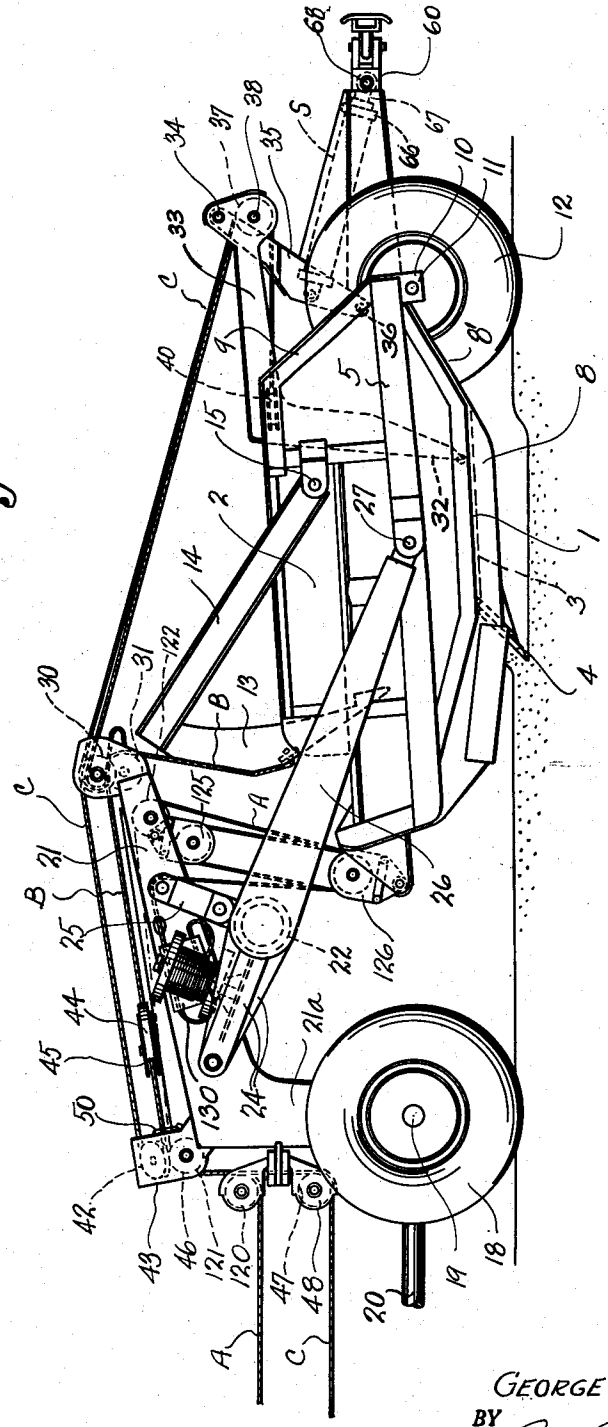
July 13, 1948. G. S. ALLIN 2,445,053

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Fig. 1



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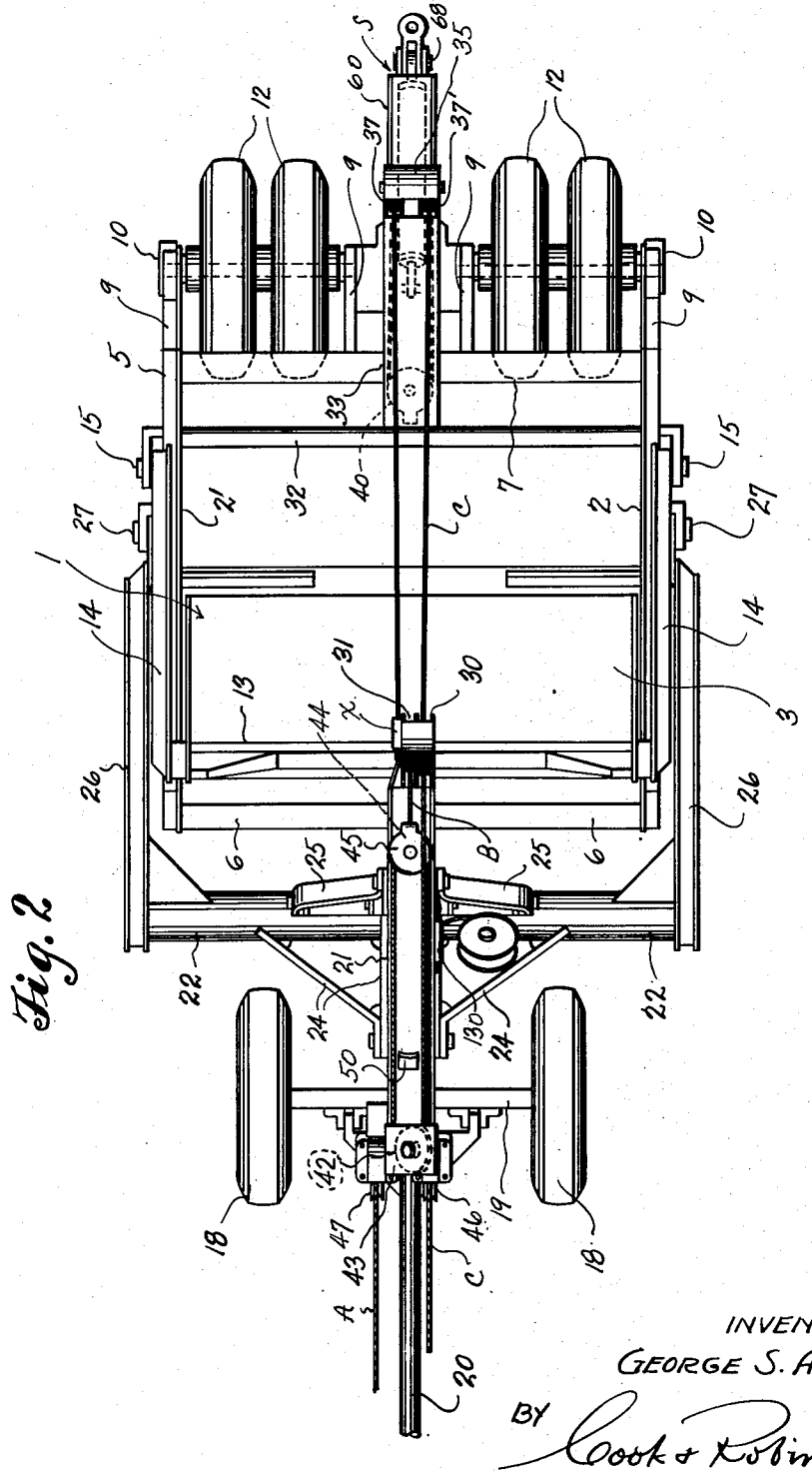


