Dec. 31, 1940. H. C. FRENCH 2,226,859

SCRAPER

Filed Jan. 26, 1939 2 Sheets-Sheet 1

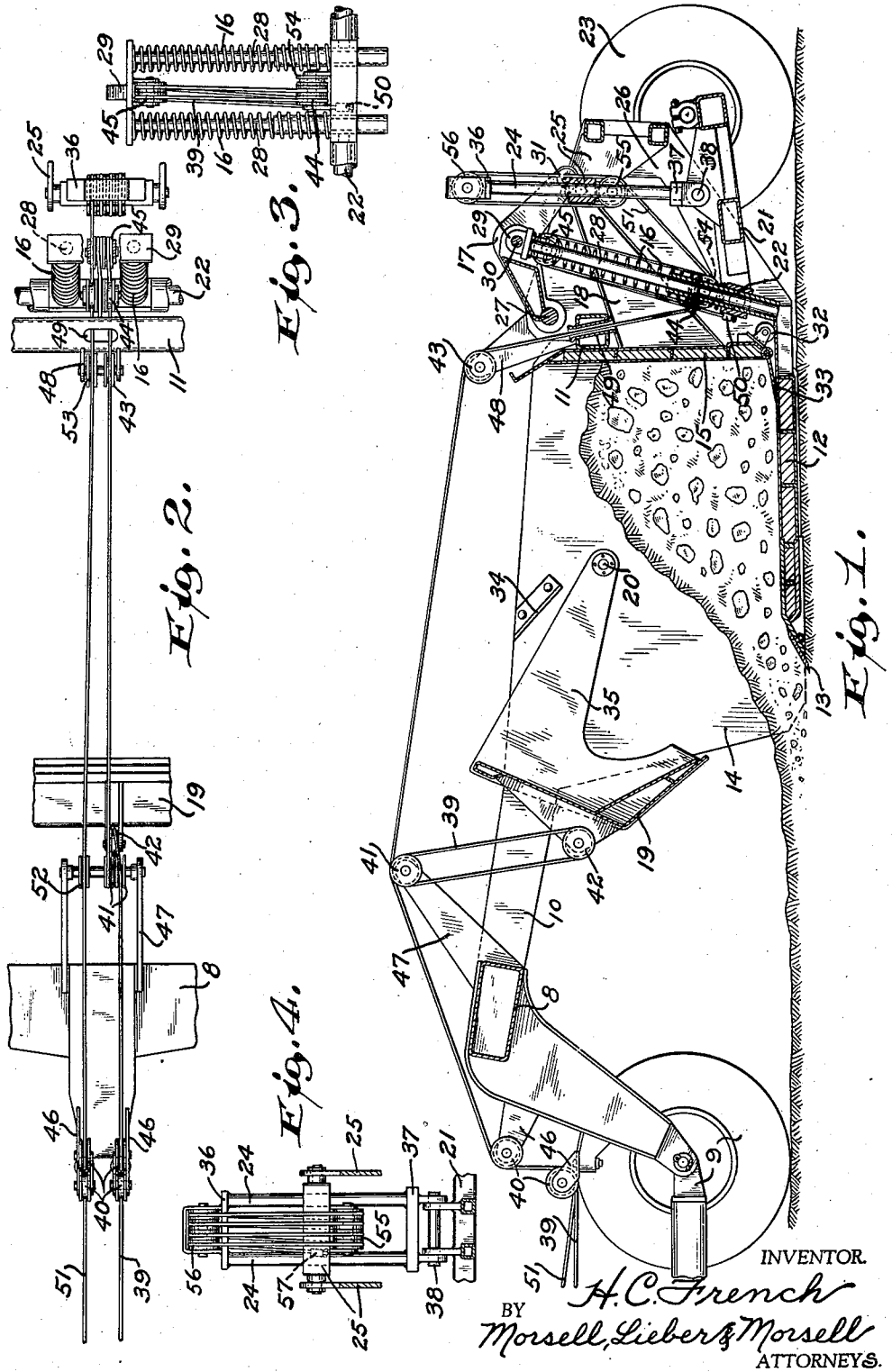

