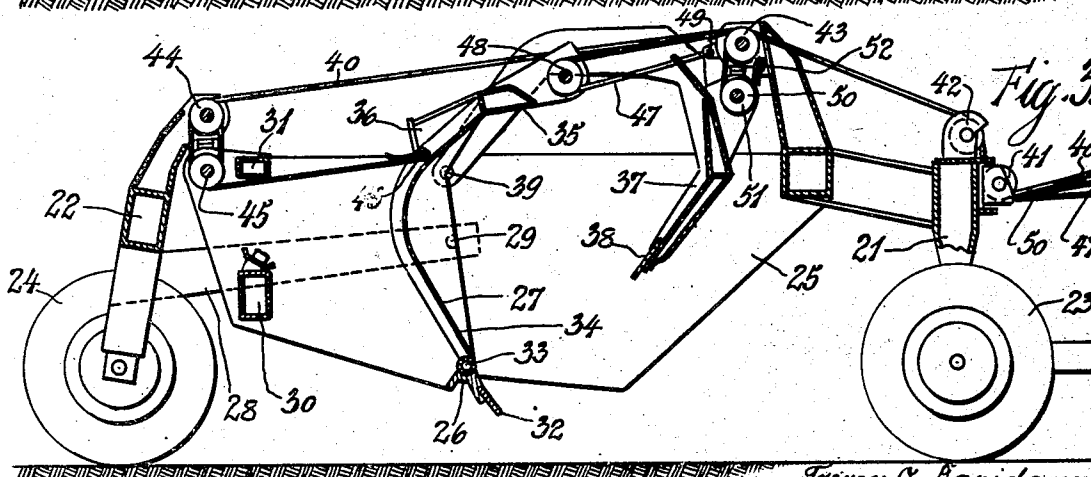
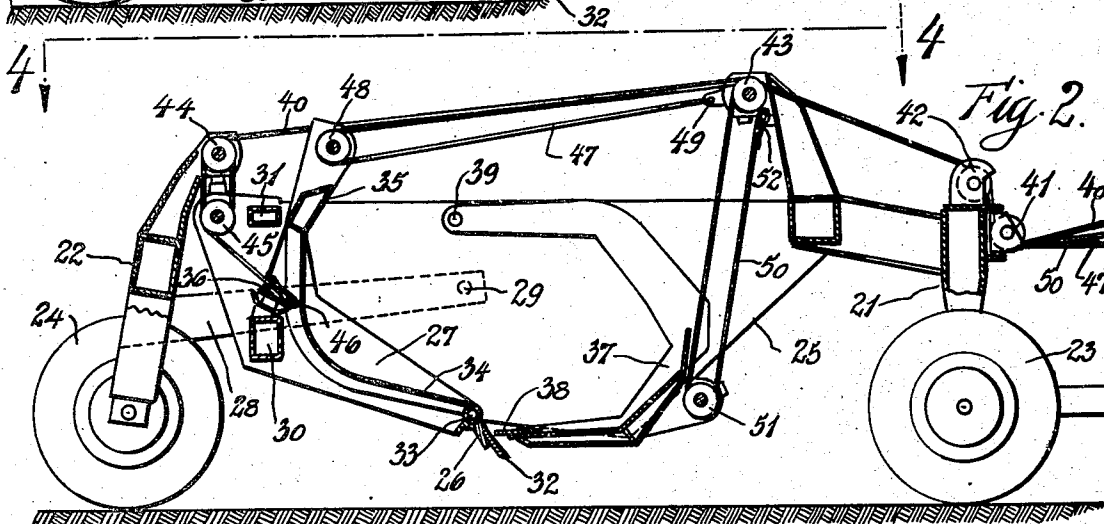
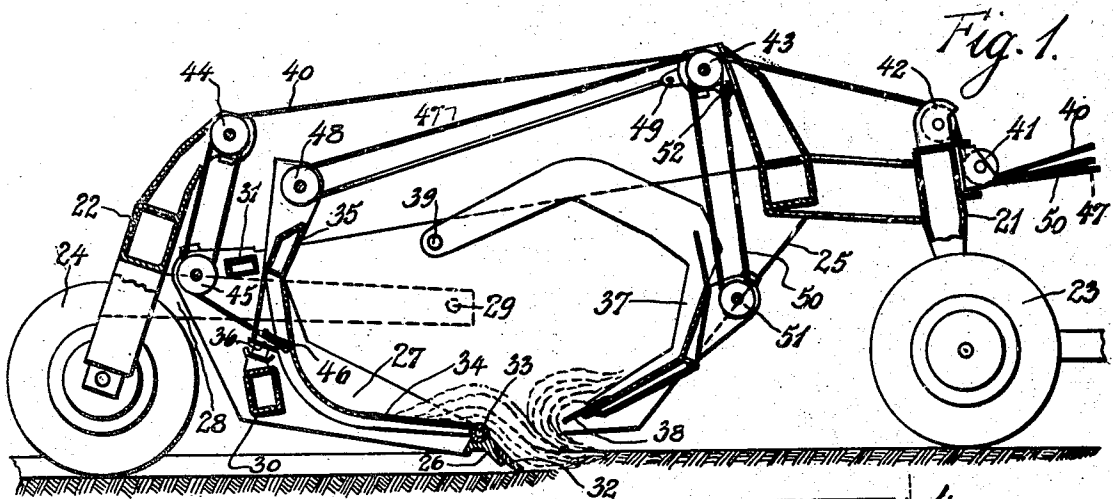
T. O. DAVIDSON ET AL