Fig. 2

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Fig. 4

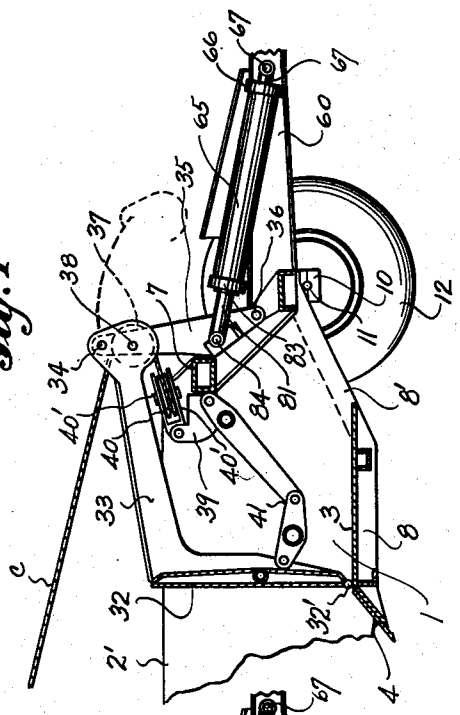


Fig. 3

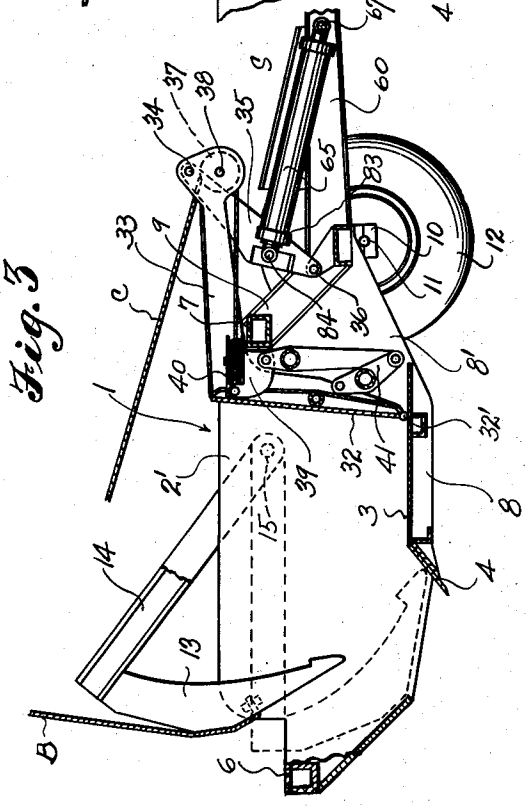
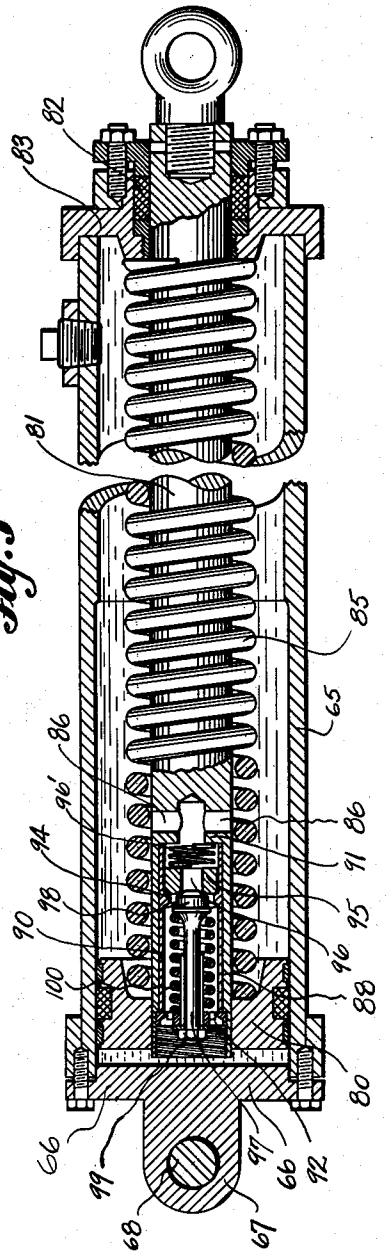