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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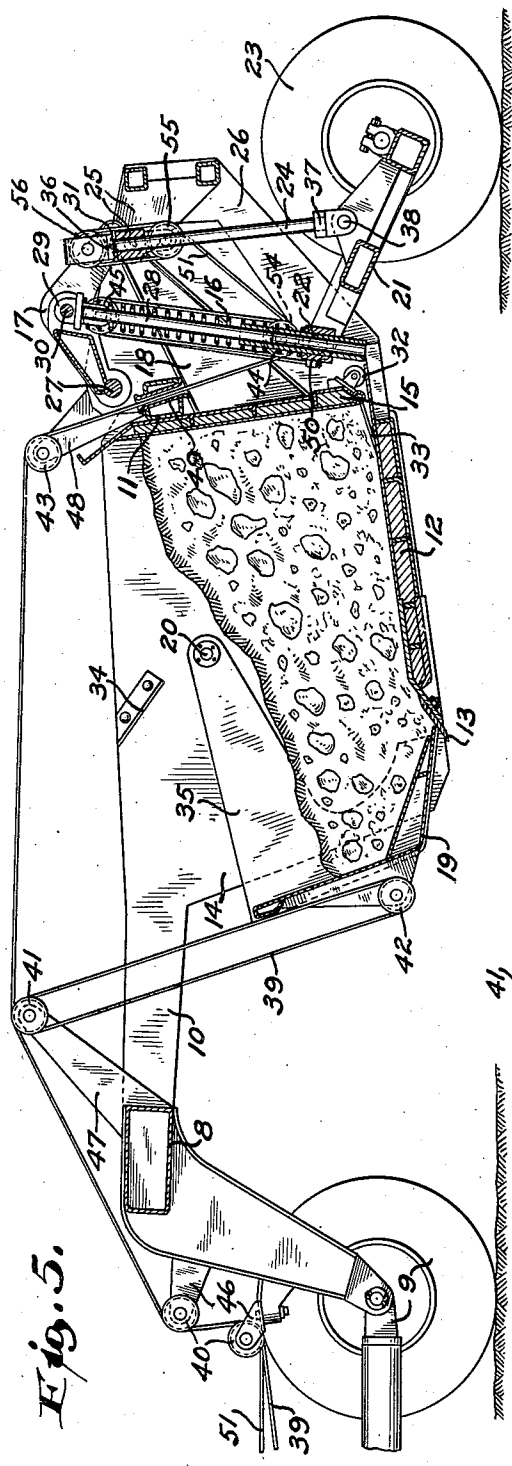

Fig. 5.

