

May 26, 1942.

H. C. FRENTZEL, JR., ET AL

2,284,412

SCRAPER

Filed March 25, 1938

2 Sheets-Sheet 1

Fig. 1.

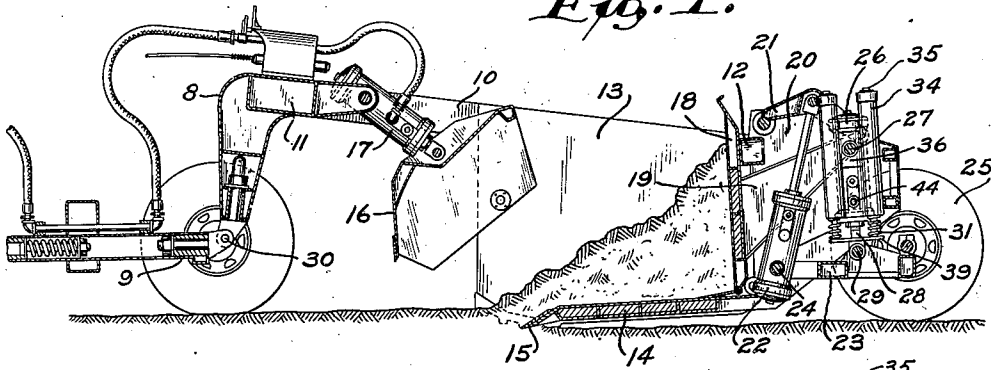
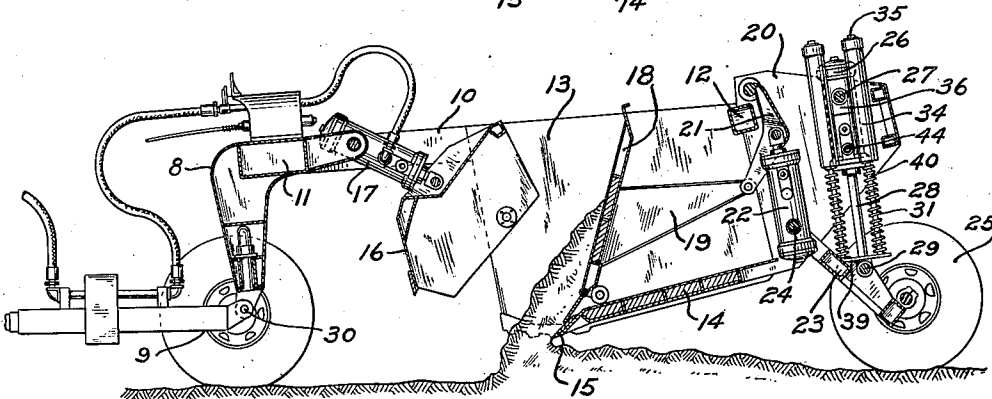


Fig. 2.

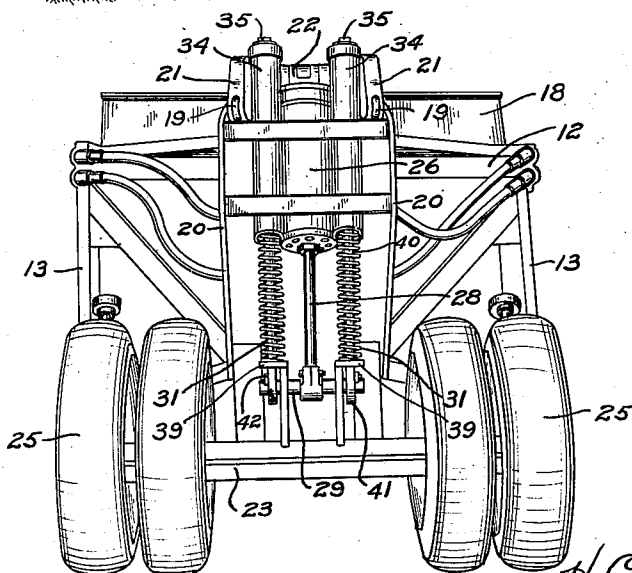


Fig. 3.