Fig. 5



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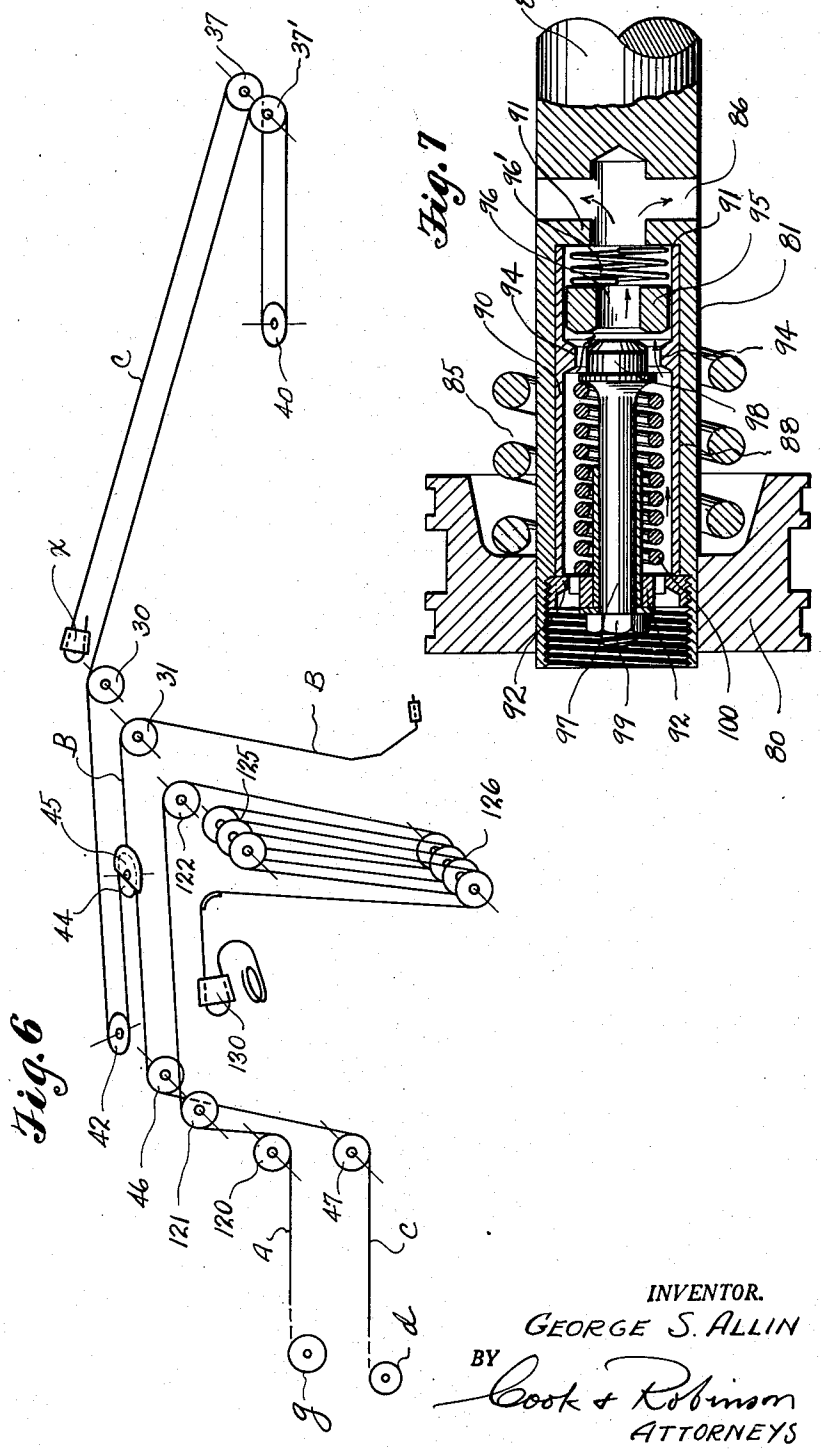