2,304,076

WHEELED SCRAPER

Filed Nov. 9, 1940

4 Sheets-Sheet 1



Trevor O. Davidson.
Roger Sherman Hoar.
INVENTORS.

Hoar & Ruhloff
ATTORNEYS.

Dec. 8, 1942.

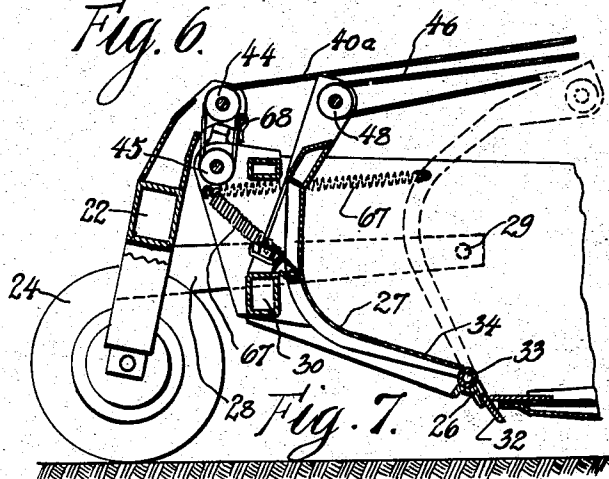
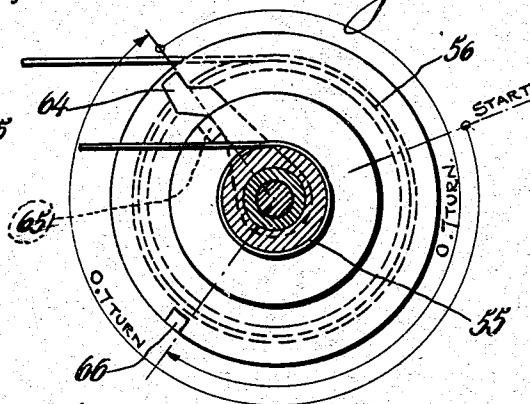
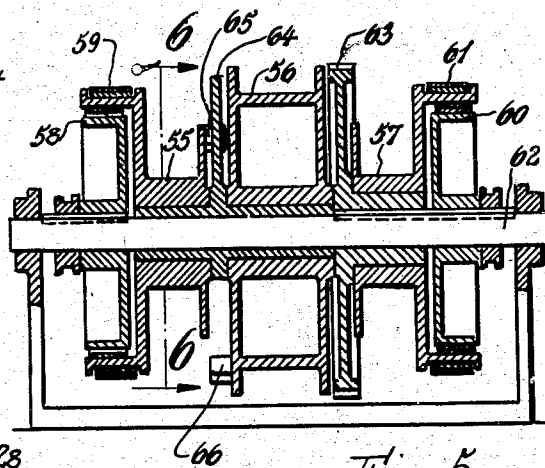
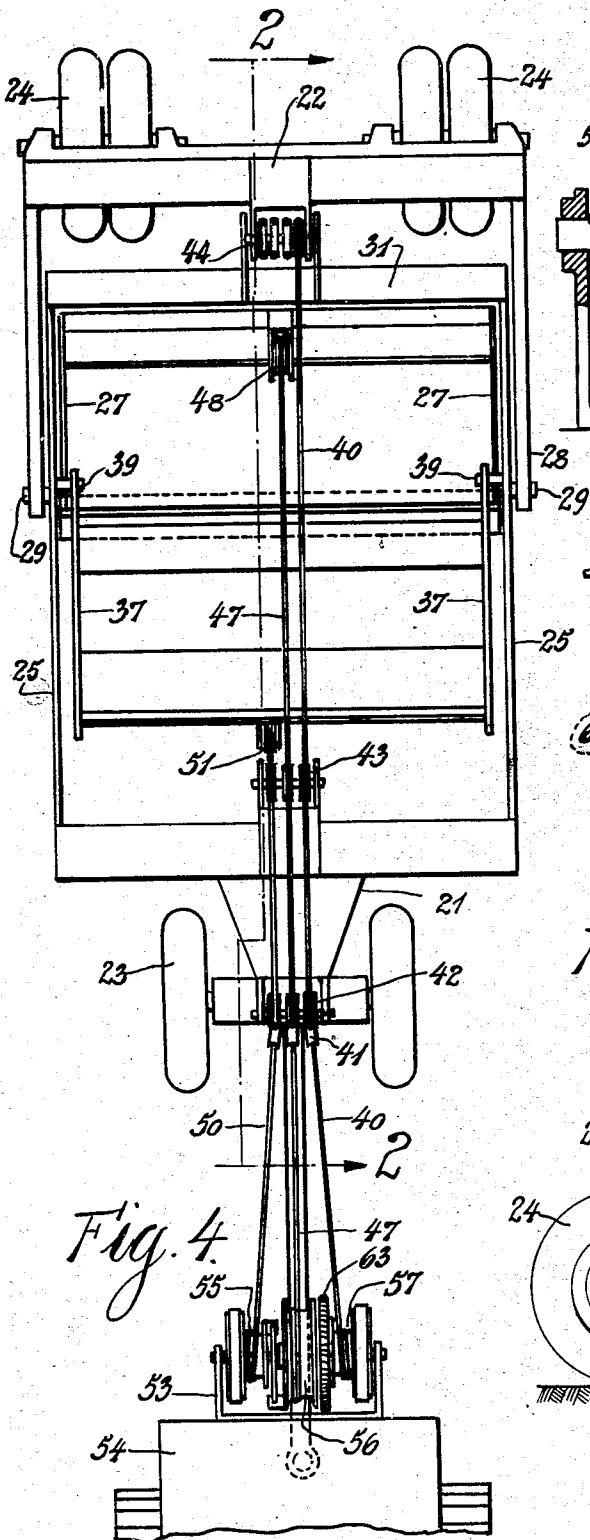
T. O. DAVIDSON ET AL