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2 Sheets-Sheet 2

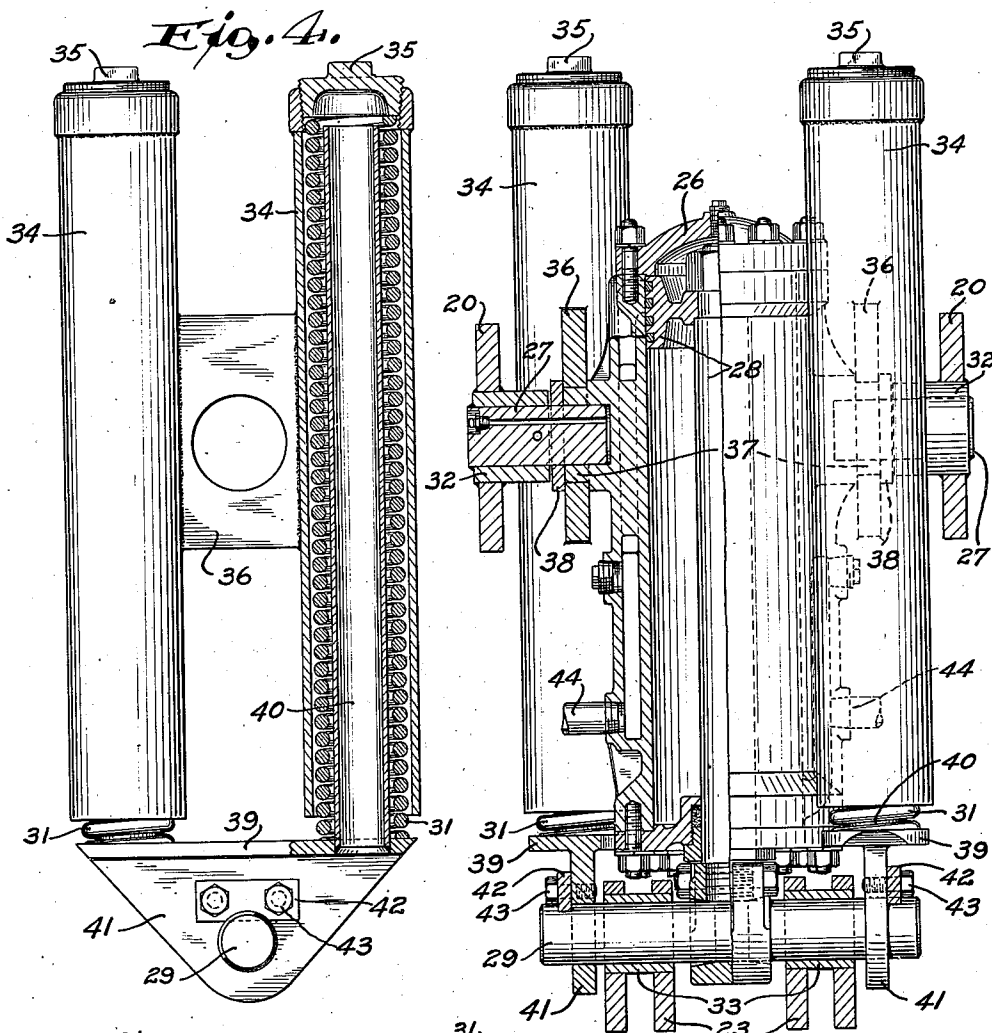
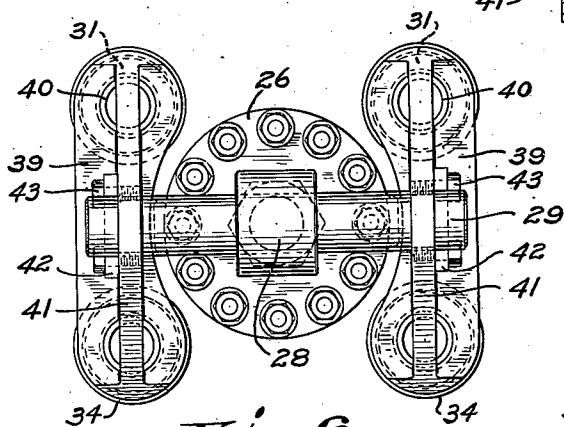


Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE

2,284,412

SCRAPER

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Application March 25, 1938, Serial No. 198,025

6 Claims. (Cl. 37—126)

The present invention relates to improvements in the construction and operation of scrapers of the type which are capable of both leveling ground and transporting excess earth from place to place, and this application is a continuation in part of our prior application Serial No. 150,232, filed June 25, 1937, and since issued as Pat. No. 2,169,946.