Fig. 6

Fig. 7

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2,445,053

SCRAPER

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Application April 22, 1946, Serial No. 664,078

11 Claims. (Cl. 37—126)

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This invention relates to dirt moving vehicles of those kinds, or types referred to in the art and known in industry as "scrapers." More particularly, the invention has reference to improvements in scrapers of large capacity, adapted to be drawn by a tractor, or other powered draft vehicle to scrape up and carry a load of dirt, and to forcibly eject the load if such is necessary or desirable.

The most common types of scrapers of the above kind now in general use, have a forwardly opening bowl, equipped across the forward edge of the bottom wall with a blade by which dirt may be scraped up and delivered into the bowl upon lowering the forwardly drawn bowl to such position as to bring the blade into ground contact. Forwardly of the blade, the bowl is equipped with an apron that may be raised to permit the bowl to be filled, and then lowered to retain the load in the bowl, and in the rear end of the bowl is a power operated ejector plate by means of which a load may be forcibly moved from the bowl.

In scrapers of this type, it is generally the case that the operations of the apron and of the ejector plate are controlled by the tractor operator through power devices on the tractor which draws the scraper.

In some of such scrapers, the lowering and raising of the bowl, the control of the apron and the actuation of the load ejector are controlled by hydraulic means. In other scrapers, these parts are operated by cables extended between the operated parts and power driven cable winding drums carried on the towing tractor. The present invention has to do with scrapers of the cable operated kinds, and it has reference particularly to improvements in scrapers of that kind illustrated and described in my copending application filed September 18, 1944, under Serial No. 554,642, utilizing cables and wherein the cable that actuates the apron between its lowered and raised positions also controls the operation of the ejector plate; it being one of the principal objects of this invention to provide an improved type of ejector plate snubber mechanism whereby the plate will be restrained in its retracted position until the apron has been completely lifted and will then yield under pull of the ejector cable to permit the plate to advance for the ejection of the load and which, upon release of cable pull, will return the ejector plate to its retracted position.

Another object of the invention is to provide a novel arrangement of control cables and sheaves

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for apron and ejector plate operation for better control of movement of parts.

Other objects of the invention reside in the details of construction and combination of parts utilized in attaining the objects as will hereinafter be fully described.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side view of a scraper embodying therein the improvements of the present invention.

Fig. 2 is a plan view of the same.

Fig. 3 is a sectional view taken in a vertical plane lengthwise of the scraper bowl, showing the ejector plate in its retracted position and the apron in raised position.

Fig. 4 is a similar view showing the ejector plate in a fully extended position.

Fig. 5 is an enlarged, longitudinal section of the snubber mechanism used in connection with the operations of the ejector plate.

Fig. 6 is a view diagrammatically illustrating the manner of threading the control cables about the various sheaves.

Fig. 7 is an enlarged, sectional detail of a part of the snubber mechanism particularly illustrating its valve devices and showing them as positioned for the return of the ejector plate from an extended position to the retracted position.

Referring more in detail to the drawings—

The scraper bowl is designated in its entirety by reference numeral 1, and it comprises opposite side walls 2 and 2' and a substantially horizontal bottom 3, which latter joins the lower edges of the side walls and extends from near their rearward ends approximately half the distance to their forward edges and there is equipped, across the full width of the scraper between the side walls, with a downwardly and forwardly directed blade 4, which, as noted in Fig. 1, extends slightly below the bottom edges of the side walls.

The side walls of the bowl comprise sheet metal plates that are rigidly fixed to a substantial frame structure which includes, as parts thereof, horizontally directed bars 5 that are located at the outside and along the opposite side walls of the bowl between their forward and rearward edges. Also, the frame includes cross beams 6 and 7, here indicated as of tubular form, that rigidly join the top portions of the side wall frames at the top edges across the forward and rearward ends of the bowl, as is clearly shown

in Figs. 2 and 3. The details of construction of the frame structure, however, have no particular bearing on the present invention.

The bottom wall 3 and blade 4 are suitably braced and supported by longitudinally directed beams or ribs 8 that underlie the wall and which have rear end portions 8' thereof extended upwardly and rearwardly from the bottom wall and joined, rearward of the bowl, with downwardly directed braces 9 fixed to the side wall frames and to the cross beam 7 for the mounting of four transversely alined bearings 10 in which transversely alined axles 11 are fixed for the mounting thereon of ground wheels 12. These wheels are located symmetrically at opposite sides of the longitudinal center line of the bowl, as noted in Fig. 2 and in that space between the sets of wheels, the ejector snubbing and retracting mechanism presently to be described, is located.