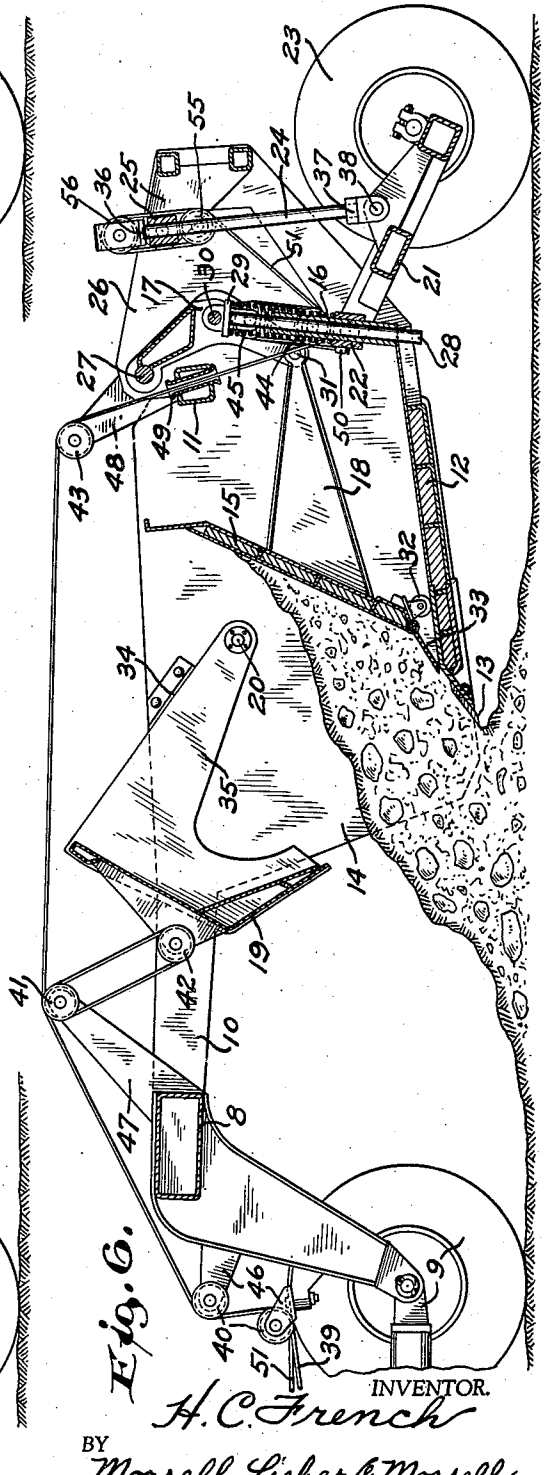

Fig. 6.

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UNITED STATES PATENT OFFICE

2,226,859

SCRAPER

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Application January 26, 1939, Serial No. 252,922

5 Claims. (Cl. 37—126)

My present invention relates generally to improvements in the art of handling bulk materials such as earth, and relates more specifically to improvements in the construction and operation of so-called dig and carry scraper assemblages.

An object of my present invention is to provide a new and useful scraper assemblage which is relatively simple and inexpensive, and which may be conveniently manipulated to perform its various functions.

As shown and described in copending application Serial No. 150,232, filed June 25, 1937, it has heretofore been proposed to provide an effective heavy duty dig and carry scraper comprising an open ended load confining bowl mounted for transportation along the ground and having a front cutting blade, the bowl being movable to vary its elevation and having front and rear movable load confining and ejecting aprons of which the movements may be independently effected by hydraulic jacks or rams controllable from a remote station. While this prior scraper assemblage has proven highly satisfactory and successful in actual commercial use, the hydraulic control and power system is naturally quite complicated and costly, especially when applied to smaller units which must be manufactured and sold at relatively low prices in order to meet competition.

It is therefore a more specific object of my present invention to provide an improved scraper unit of the above described general type, wherein the various movable or adjustable parts may be actuated by mechanism other than hydraulic means, as for instance by cables or links.

Another specific object of this invention is to provide an improved cable operated scraper assemblage which is simple and compact in construction, and which is moreover highly flexible in use.

A further specific object of the invention is to provide a rugged and durable dig and carry scraper which is rapid in action, and is adapted to be manipulated and maintained in operative condition by a novice.

Still another specific object of the present invention is to provide a relatively inexpensive but highly efficient dirt moving assemblage, having various parts conveniently operable from a remote and common control station, and which is especially applicable to smaller size high speed units.

These and other specific objects and advantages will be apparent from the following detailed description.

A clear conception of embodiments of the several features constituting my present invention, and of the mode of constructing and of utilizing a dig and carry scraper assemblage built in accordance with my improvement, may be had by referring to the drawings which accompany and form a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a longitudinal vertical section through one of my improved scrapers in the act of digging or loading the confining bowl, showing the blade in the cut, the rear apron retracted, and the front apron partially raised;

Fig. 2 is a fragmentary top view of the cable system for effecting actuation of the aprons and for raising the bowl;

Fig. 3 is a fragmentary rear view of a portion of the apron actuating cable mechanism;

Fig. 4 is a fragmentary rear view of a portion of the bowl elevating cable mechanism;

Fig. 5 is a longitudinal vertical section through the scraper in the act of carrying or transporting a load, showing the bowl elevated, the rear apron retracted, and the front apron closed or lowered to the extreme; and

Fig. 6 is a similar sectional view of the assemblage, showing the same in the act of dumping a load, with the bowl elevated, the front apron raised to the extreme, and the rear apron moved forward to the extreme position.

In the present disclosure, the mechanism has been shown rather diagrammatically for the sake of clearness, and flexible cables coacting with simplified sheaves have been utilized for motion transmission purposes, but it is not the intention to unnecessarily restrict the scope or utility of the invention by virtue of this specific disclosure.