2,304,076

WHEELED SCRAPER

Filed Nov. 9, 1940

4 Sheets-Sheet 2



Trevor O. Davidson.
Roger Sherman Hoar.
INVENTORS.

Hoar & Ruhloff
ATTORNEYS.

Dec. 8, 1942.

T. O. DAVIDSON ET AL

2,304,076

WHEELED SCRAPER

Filed Nov. 9, 1940

4 Sheets-Sheet 3

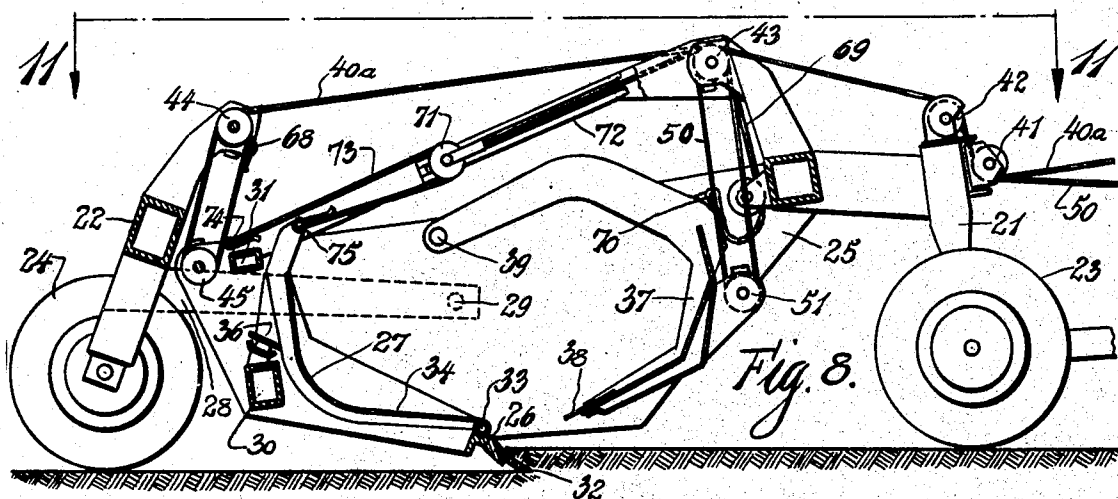


Fig. 8.