Generally defined, an object of our present invention is the provision of an improved grading and load transporting scraper assemblage, which is simple and durable in construction as well as being highly efficient in operation.

One of the more specific objects of this invention is to provide an improved dig and carry scraper assemblage having a wide range of use with minimum power consumption for predetermined capacity.

Another important specific object of our invention is the provision of a new and useful power actuated dirt mover, wherein the various movable parts and especially the load confining bowl, are operable with the aid of simplified and effective hydraulic jack mechanisms operable with minimum pressure.

A further specific object of the present invention is to provide improved mechanism for enabling smooth operation of the loading and unloading rig of a power scraper, with minimum effort and maximum speed, so that least time is required for normal operation of the equipment.

Still another specific object of our present invention is the provision of improved and automatically functioning means for assisting the load elevating mechanism of a scraper in its action, and for cushioning the cutting blade in its downward movement.

These and other objects and advantages of the present invention will be apparent from the following detailed description, and some of the novel features of scraper construction, which are shown but not specifically claimed herein, form the subject of our copending application hereinabove identified.

A clear conception of an embodiment of our present invention, and of the mode of constructing and of operating scraper mechanism built in accordance with the improvement, may be had by referring to the drawings accompanying and forming 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 a typical dig and carry scraper assemblage with

the cutter blade and bowl lowered into the cut, and the front apron elevated;

Fig. 2 is a similar view of the scraper with the blade and bowl elevated and the rear apron in the act of discharging a load from the bowl;

Fig. 3 is an enlarged rear perspective view of the improved scraper;

Fig. 4 is a further enlarged side elevation, partly in section, of the spring and casing assemblage on one side of the blade and bowl actuating jack;

Fig. 5 is a similarly enlarged part sectional rear view of the entire bowl lifting jack and power spring assembly; and

Fig. 6 is a bottom view of the lower portion of the jack and spring assembly alone.

Although our invention has been illustrated herein as being specifically applied to a hydraulically operated scraper assemblage capable of both leveling the ground and carrying loads of earth, and adapted to be drawn by a traction vehicle, it is not our intent to thereby unnecessarily restrict the scope, since some of the features may be more generally applicable to other types of scrapers.

Referring to the drawings, our improved dig and carry scraper as illustrated, comprises in general a main front frame 8 which is pivotally supported at its lower front portion upon a wheeled draft carriage 9 and has rearwardly extending laterally spaced side arms 10 rigidly interconnected at their front and rear ends by transverse upper beams 11, 12 respectively; an open ended load carrying bowl having parallel side walls 13 rigidly suspended from the side arms 10 and rear beam 12 and a flat bottom 14 rigidly connecting the lower extremities of the side walls 13; a cutting blade 15 firmly attached to the front portion of the bowl bottom 14; a front apron 16 pivotally suspended from the side walls 13 and being swingable toward and away from the scraper blade 15 between the walls 13 by means of a hydraulic jack 17 which is pivotally suspended from the front beam 11; a rear apron 18 movable within the bowl between the side walls 13 and over the bottom 14 and having rearwardly projecting integral actuating arms 19; rearwardly extending rigidly interconnected heavy ears or plates 20 firmly attached to the rear beam 12 of the main frame 8 and to the rear of the bowl; actuating levers 21 for the rear apron 18, pivotally suspended from the plates 20 and pivotally attached to the arms 19, and being operable by a second hydraulic jack 22; an auxiliary rear frame 23 having its front

end pivotally connected to the lower rear portion of the front/frame assemblage by means of a transverse pivot 24, and having its rear end pivotally suspended from rear transporting wheels 25; and a third hydraulic jack having a cylinder 26 pivotally suspended from the plates 20 by trunnion pins 27, and a piston 28 movable in the cylinder and connected to a medial portion of the rear frame 23 by means of a pivot pin 29.