The apron whereby a scraped up load may be retained in the bow, is designated by numeral 13, and it is operatively mounted on the bowl by means of arms 14—14 that are rigidly secured to its opposite ends and which extend rearwardly from the apron and have their ends pivoted in the frame structure of the side walls of the bowl, as at 15, in Fig. 1, so that the apron may be swung upwardly and forwardly, from its closed position with its lower edge engaged against the blade, as shown in dotted lines in Fig. 3, to the fully raised position in which it is shown in full lines in that view.

The forward end of the vehicle is supported by a pair of ground wheels 18, mounted on the opposite ends of a cross axle 19 to which axle a tongue 20 is operatively attached for the operative connection of the scraper to a draft vehicle of suitable kind, not herein shown.

Supported upon and fixed pivotally to the cross axle 19, centrally between its ends, is the downwardly directed, forward end portion 21*a* of a boom beam 21 which extends from the axle in a rearwardly and upwardly directed position centrally above the forward end portion of the bowl frame. Beneath this boom 21 is a rigid frame structure comprising a tubular, horizontally directed cross beam 22 which extends equally to opposite sides and slightly beyond the line of the side walls of the bowl, as noted in Fig. 2. This cross beam is fixed rigidly to the boom 21 by means of forwardly directed brace members 24, and upwardly and rearwardly directed members 25. Fixed rigidly to the opposite ends of the cross beam 22, are paired, rearwardly and downwardly extended arms 26—26, which, at their rearward ends, have pivoted connection, as at 27, with opposite side frames of the bowl; these points of pivotal connection being transversely alined and being located a distance back of the cutting edge of the blade that is equal to their height above the cutting edge. The height above the cutting edge is equal to the rolling radii of the standard size tires for each different size scraper.

The rearward end portion of the boom beam 21 centrally overhangs the apron and the forward part of the bowl frame and it carries therein, at its extreme end, a sheave 30 over which a cable C operates, as presently explained, for control of movements of the ejector. Also, at its end, and slightly below the sheave 30, the boom carries a sheave wheel 31 over which a cable B for the raising and lowering of the apron extends, as will presently be explained. The cable C controls the ejector operation, and it extends to the scraper from a suitable power device that would

be located on the draft vehicle; for example, a power driven winding drum which could be operated under control of the draft vehicle operator.

The load ejector mechanism as contained within or back of the bowl, is shown best in Figs. 3 and 4, and it comprises an upright plate 32, referred to as the ejector plate, extended between the side walls of the bowl and equipped at its lower edge with rollers 32' resting for travel upon the bottom wall 3 of the bowl. This plate extends substantially to the full width of the bowl, and its normal location therein during the time when the bowl is being loaded, is that retracted position adjacent the rear edge of the bottom plate, in which it is shown in Fig. 3.

Fixed rigidly to the ejector plate, centrally thereof and at its top edge, is a rearwardly extended, horizontally directed arm 33, which arm, at its rear end, extends between and has a pivoted or hinged connection, as at 34, with the upper ends of transversely spaced portions of an upright arm, or link 35. The link 35 is hingedly mounted at its lower end in the bowl frame, as at 36, and is adapted to swing forwardly and rearwardly with the forward or rearward movements of the ejector plate.

Mounted in the arm 33, at a short distance below its pivotal connection with link 35, are paired sheaves 37—37' carried on a cross shaft 38, and fixed to the cross beam 7 at a location midway of its ends, is a forwardly directed bracket arm 39 to which a sheave block 40' containing a sheave wheel 40 is pivotally attached. The cable C is extended about the sheave wheels 37—37' and the sheave 40, as presently explained, for the forward actuation of the ejector.

The ejector plate is held properly in transverse alinement during its forward and rearward movements by means of a toggle linkage shown at 41 and having pivotal connection at its ends to the plate and to the cross beam 7.

For a better understanding of the threading and use of the cable C, attention is directed to Figs. 2 and 6, which show that end of the cable that is opposite that which would be wound on the drum of the power device, is dead-ended by a clamp member X to the upper end of boom beam 21. From this clamp member, the cable extends rearwardly, about the sheave 37, thence forwardly and about the sheave 40 of the block 40', thence rearwardly and about the sheave 37', thence forwardly over the top of sheave 30, and continuing forwardly, is passed about a sheave wheel 42 that is mounted in a supporting bracket 43 fixed to the forward end portion of boom 31. From the sheave 42, the cable extends a short distance rearwardly where it passes about a sheave 44 carried in a movable block 45, thence again extends forwardly and over the top side of another sheave 46 mounted in bracket 43, thence downwardly and about the under side of a sheave 47 mounted in a pivotally mounted block 48 fixed to the boom, and from this extends to a winding drum carried on the power device or tractor; this drum being designated at *d* in Fig. 6.