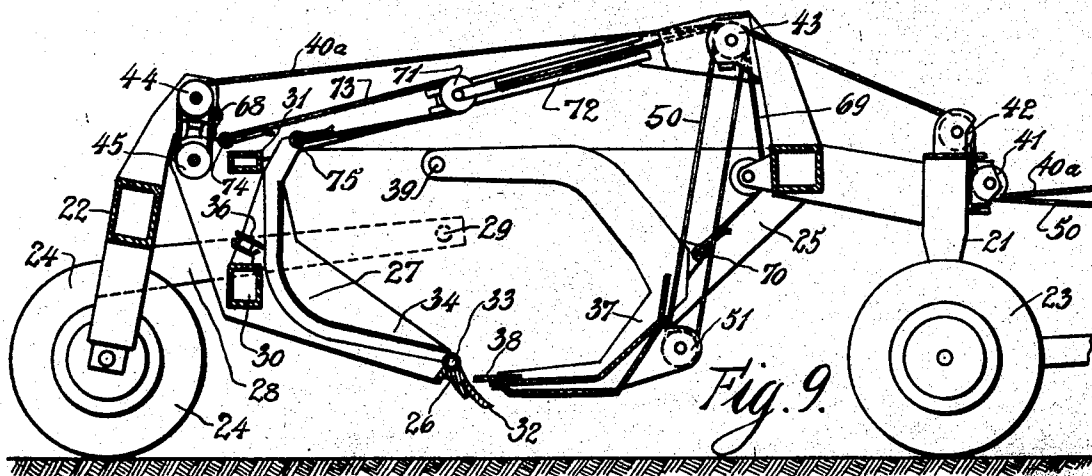


Fig. 9.

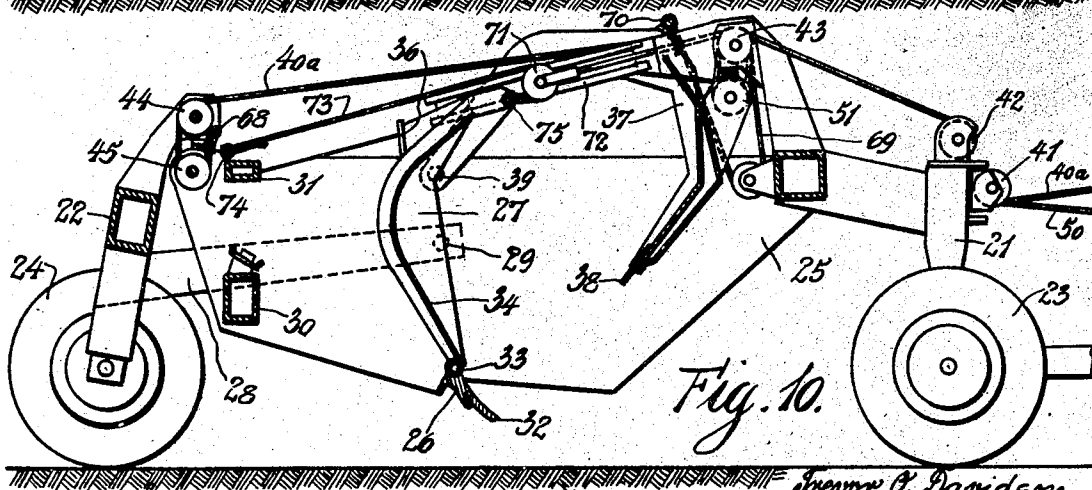


Fig. 10.

Trevor O. Davidson
Roger Sherman Hoar
INVENTORS

Hoar & Ruhlhoff
ATTORNEYS.

Dec. 8, 1942.