Referring to the drawings, my improved dig and carry scraper assemblage, as illustrated, comprises in general a rigid main frame 8 pivotally suspended at its front central portion upon a transportable draft carriage 9 and having rearwardly extending laterally separated side arms 10 which are rigidly interconnected at their rear ends by a transverse beam 11; an open ended load confining bowl having a bottom 12 provided with a front cutting blade 13, and being rigidly suspended from the frame arms 10 by means of side walls 14; a rear apron 15 normally forming a closure for the rear end of the bowl and being movable between the side walls 14 and along the bowl bottom 12 by means of cable and sheave mechanism coacting with springs 16 and arms

17, the latter being swingably suspended from the rear of the main frame 8 and pivotally attached to rear projections 18 formed integral with the apron 15; a front apron 19 swingably suspended from the bowl side walls 14 by means of coaxial pivots 20 and being movable toward and away from the blade 13 with the aid of the same cable and sheave system which is used to actuate the rear apron 15; an auxiliary frame 21 having its front end articulably attached to the rear lower part of the bowl by means of a transverse pivot pin 22 and its rear portion pivotally suspended upon rear carrier wheels 23; and independently operable and manipulable cable and sheave mechanism coacting with parallel rods 24 which are slidable in a bracket 25 rigidly attached to integral side portions 26 of the bowl and main frame 8, between the arms 17, to effect raising and lowering of the load confining bowl and blade 13.

The main frame 8 with its side arms 10, cross-beam 11, rear portions 26, bracket 25, and bowl, is preferably formed of durable metal plate to provide an integral rigid assemblage which is swingable about the axle of the draft carriage 9 so as to position the bowl bottom 12 and blade 13 either in the cut as shown in Fig. 1, or elevated from the ground as in Figs. 5 and 6. The draft carriage 9 may be either the rear position of a tractor, or a special mounting rig adapted for attachment to the tractor with a draw bar or otherwise, and the auxiliary frame 21 is likewise formed of durable metal plates and bars and is swingable about the axis of the rear wheels 23 during raising and lowering of the bowl. The rear apron actuating arms 17 are swingably suspended from the main frame 8 by means of a pivot 27 and the springs 16 embrace guide rods 28 which are attached to a cross-head 29 and slidably engage tubes passing through the enlarged medial portion of the oscillatory pivot pin 22 which connects the auxiliary frame 21 to the main frame 8. The cross-head 29 is connected to the medial portions of the arms 17 by means of a transverse pivot pin 30, and the springs 16 are of the compression type and react at their opposite ends against the cross-head 29 and pivot pin 22 respectively. The swinging extremities of the arms 17 are pivotally attached to the correspondnig rear apron projections 18 by pivot pins 31, and the rear apron 15 is supported upon the bowl bottom 12 by rollers 32 and has a scraper blade 33 which rides along the bottom 12. In order to limit the upward swinging motion of the front apron 19 about the pivots 20, stops 34 may be provided, but these positive stops are not essential since the upward swing of the front apron 19 is automatically limited by the position of the pivots 20, relative to the elevating rig. The aprons 15, 19 are again formed of suitable metal plate, and the front apron has suspension arms 35 which are movable along the bowl walls 14 and are engageable with the stops 34 as illustrated in Fig. 6. As previously indicated, the rods 24 of the bowl elevating mechanism, are slidable in the frame bracket 25, and the upper ends of these rods 24 are rigidly united by a cross-bar 36 while their lower ends are rigidly connected by a cross-head 37 which is pivotally attached to the medial portion of the frame 21 by a pivot pin 38. In order to compensate for or accommodate varying angularity of the rods 24, the portion of the bracket 25 in which these rods slide, must either be formed for slight rotative or angular displacement, or the through openings must be formed to eliminate binding.

The improved cable and sheave mechanism for actuating the front and rear aprons 19, 15, comprises a flexible cable 39 which extends rearwardly from the winch or operating lever located at the common control station on the tractor, and after engaging a pair of guide sheaves 40, this cable coacts with a set of front apron actuating sheaves 41, 42 and therefter continues rearwardly and coacts with a guide sheave 43 and with sets of rear apron actuating sheaves 44, 45. The front guide sheaves 40 are supported from the front of the frame 8 by means of adjustable brackets 46, and the upper sheaves 41 are also suspended from the main frame 8 by a bracket 47 while the lower sheave 42 is journaled on the forward portion of the front apron 19; so that when a pull is exerted on the cable 39, the sheaves 41, 42 will be drawn toward each other to raise the apron 19, whereas release of the pull will permit this apron to drop by gravity. The rear guide sheave 43 is journaled in a bracket 48 secured to the main frame 8 and the cross-beam 11 is provided with a guide tube 49 through which the cable 39 extends. The lower sheaves 44 are journaled fixedly upon the pivot pin 22, while the upper sheaves 45 are carried by the cross-head 29, and the extreme end of the cable 39 is anchored to the pivot pin 22 by a fastener 50; so that a pull exerted upon the rear portion of the cable 39 will cause the cross-head 29 and sheaves 45 to approach the pin 22 and sheaves 44 and thus compress the springs 16, whereas release of this pull will permit the springs to expand and return the rear apron 15 to normal position.