The block 45 is disposed above the forward end portion of the boom and has the cable B fixed thereto, and this cable extends rearwardly over the sheave 31 at the upper end of the boom, thence downwardly, along the front side of the apron 13, and is fixed to the latter, for lifting it between lowered and raised positions.

With the cable B so attached to the apron, and

the cable C so threaded over the various sheaves, as shown in Fig. 6, it controls the action of both the apron and the ejector plate. However, as was previously explained, a snubber mechanism is provided to normally retain the ejector plate in a retracted position against pull of the cable C, until the apron has been fully lifted or the block 45 positively checked in its forward travel. Therefore, when the apron is in its lowered position, and the ejector is fully retracted, as in Fig. 3, the initial winding in of the cable C on its drum will cause the block 45 to be pulled forwardly and through cable B, to lift the apron.

It is to be understood that there will be no advancing of the ejector plate by reason of the winding in of the cable C on its drum until the forward movement of the block 45 has been checked.

After the apron has been fully lifted, the block 45 comes to rest against a seat or abutment 50 on the bracket 43, and thereafter any further winding in of the cable operates to pull the ejector forwardly; this being due to the fact that the sheave block 40' is anchored to the bowl frame and the sheaves 37—37' are carried on the arm 33 that moves the ejector plate.

When cable C is payed out from its winding drum and the length of that part thereof that extends between the sheaves 42 and 46 and about sheave 44 is lengthened, the lifted apron will then be permitted to move down under its own weight as this length increases. Also, the retraction of the advanced ejector plate takes place by reason of the paying out of the cable C from its winding drum, and this retracting movement is automatically effected by spring means associated with the snubber mechanism which is best shown in Figs. 3, 4 and 5 and which will now be described.

Fixed centrally to the rear end portion of the bowl frame structure is a rearwardly extended pusher frame 60, and disposed therealong, and pivotally fixed thereto and to the arm or link 35, is the hydraulic snubber which is designated in its entirety by reference character S. This comprises a hydraulic cylinder 65 that is closed at one end by a head 66 having a lug 67 thereon through which a pin 68 extends to pivotally fix that end of the cylinder to the said extended frame 60.

Reciprocally contained in the cylinder is a piston 80 to which a piston rod 81 is fixed, and which rod extends through a packed gland 82 in a head 83, that is fixedly applied to the other end of the cylinder; the rod being pivotally fixed at its outer end, as at 84, to the link 35. A coiled spring 85 is contained under compression in the cylinder about the piston rod, bearing at its ends against the piston and end head 83; the force of this spring being sufficient to move the ejector plate from extended position to a retracted position when not restrained by the tension of cable C.

The cylinder 65 is filled with a fluid pressure medium, such as oil, and in the movement of the piston, this oil must flow from one side thereof to the other. This flow is provided for by reason of there being a transverse channel 86 in the piston rod at a location near the piston, and an axial bore 88 leading into this channel from the inner end of the piston rod; this end of the rod being extended through the piston as shown in Fig. 5.

A special valve and control mechanism is arranged in the axial bore to resist the flow of oil therethrough in one direction to that extent required to hold the ejector plate against any ejecting movement while cable C is being wound in on its drum for the purpose of raising the apron 13 to a fully open position. This valve mechanism, as seen in Fig. 5 and Fig. 7, is as follows:

Fitted in the bore 88 of the piston rod, is a sleeve 90, open at its ends and solidly engaged at its inner end against a shoulder 91 in the bore, and held seated thereagainst by a spider nut 92 threaded into the outer end portion of the bore and tightened against the outer end of the sleeve.

Intermediate its ends, the sleeve 90 is formed interiorly with an annular shoulder 94 and slidably contained in the sleeve, between the shoulders 91 and 94 is a valve seat element 95 formed with a central port 96. A light pressure coiled spring 96', of relatively light pressure, bears against the valve seat element 95 and the shoulder 91 to urge the element closed against the shoulder 94 which is, in effect, a valve seat.

Mounted slidably in the spider nut 92 is a valve stem 97 equipped at its inner end with a valve head 98, and having a nut 99 on its outer end for limiting the inward travel of the stem in the spider nut. The valve head 98 is adapted to engage against the valve seat element 95 to close the port 96 and a coiled spring 100 surrounds the stem 97 and bears against the spider nut and valve head to yieldingly hold the head seated, thus to resist the flow of oil through the valve from one side of the piston to the other in that direction that would permit the ejector to be moved forward under the pull of cable C.

It is to be understood that the strength of the spring 100 shall be definitely determined and such that it will retain the valve head seated over port 96 under the maximum pressure required for apron raising under all conditions, but thereafter it will yield under pressure of the hydraulic medium to allow flow of oil through the port 96 and thus allow the ejector to be advanced; such advancement being effected by the winding in of the cable C and the shortening of that part between the sheaves 37 and 37' and extended about the sheave 40 in the block 40'.