T. O. DAVIDSON ET AL

2,304,076

WHEELED SCRAPER

Filed Nov. 9, 1940

4 Sheets-Sheet 4

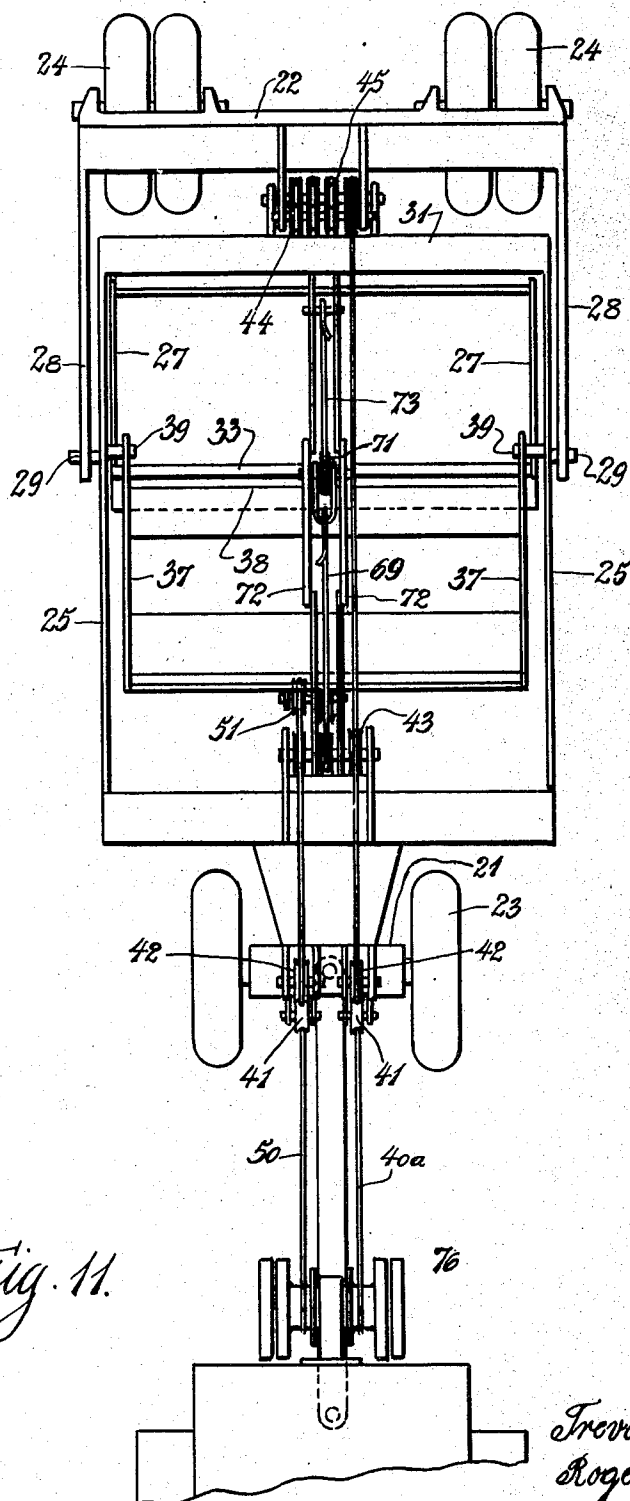


Fig. 11.

Trevor O. Davidson.
Roger Sherman Hoar
INVENTORS.
Hoar & Ruhloff
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,304,076

WHEELED SCRAPER

Trevor O. Davidson, Milwaukee, and Roger Sherman Hoar, South Milwaukee, Wis., assignors to Bucyrus-Erie Company, South Milwaukee, Wis., a corporation of Delaware

Application November 9, 1940, Serial No. 364,980

13 Claims. (Cl. 37-126)

Our invention relates to new and useful improvements in wheeled scrapers of the general type shown and described in U. S. Patent No. 2,152,899, granted April 4, 1939, to Earl B. Maloon, to which patent reference is hereby made, inasmuch as this present invention represents an improvement thereon.

In scrapers of that type, the bowl fills and dumps at its front end.

The main frame of such a scraper is pivoted at either its front end or rear end to a wheeled truck, and the digging and spreading depth is determined by raising or lowering the other end with respect to a second truck. This is the first operating function.

In Maloon and this present invention, the pivoting is at the front end, and the raising and lowering takes place at the rear end; but this, although very advantageous, is not essential.

The digging blade is carried rigid with the main frame, though this is not essential.

Adjacent the digging blade is pivoted a dirt-extruding curved member, variously termed. For conformity with the nomenclature of the Maloon patent, it will here be called a "bowl." Swinging this bowl upward to dump is the second function. Returning it to load-carrying position is the third function.

There is also a front closure, known as the "apron." Opening this apron (when digging or dumping), and closing it again for carrying, is the fourth function.

Maloon has two controls (ropes), one of which performs the first function (namely depth-control), and the other of which successively performs the fourth function (apron opening) and the second function (dumping). For the third function (bowl return), Maloon depends on gravity, although in another patent (No. 2,198,916, granted April 30, 1940) he performs this function by a kick-back cam, actuated by the fall of the apron.

It is the principal object of our present invention to employ two controls, one of which performs the first function (depth control), and the other of which performs the fourth function (apron opening). A lag interlock between apron opening and the second function (dumping) performs this second function.

A further object is to devise alternative novel means to perform the third function (bowl return) by some constant tension means (such as the dead end of the first listed control, or a spring), so contrived as to initiate the bowl re-

turn forcefully, without however materially opposing dumping.

In addition to our principal objects, above stated, we have worked out a number of novel and useful details, which will be readily evident as the description progresses.

Our invention consists in the novel parts and in the combination and arrangement thereof, which are defined in the appended claims, and of which three embodiments are exemplified in the accompanying drawings, which are hereinafter particularly described and explained.

Throughout the description, the same reference number is applied to the same member or to similar members.

Figures 1, 2 and 3 are vertical longitudinal sections of one form of our scraper, in digging, carrying, and dumping positions respectively, but without showing the winch.

Figure 4 is a plan view of this variant, taken along the lines 4-4 of Figure 2, and including the winch which controls three of the functions.

Figure 5 is an enlarged plan view of the winch per se, more in detail.

Figure 6 is a side elevation of this winch.

Figure 7 is a vertical longitudinal section corresponding to a portion of Figure 2, but showing alternative bowl return means, and showing dotted the same in a position corresponding to Figure 3.

Figures 8, 9 and 10 are vertical longitudinal sections of a second form of our scraper, in digging, carrying, and dumping positions respectively.

Figure 11 is a plan view of this variant, taken along the lines 11-11 of Figure 8.