The improved cable and sheave mechanism for raising the bowl and scraper blade 13 away from the ground, comprises another independently operable flexible cable 51 which also extends rearwardly from the operator's station on the tractor and initially engages guide sheaves 40 journaled in the adjustable brackets 46. As this cable 51 proceeds rearwardly, it first coacts with a guide sheave 52 carried by the bracket 47 and then with a guide sheave 53 journaled in the bracket 48. The cable 51 thereafter passes through the tube 49 and beneath a fixed pulley or sheave 54 journaled on the pivot pin 22, and the cable 51 subsequently engages lower and upper sheaves 55, 56 in alternate series and finally has its extreme end permanently attached to the fixed bracket 25 by means of a fastener 57 as shown in Fig. 4. The lower sheaves 55 are fixedly journaled on the bracket 25 between the rods 24, and the upper sheaves 56 are journaled on the cross-bar 36; so that a pull applied to the cable 51, will cause the sheaves 55 to approach the sheaves 56 thereby raising the bowl and blade 13 as in Figs. 5 and 6, whereas release of the tension or pull will cause the bowl to descend by gravity and will thus separate the sheaves 55, 56, as in Fig. 1.

The winch or mechanism for exerting a pull on either of the cables 39, 51 is preferably located at the control station on the propelling tractor, and is of well known construction. These cables 39, 51 are preferably formed of durable material and have sufficient flexibility to permit the same to properly engage and to remain in proper coaction with the several pulleys or sheaves, and adequate guards for the cables and sheaves would also be provided.

During normal operation of my present improved scraper assemblage, the cables 39, 51 are independently operable to actuate the aprons

15, 19 and to elevate the bowl, respectively, and while the cable 51 is utilized only for controlling the lifting and lowering of the bowl and blade 13, the other cable 39 serves the dual purpose of controlling the raising and lowering of the front apron 19 and the movement of the rear apron 15. When the parts are positioned as shown in Fig. 1 with the bowl and blade 13 in the cut, the front apron 19 should be raised more or less so as to permit the dirt to enter the bowl over the blade 13 as the scraper is advanced along the ground. This raising of the front apron 19 may be effected by exerting an initial pull on the cable 39 insufficient to bring the front apron arms 35 against the stops 34 and also insufficient to exert a pull on the cable beyond the sheave 43 sufficient to move the rear apron 15 forwardly. With such an initial pull exerted upon the cable 39, the sheaves 41, 42 will be brought toward each other and the front apron 19 may be elevated against the action of gravity, to any desired position without disturbing the location of the rear apron 15; and when this initial pull is released, the front apron 19 will drop by gravity until it engages the blade 13 and thus prevents admission of more dirt while confining the load within the bowl.

Such lowering of the front apron 19 to confine the load within the bowl, should be effected when it becomes desirable to raise the bowl and transport the load. In Fig. 5, the front apron 19 has been completely lowered to confine the load, and the bowl and blade 13 have been elevated away from the ground. This elevation is accomplished by exerting a pull on the cable 51, and such a pull causes the sheaves 55, 56 to approach each other and thus causes the rods 24 to pull the auxiliary frame 21 upwardly, thereby simultaneously swinging the rear portion of the bowl and main frame upwardly. When the bowl is thus elevated, the load confined therein will move forwardly and will settle against the front apron 19 as shown in Fig. 5, so that subsequent opening or raising of this apron will immediately result in discharge of at least a portion of the load by gravity alone.

In order to effect complete delivery of the load, the front apron 19 should be elevated to its extreme height, and the rear apron 15 should be moved forwardly within the bowl as illustrated in Fig 6. Such movement of the aprons may be readily effected by exerting an initial pull upon the cable 39, sufficient to elevate the arms 35 of the front apron 19 into engagement with the stops 34. By continuing the pull on the cable 39 after the movement of the apron 19 has been arrested, the portion of the cable 39 beyond the guide sheave 43 will cause the sheaves 45 to approach the sheaves 44, thereby swinging the arms 17 downwardly and forwardly and at the same time causing the rods 23 to slide downwardly through the pivot 22 and compressing the springs 16. The downward and forward swinging of the arms 17 will obviously cause the apron 15 to move forwardly along the bowl bottom 12 and to simultaneously change its inclination relative to this bowl bottom. The load will thus be positively ejected from within the bowl and it is to be noted that the rollers 32 provide a movable support for the rear apron 15, and that the scraper blade 33 insures complete removal of the load.