If the ejector is in an advanced position and tension on cable C is relieved, the spring 85 operates to retract the piston rod into the cylinder 65 and thus to retract the ejector plate. The incident return flow of oil through channels 86 and 88, from one side of piston 80 to the other, is permitted by reason of the fact that the inward movement of the valve head 98 is definitely limited by nut 99 and the valve seat element 95 has relatively free inward movement from the valve seat 94 when the hydraulic pressure is exerted in this direction. There is practically no resistance by the hydraulic medium to the return of the ejector and what resistance there may be, acts to cushion the return action.

By use of this snubber, the unsatisfactory practise heretofore followed of using a number of exceedingly heavy springs to withstand the forward pull of the cable C while the apron is being lifted, has been eliminated, and a better action both in apron and ejector movement is provided.

The raising and lowering of the bowl is effected through a cable A that extends from a winding drum in the tractor, such drum being designated at *g* in Fig. 6. This cable passes rearwardly about the under side of a sheave 120, carried on the boom, thence upwardly over a sheave wheel 121 carried on bracket 43, thence rearwardly over a sheave 122 on boom 21 and then is threaded through multiple sheave blocks 125 and 126 that

are attached respectively to the boom and to the forward end of the bowl frame structure. The end of the cable A is then dead ended by a clamp 138 on the boom. Raising and lowering of the bowl is independent of the apron and gate action; however, by reason of a relative lengthening and shortening of the distance between the upper end of the boom and the sheaves 37—37' with the raising and lowering operation, there is a certain cable action that has been explained fully in the copending application, that compensates for what might otherwise cause the gate to be moved relative to the bowl with the raising or lowering of the bowl.

With the snubber device so constructed and applied, there is the advantage of more positive control of the ejector and the elimination of long and heavy springs or other complicated equipment for this very desirable control of apron and ejector by a single cable.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. In a scraper of the character described, having a bowl, a load ejector therein and an ejector actuating mechanism; an ejector snubber comprising a hydraulic cylinder, a piston in the cylinder having a rod extended therefrom, a hydraulic medium filling the cylinder at both sides of the piston; said cylinder and rod being operatively fixed one to the scraper frame and one to the ejector in a manner whereby movements of the ejector between ejecting and retracted positions is in accordance with the permitted movements of the piston in the cylinder; said piston having a passage therethrough for by-passing of the hydraulic medium from one side to the other to permit piston movement and a valve mechanism in the passage operable to permit a relatively free by-passing of the medium when the ejector is being retracted by its actuating means, and operable to resist by-passing of the hydraulic medium with a predetermined force in the other direction.

2. In a scraper of the character described comprising a bowl, a load retaining apron therein adapted to be lifted to an open position and to close by gravity and an ejector adapted to be actuated to ejecting position and to be returned by spring means; a cable winding means, a cable extended therefrom and anchored at its end and having free running bights operatively connected with the apron and with the ejector for their actuation by pull on the cable effected through the winding mechanism, and a snubber mechanism for the ejector comprising a hydraulic cylinder, a piston in the cylinder having a piston rod extended from the cylinder; said cylinder and rod being operatively fixed one to the scraper frame and one to the ejector in a manner whereby movements of the ejector between ejecting and retracted positions is in accordance with permitted movements of the piston in the cylinder, a hydraulic medium filling the cylinder at both sides of the piston; said piston having a passage therethrough for by-passing of the hydraulic medium from one side to the other to permit piston movement and a spring loaded valve mechanism in the passage operable to permit a relatively free by-passing of the medium under pressure created by the spring means for retracting the ejector, and operable to resist by-passing of the hydraulic medium in the other direction with a predetermined force.

3. In a scraper, the combination with a relatively fixed member, a load ejector, and an ejector operating means, of a snubber for the ejector comprising a hydraulic cylinder, a piston in the cylinder having a rod extended therefrom; said cylinder and rod being operatively fixed, one to the ejector and one to the said relatively fixed member, means retaining retractive pressure on the piston, a hydraulic medium filling the cylinder at both sides of the piston; said rod having a passage therein opening to opposite sides of the piston and an annular valve seat in said passage, a valve member associated with said seat and movable from it to permit free flow of medium through the passage in one direction, and to close against it to check flow in the other direction; said valve member having a port therethrough, and a valve head supported in the passage in position to close said port when the valve member is disposed against said annular valve seat, and yieldable under a predetermined high pressure applied thereagainst through said port.

4. A combination as recited in claim 3 wherein the valve head is limited in movement toward the movable valve member, and is yieldingly mounted for movement in the other direction, and is adapted to be moved away from said port of the valve member under a predetermined high pressure of hydraulic medium applied thereagainst through the said port.

5. A combination as recited in claim 3 including also a valve stem guide fixed in the rod passage, a valve stem slidable in the guide and mounting said valve head thereon in position for closing the port of said valve member, and a spring acting against the valve head to resist with a predetermined force, movement of the head away from the port of said valve member.