Referring now to Figures 1 to 4, we see that the implement to which we have applied our invention, includes a forward truck 21, and a rear truck 22, supported respectively on two forward wheels 23, and four rear wheels 24. The forward truck 21 is rigidly secured to two side plates 25, preferably having substantially the outline indicated in Figure 2. In place of either such truck, we could support one end of the scraper on the propelling vehicle, such support then constituting one of the ground supports mentioned in our claims.

These parts constitute parts of the frame of the implement, and in accordance with the invention they are connected together in such a way as to enable the shoe 26, which is located forward of the bowl 27, to be raised or lowered at will with respect to the ground level. In order to accomplish this, the rear truck 22 is

preferably provided with rigid forwardly projecting side arms 28 that extend forwardly to a point about midway between the two trucks, at which point the arms 28 are connected by pivot bolts or pins 29 to the side plates.

Rigidly secured to the side plates 25, we provide a transverse lower beam 30, and an upper beam 31, which latter beam may if desired be made of lighter construction than the lower beam. The shoe 26 is preferably rigidly secured at its ends to the side plates 25, and preferably includes an inclined blade 32 that cuts into the earth when the bowl 27 is being filled. Adjacent the shoe and preferably at its rear edge, the bowl 27 is pivotally mounted on a transverse pivot bar 33. When, in the claims, we state that the digging blade is carried by the main frame, we do not intend to limit this to direct carriage. The blade might, for example, be carried by the bowl forward of its pivot, without departing from the spirit of our invention.

The rear end of the bottom plate 34 of the bowl 27 is preferably bent upwardly to form an integral dished rear head 35 for the bowl.

When the bowl 27 is in the position of rest as indicated in Figures 1 and 2, the stop bracket 36, carried by the rear end of the bowl, rests against the upper side of the lower beam 30, and this limits the downward movement of the rear end of the bowl.

In place of the bowl 27, we might instead use any other sort of dirt extruding element.

During the scraping operation with this implement, the shoe 26 is held at a low level so as to engage the dirt to be picked up, and the dirt passes back over the shoe into the rear end of the bowl. As this takes place, an apron 37 at the forward end of the bowl is held in an elevated position: that is to say, in a partially open position so that as the dirt passes up between the lower edge 38 of the apron 37 and the shoe 26, the dirt piling up in the bowl 27 can gravitate into the apron, after which the apron 37 can be moved to a closed position so as to retain the load. The apron is pivotally supported on pivot pins 39.

In this particular variant of our invention, we employ three control cables, the reeving of which will now be described, still with reference to Figures 1 to 4.

Cable 40 controls the first listed function, namely depth-control. It passes, from the winch (later to be described; not shown in Figures 1 to 3), under one of fairlead sheaves 41, over one of fairlead sheaves 42, over one of sheaves 43, and several times around sheaves 44 on the rear truck 22, and sheaves 45 on the side plates 25. Thence it passes to an anchorage 46 on the rear of the bowl 27. Drawing-in on this rope 40 draws sheaves 44 and 45 together, as shown in Figures 2 and 3 thus raising the digging blade 32. The constant tension in this rope 40, due to the weight of the side-plates, load, etc., also performs our third function, namely bowl return, by virtue of the reach anchored at 46 to the bowl 27, see Figure 3. But, due to the inclination of this reach in Figures 1 and 2, it also tends to initiate the dumping motion of the bowl, this tendency being resisted by the weight of the bowl and its contents. If a stronger initial impulse is desired, the inclination of this reach can be increased, by locating sheaves 44 higher and/or by locating anchorage 46 lower. During the central part of the dumping cycle, this reach passes through dead center, and thus then neither

er assists nor resists dumping. This reach also serves somewhat the purpose of a shock-absorber, after sheaves 44 and 45 have been drawn block to block.

Rope 47 controls the second listed function, namely dumping. It passes, from the winch, under one of fairlead sheaves 41, over one of fairlead sheaves 42, over one of sheaves 43, around sheave 48 on the top of the bowl 27, and back to an anchorage 49 adjacent sheaves 43. Drawing-in on this rope 47 draws sheaves 43 and 48 together, thus tilting the bowl 27 from its carrying position as shown in Figures 1 and 2, to its dumping position as shown in Figure 3.

Rope 50 controls the fourth listed function, namely apron opening. It passes, from the winch, under one of the fairlead sheaves 41, over one of the fairlead sheaves 42, over one of the sheaves 43, and thence down and around the sheave 51 on the apron 37, and back to an anchorage 52 adjacent sheaves 43. Drawing-in on this rope 50 draws sheaves 51 and 43 together, thus raising the apron 37.

We now come to a special kind of winch, which is one of the features of our invention. This winch is preferably, but not necessarily, mounted as shown at 53 on the rear of the tractor 54, which draws our scraper, as shown in Figure 4. If so mounted, it may be actuated by the engine of the tractor in any convenient manner. Or it may be mounted elsewhere, as for example on the scraper itself.