When the bowl has been thus cleared of material, the pull on the cable 39 may be released, whereupon the compressed springs 16 will become quickly effective to return the rear apron 15 to its normal position at the rear end of the bowl. Subsequent continued release of the pull on the cable 39 will obviously cause the front apron 19 to drop by gravity, and if it becomes desirable to again return the blade 13 to cutting position, it is only necessary to release the tension on the cable 51, whereupon the bowl will drop by gravity and the sheaves 55, 56 will again be supported to the position shown in Fig. 1. All of these operations may obviously be effected from the central point of control located upon the tractor vehicle and within easy reach of the driver who is normally seated upon the tractor. In the event that one of the cables 39, 51 should break, they may be readily replaced by merely releasing the fasteners 50, 57 which normally hold the ends of the cables.

From the foregoing detailed description, it will be apparent that my present invention provides an improved scraper assemblage which is relatively simple, compact and durable in construction and which is conveniently manipulable to cause the same to properly perform its various functions. Since it is always desirable to elevate the front apron 19 to its extreme limiting position, before the rear apron 15 is moved forwardly, it is only necessary to provide a single cable 39 for the purpose of manipulating both of the aprons 19, 15. This makes it possible to perform all operations with a minimum number of cables, and as previously indicated, the stops 34 are not essential since the upward swinging movement of the front apron 19 will obviously discontinue when the pivots 20 and the sheaves 41, 42 are brought into direct alinement with each other. While the apron 19 and the bowl are elevated by direct pull upon their respective cables 39, 51, these elements descend by gravity, and it has also been found that the springs 16 will quickly return the rear apron to normal position upon release of the pull on the cable 39. The improved scraper can obviously be manufactured at moderate cost and is adapted to be manipulated and maintained in operative condition by a novice.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of operation, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:

1. In a scraper, a transportable bowl having a scraping blade, a rear apron movable within said bowl toward and away from said blade, an arm pivotally attached to said bowl and apron for moving the latter, a cable for swinging said arm, and a helical spring compressible directly by said arm during cable movement of said apron in one direction and being operable to move the arm and apron in the opposite direction upon release of said cable.

2. In a scraper, a transportable bowl having a front scraping blade, a rear apron movable within said bowl toward and away from said blade, rollers supporting said apron for movement relative to said bowl, an arm pivotally attached at its opposite ends to said bowl and apron respectively, a cable for swinging said arm to move said apron toward said blade, and a helical spring compressible directly by said arm during cable movement of said arm and apron and being operable to move these parts in the opposite direction upon release of said cable.

3. In a scraper, a transportable bowl having a

front scraping blade, a rear apron movable within said bowl toward and away from said blade, an arm pivotally attached at its opposite ends to said bowl and apron respectively, sheaves carried by said bowl and said arm, a cable coacting with said sheaves to move the same toward each other and thereby move said arm and apron in one direction, and a spring compressible by movement of said sheaves toward each other and being operable to move said arm and apron in the opposite direction.

4. In a scraper, a transportable bowl having a front scraping blade, a rear apron movable within said bowl toward and away from said blade, an arm pivotally attached at its opposite ends to said bowl and apron respectively, sheaves carried by said bowl and said arm, a cable coacting with said sheaves to move the same toward each other and thereby move said arm and apron in one direction, a spring compressible by movement of said sheaves toward each other and being operable to move said arm and apron in the opposite direction, and a guide rod carried by said arm and coacting with said bowl to guide the movement of said sheaves and spring.

5. In a scraper, a transportable bowl having a front scraping blade, a rear apron movable within said bowl toward and away from said blade, an arm pivotally attached to its opposite ends to said bowl and apron respectively, sheaves carried by said bowl and said arm, a cable coacting with said sheaves to move the same toward each other and thereby move said arm and apron in one direction, a guide rod for causing said sheaves to move along a definite path, and a spring embracing said rod and coacting with said arm to move said arm and apron in the opposite direction.

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