The front or main frame assemblage including the arms 10, beams 11, 12, walls 13, bottom 14 and ears 20, is preferably formed of relatively stiff metal plates welded or otherwise firmly attached to each other so as to provide a rigid and durable unit, and this front frame structure is tiltable about a pivot 30 on the front draft carriage 9 so as to either position the bowl bottom 14 within the cut as shown in Fig. 1, or to elevate the bowl away from the ground as in Figs. 2 and 3. The rear or auxiliary frame 23 which is articulably connected with the main frame assemblage by means of the transverse pivot pin 24, from which the jack 22 is also pivotally suspended, is likewise formed of metal beams and plates so as to provide a strong assemblage which is swingable about the axis of the rear wheels 25 during raising and lowering of the bowl and the cutting blade 15. The draft vehicle or tractor for propelling the scraper assemblage over the ground, is ordinarily coupled to the draft carriage 9, and is provided with a pump and control levers which are operable to independently control the actuation of the jacks 17, 22, and of the rear jack which effects raising and lowering of the bowl.

In order to reduce to a minimum the hydraulic pressure necessary to move the piston 28 of the third jack, downwardly within the cylinder 26 so as to raise the bowl and its load, and also in order to cushion the downward movement of the bowl and blade 15, we have provided a group of helical compression springs 31 which cooperate with this jack in the manner shown in detail in Figs. 4, 5 and 6. As previously indicated, the jack cylinder 26 is suspended from trunnion pins 27 which are firmly attached to sleeves or bushings 32 rigidly secured to the plate ears 20 of the front frame, and the lower end of the piston 28 is pivotally connected to the medial portion of the rear frame 23 by means of a heavy pin 29 which is preferably carried by aligned bushings 33 rigidly attached to the auxiliary frame 23, as in Fig. 5. A group of four tubular spring casings or bushings 34 which are parallel to each other and arranged in sets of two on each side of the cylinder 26, is provided for confining the individual springs 31, and each housing 34 has an upper cap 35 with which the confined spring 31 coacts, and is open at its lower end. Each set of housings 34 is integrally united by means of a plate 36 having a central opening snugly embracing an adjacent cylinder trunnion socket 37 and confined thereon by means of a washer 38 embracing the corresponding trunnion pins 27 and coacting with the inner end of the adjacent bushing 32, so that the housings 34 are in fact secured to the cylinder 26 but may tilt slightly relative thereto. While the upper ends of the springs 31 react against the closure caps 35, the lower spring ends coact with brackets 39 having rigid upwardly projecting tubular guides 40 embraced by the springs 31 and extending into the casings or housings 34, and also having depending integral flanges 41 provided with aligned holes

for snug reception of the pivot pin 29. The opposite ends of the pin 29 are notched; and locking plates 42 which are secured to the flanges 41 by means of cap screws 43, engage these notches and prevent axial shifting of the pin 29, see Figs. 4, 5 and 6. The assemblage is obviously such that when the hydraulic jack expands as in raising or elevating the load, the springs 31 will also expand and assist the jack in its elevating movement; whereas lowering of the bowl by contraction of the jack through gravity action, will compress the springs 31 and will store energy therein while at the same time cushioning the downward motion of the bowl. Fluid such as oil may be admitted to and from the cylinder 26 of the rear hoist through piping 44 to raise the piston 28 and to permit lowering thereof, in a well known manner.

During normal operation of our improved scraper, the draft carriage 9 is connected to a suitable traction vehicle such as a tractor, and the circulating pump on the tractor may be placed in operation by the driver. The hydraulic jacks may then be operated independently of each other to either actuate the front and rear aprons 16, 18, or to elevate or lower the main bowl and scraper blade 15. When the scraper elements are positioned as shown in Fig. 1, and the assemblage is being drawn along the ground, the bowl is being loaded with dirt which piles up on the bottom 14 and against the rear apron 18 between the walls 13, as it enters the bowl over the scraper blade 15. With the blade 15 thus in cutting position, the bowl bottom 14 is disposed approximately horizontal, and the piston 28 is in the upper portion of the cylinder 26 while the springs 31 are compressed as illustrated in Figs. 1, 4 and 5. The front apron 16 is elevated so as to permit unobstructed entry of the dirt into the bowl, and the rear apron 18 is moved rearwardly within the bowl and engages the upper beam 12.