Turning now to Figure 5, we see that the winch, there shown in section, has three drums, 55, 56 and 57. Drum 55 operates rope 50, and is controlled by cone-clutch 58 and band-brake 59, in well-understood manner. Drum 56 operates rope 47, and has no direct control. Drum 57 operates rope 40, and is controlled by cone-clutch 60 and band-brake 61, in well-understood manner.

The three drums are journaled loosely on shaft 62, which is driven by gear 63 from any convenient power-source (not shown). Also journaled on this shaft, there is a projection 64. Drum 55 carries a stop 65. Drum 56 carries a stop 66.

Assume that drum 55 is in such angular relation to drum 56, that stop 65 on drum 55 occupies the position labeled "start" in Figure 6, and that stop 66 on drum 56 occupies the position in which it is shown. Assume that then the operator clutches drum 55, which then starts to revolve clockwise, pulling in on rope 40 and raising the apron 37 from the position shown in Figure 2. When drum 55 has rotated through about 240°, its stop 65 will engage projection 64, thereafter rotating this projection with it. After another 240°, when the apron 37 has been raised to a position slightly above that shown in Figure 1, projection 64 will engage stop 66 on drum 56, thereafter rotating this drum too, and thus pulling in on rope 47, and thereby raising the bowl 27, as the apron 37 continues to rise.

Our delayed action drum could be used to actuate any other function of a scraper, which it is desired to perform in delayed synchronous relation to any other function.

A substitute for the dead-end portion of rope 40 is the spring 67, shown in Figure 7, and functioning in the same manner. Figure 7 shows this spring in its two extreme positions. In place of rope 40 to raise the digging edge by raising the rear end of the main frame, we now have rope 40a, reeved identically as rope 40, except that

rope 40a is dead-ended at 68, adjacent sheaves 44.

We now come to the variant of Figures 8 to 11. Identical parts bear the same reference-numbers as in Figures 1 to 4, and 7, and will not be re-described here.

There is no rope 47 to control the bowl 27. But the same lag-action control is effected in another manner, which will now be described. A rope 69 extends from a dead end 70 on apron 37 to a dead end on floating sheave 71, which slides in guide-ways 72. Around sheave 71, there passes a rope 73, dead-ended at 74 on the main frame, and at 75 on the top of bowl 27.

Ropes 40a and 50 extend to an ordinary two-drum winch 76, preferably on the tractor. Rope 69 is taut in carrying position (Figure 9), and slack in loading position (Figure 8). But when the apron 37 is fully opened for dumping (Figure 10), this rope 69 tautens sufficiently to pull on sheave 71 and hence on rope 73 sufficiently to dump the bowl 27.

To return the bowl 27 from dumping position, this variant of our invention can employ either the dead-end expedient of Figures 1 to 4, or the spring expedient of Figure 7, or neither.

Having now described and illustrated three forms of our invention, we wish it to be understood that our invention is not to be limited to the specific form or arrangement of parts herein described and shown, except as specifically covered by our claims.

We claim:

1. In a scraper, having: ground support; a main frame, supported thereby; a digging blade, carried by the main frame; a dumping and dirt holding bowl, pivoted to the main frame adjacent the blade; and a front apron, pivotally supported by the main frame, and adapted, when lowered, to retain dirt within the bowl; the combination therewith of: a rope, connecting the apron to the main frame, to open the apron; means to actuate that rope; a rope, connecting the bowl to the main frame, to dump the bowl; and lost-motion means, actuable by the apron opening means, after the apron has opened a predetermined distance, to cause delayed actuation of the dumping rope.

2. In a scraper, having: ground support; a main frame, supported thereby; a digging blade, carried by the main frame; a dumping and dirt-holding bowl, pivoted to the main frame adjacent the blade; and a front apron, pivotally supported by the main frame and adapted, when lowered, to retain dirt within the bowl; the combination therewith of: a rope, connecting the apron to the main frame, to open the apron; means to actuate that rope; a rope, connecting the bowl to the main frame, to dump the bowl; lost-motion means, actuable by the apron opening means, after the apron has opened a predetermined distance, to cause delayed actuation of the dumping rope; and tension means, extending from the bowl rearwardly to the frame, and tending to initiate the return of the bowl from dumping to carrying position.

3. In a scraper, having: ground support; a main frame, supported thereby; a digging blade, carried by the main frame; a dumping and dirt-holding bowl, pivoted to the main frame adjacent the blade; and a front apron, pivotally supported by the main frame and adapted, when lowered, to retain dirt within the bowl; the combination therewith of: a rope, connecting the apron to the main frame, to open the apron; means to actuate

that rope; a rope, connecting the bowl to the main frame, to dump the bowl; lost-motion means, actuable by the apron opening means, after the apron has opened a predetermined distance, to cause delayed actuation of the dumping rope; and tension means, tending to initiate the return of the bowl from dumping to carrying position, said tension means being applied to the bowl at such a point and at such an angle as to have a tendency, when the bowl is in carrying position, to assist, rather than oppose, the dumping rope.