6. In a scraper comprising a frame, a load carrying bowl supported therein, a load retaining apron associated with the bowl and adapted to be lifted to an open position and to close therefrom by gravity, and a load ejector movable in the bowl between retracted and ejecting positions; an operating cable common to the apron and ejector and having a pulling connection with the ejector for effecting its ejecting movements and having a free running, lifting connection with the apron, and an ejector snubber mechanism comprising a hydraulic cylinder and a piston therein having a rod extended from the cylinder; said cylinder and rod being operatively attached, one to the ejector and one to the frame; said piston having a passage therethrough, a hydraulic medium filling the cylinder at both sides of the piston, a retracting spring operable to return the ejector from ejecting to its retracted position when cable pull is sufficiently relieved and a valve mechanism operable to permit substantially free flow of the hydraulic medium through the piston passage for the return of the ejector under influence of said spring and operable to resist its flow therethrough in the other direction to the extent required to prevent functional movement of the ejector under pull of the operating cable until the apron has been fully lifted.

7. A scraper as recited in claim 6 wherein the said spring is confied under compression in the cylinder about the piston rod and acts against the piston rod and end head of the cylinder.

8. In a scraper comprising a frame, a load carrying bowl supported therein, a load retaining apron associated with the bowl and adapted to be lifted to an open position and to close therefrom by gravity, a load ejector movable in the

bowl between retracted and ejecting positions; an operating cable common to the apron and ejector and having a pulling connection with the ejector for effecting its ejecting movements and having a free running lifting connection with the apron, and an ejector snubber mechanism comprising a hydraulic cylinder, a piston therein and a piston rod extended from the cylinder; said cylinder and rod being operatively attached, one to the frame and the other to the ejector, a spring confined in the cylinder about said rod and acting against the piston to return the ejector from ejecting to retracted position when cable tension is sufficiently relieved; said piston rod having a passage therein opening to opposite sides of the piston and said cylinder being filled at both sides of the piston with a hydraulic medium, and a valve mechanism applied to said passage and operable to permit relatively free flow of the hydraulic medium therethrough in the direction that permits the return movement of the ejector by said spring and to resist its flow therethrough in the other direction to the extent required to prevent functional movement of the ejector under pull of the cable until the lifting movement of the apron has been stopped.

9. In combination with relatively fixed and movable members: a snubber for the movable member comprising a hydraulic cylinder operatively fixed to one member and a piston in the cylinder having a rod extended therefrom and operatively fixed to the other of said members, spring means in the cylinder maintaining retractive force on the rod, a hydraulic medium filling the cylinder at both sides of the piston; said rod having a passage therein opening to opposite sides of the piston for the by-passing of the hydraulic medium to permit piston movement and said passage having an annular valve seat therein, a valve member adapted to close against the seat to resist flow of medium through the passage in a direction that permits extending of the rod from the cylinder; said valve member having a port therethrough, a valve head yieldingly supported in the rod passage in position to seat in said port of the said valve member when the latter moves to a position closed against the said annular seat, and adapted under an increased pressure of medium thereagainst through said port, to be unseated for flow of medium that permits the rod to be extended.

10. A scraper comprising a mobile frame, a load carrying bowl supported therein, a load retaining apron associated with the bowl and adapted to be lifted to an open position and to close therefrom by gravity, a load ejector movable in the bowl between retracted and ejecting positions, a hydraulic snubber connected to the ejector to resist its ejecting action up to a predetermined amount and to return it to retracted position, under a lesser amount of force, a cable winding means, an operating cable extended therefrom and dead ended in the vehicle, a pulley block connected with the apron lifting means and adapted to move with the lifting of the apron, a stop against which the block comes into abutment when the gate is fully lifted and a pulley in the block; said operating cable having a bight with a free-running connection with the ejector, and another bight passing about the said pulley and operable, when decreased in length by the winding in of the cable, first to lift the apron and engage the pulley block against said stop to limit the lifting travel of the apron, and whereby continued winding of the cable decreases the length of the other bight of the cable to cause actuation of the ejector.

11. A scraper comprising a frame, a load carrying bowl supported therein, a load retaining apron associated with the bowl and adapted to be lifted to an open position, and to close therefrom by gravity, a load ejector movable in the bowl between retracted and ejecting positions, a hydraulic snubber for resisting its ejecting movement with a predetermined amount of force and to return it to retracted position after actuation with lesser force, a cable winding means, a cable extended therefrom and dead-ended in the vehicle, a pulley block connected with the apron lifting means to move therewith, a stop for limiting the block movement when the gate is fully lifted, a pulley in the block, and said cable having a bight with a free running connection with the ejector, and another bight passing about the said pulley; and adapted when wound in by the winding means, to decrease the length of the second mentioned bight to move said block against said stop to lift the apron to a definite open position, then to decrease the length of the first mentioned bight to actuate the ejector.

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