4. In a scraper, having: ground support; a main frame, supported thereby; a digging blade, carried by the main frame; a dumping and dirt-holding bowl, pivoted to the main frame adjacent the blade; and a front apron, pivotally supported by the main frame and adapted, when lowered, to retain dirt within the bowl; the combination therewith of: a rope, connecting the apron to the main frame, to open the apron; a driven winch drum to actuate that rope; a rope, connecting the bowl to the main frame, to dump the bowl; a winch drum, to actuate that rope; and a lost-motion connection between these two drums, whereby the first drum, after rotating to a predetermined extent, will impart delayed rotation to the second drum.

5. In a scraper, having: ground support; a main frame, supported thereby; a digging blade, carried by the main frame; a dumping and dirt-holding bowl, pivoted to the main frame adjacent the blade; and a front apron, pivotally supported by the main frame and adapted, when lowered, to retain dirt within the bowl; the combination therewith of: a rope, connecting the apron to the main frame, to open the apron; means to actuate that rope; a rope, connecting the bowl to the main frame, to dump the bowl; and lost-motion means operatively connecting this last-mentioned rope and the apron, whereby after the apron has opened a predetermined distance, further opening of the apron will cause delayed actuation of the said last mentioned rope.

6. In a scraper, having: ground support; a digging blade, supported thereby; a dumping and a dirt-holding element, supported by the ground support, and mounted for dumping movement; and a dirt-retaining front apron, supported by the ground support, and mounted for rising movement; the combination therewith of: two separate means for respectively causing the dumping element to dump and for raising the apron; a lost motion connection between these two means; said first means being actuable by said second means, through said lost-motion connection, after the apron has opened a predetermined amount.

7. In a scraper, having: ground support; a digging blade, supported thereby; a dumping and dirt-holding element, supported by the ground support, and mounted for dumping movement; a dirt-retaining front apron; supported by the ground support, and mounted for rising movement; the combination therewith of: two separate means for respectively causing the dumping element to dump and for raising the apron; a lost-motion connection between these two means; said first means being actuable by said second means, through said lost-motion connection, after the apron has opened a predetermined amount; and tension means extending rearwardly from the dumping and dirt-holding element, to some other portion of the machine

with respect to which other portion the dumping

and dirt-holding element is relatively moveable, and tending to initiate the return of that element from dumping to dirt-holding position.

8. A scraper, according to claim 7, characterized by the fact that said tension means is a spring operatively connecting the dumping and dirt-holding element to some other part of the scraper, with respect to which other part said element is relatively movable during dumping.

9. A scraper, according to claim 7, characterized by the fact that said tension means is a spring operatively connecting the dumping and dirt-holding element to some other part of the scraper, with respect to which other part said element is relatively movable during dumping; and by the further fact that said spring is applied to said element at such a point and at such an angle as to have a tendency, when said element is in dirt-holding position, to assist, rather than oppose, the dumping rope.

10. A scraper according to claim 5, characterized by the fact: that the lost-motion means, which operatively connects the dumping rope and the apron, comprises a rope extending from the apron around a sheave fixed with respect to the main frame to an actuating connection with a floating sheave, which floating sheave engages the dumping rope.

11. A scraper according to claim 5, characterized by the facts: that the lost-motion means, which operatively connects the dumping rope and the apron, comprises a rope extending from the apron around a sheave fixed with respect to the main frame to an actuating connection with a floating sheave, which floating sheave engages the dumping rope; and that there are guides for the floating sheave.

12. In a scraper, having: ground support; a digging blade; a dirt-extruding rear element, capable of being shifted to extrude dirt; a dirt-retaining front apron, capable of being opened; and a main body capable, in conjunction with the dirt-extruding element and the apron, of serving as a dirt-holding container; the combination therewith of: a rope to open the apron; means to actuate that rope; a rope to shift the dirt-extruding element to extrude dirt; means to actuate that rope; and lost-motion means, actuable by the apron opening means, after the apron has opened a predetermined distance, to cause delayed actuation of the dirt-extruding rope.

13. In a scraper, having: two ground supports; a main frame, pivoted to one of such supports, and capable of being raised and lowered with respect to the other of such supports; a digging blade, carried by the main frame; and a dumping and dirt-holding bowl, pivoted to the main frame adjacent the blade; the combination therewith of: a rope connecting the main frame to the second mentioned support to raise and lower the frame; means to actuate that rope; a rope, connecting the bowl to the main frame to dump the bowl; means to actuate that rope; and an operative connection between the frame-raising rope and the bowl, tending to initiate the return of the bowl from dumping to carrying position, said operative connection being applied to the bowl at such a point and at such an angle as to have a tendency, when the bowl is in carrying position, to assist, rather than oppose, the dumping rope.

TREVOR O. DAVIDSON.
ROGER SHERMAN HOAR.