After the bowl has been sufficiently loaded, the front apron 16 may be lowered by operating the front jack 17 until this apron coacts with the blade 15, thereby positively confining the load within the bowl. The loaded bowl may thereafter be elevated by admitting fluid under pressure to the cylinder 26 above the piston 28, and thus expanding the rear hydraulic jack to the position shown in Figs. 2 and 3. During this expansion of the rear bowl actuating jack, the springs 31 which have been previously compressed and energized during lowering of the bowl, will also expand and will thereby materially assist the jack in relatively swinging the front and rear frames 9, 23 about the pivot pin 24. This bowl elevating action exerted by the springs 31 will obviously considerably reduce the fluid pressure required in the cylinder 26 when lifting or elevating relatively heavy loads, especially in starting such loads on their upward journey and when the blade 15 is still embedded in the cut.

When the bowl has been thus elevated, the scraper may be freely transported over the ground, and if it becomes desirable to subsequently dump the load, the front apron 16 may be elevated by operation of the front jack 17 and the rear apron 18 may be moved forwardly by operation of the second or intermediate jack 22, as illustrated in Fig. 2. The forwardly advancing rear apron 18 will then force the load out of the bowl over the blade 15, and the latter during its advancement over the ground will effectively

spread the dirt and level the same. After the bowl has been emptied, the jack 22 may again be manipulated to return the apron 18 to the rear of the bowl, and the front apron 16 may be retained in open position. Upon subsequent release of the fluid pressure within the cylinder 26 of the rear jack, the weight of the bowl and of the other elements associated with the rear portion of the main frame 8, causes the frames 8, 23 to swing downwardly at the pivot pin 24 and about their pivotal axes, thereby returning the bowl and the blade 15 to the position shown in Fig. 1 and again compressing the springs 31 to store up potential energy. It will thus be noted, that these springs 31 not only assist in elevating the bowl and load, but also function to cushion the downward movement of the relatively heavy scraper parts.

From the foregoing detailed description of the construction and operation of a dig and carry scraper, it will be apparent that our present invention provides a simple, compact and durable assemblage wherein the load carrying bowl is quickly and effectively operable with minimum power. The improved power and cushioning spring assemblage besides most effectively performing its function by virtue of the location thereof at the extreme end of the main frame 8 and relatively near the bowl, is also well protected against possible damage due to impact with objects in the path of travel of the scraper. The provision of a group of these springs carried by and located closely adjacent to the rear jack, most effectively distributes the spring pressures and provides a compact spring assemblage. The invention has moreover proven highly successful in actual commercial operation, and has made it possible to load and unload with maximum speed and minimum effort.

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

We claim:

1. In a scraper, articulably connected front and rear frames transportably supported upon front and rear wheels, a load receiving bowl suspended from the rear portion of said front frame, a hydraulic jack having a cylinder suspended from said front frame in back of said bowl and having a plunger movable in said cylinder and connected to the medial portion of said rear frame, housings carried by said cylinder, brackets carried by said plunger, and springs within said housings and coacting with said brackets and said housings.

2. In a scraper, articulably connected front and rear frames transportably supported upon front and rear wheels, a load receiving bowl suspended from the rear portion of said front frame, a hydraulic jack having a cylinder suspended from said front frame in back of said bowl and having a plunger movable in said cylinder and connected to said rear frame, a housing carried by said cylinder, a bracket carried by said plunger, and a spring within said housing and coacting with said bracket and said housing.

3. In a scraper, pivotally interconnected front and rear frames mounted for transportation along the ground, a scraper blade suspended from one of said frames, a hydraulic jack having a cylinder connected to one of said frames and having a plunger movable in said cylinder and connected to the other frame, a housing carried by said cylinder, a bracket carried by said plunger, and a spring within said housing and coacting with said bracket and said housing.

4. In a scraper, pivotally interconnected front and rear frames mounted for transportation along the ground, a scraper blade suspended from one of said frames, a hydraulic jack having a cylinder suspended from one of said frames and having a plunger movable in said cylinder and connected to the other frame, a housing carried by said cylinder, a bracket carried by said plunger, and a spring within said housing and coacting with said bracket and said housing.

5. In a scraper, pivotally interconnected front and rear frames mounted for transportation along the ground, a scraper blade suspended from one of said frames, a hydraulic jack having a cylinder connected to one of said frames and having a plunger movable in said cylinder and connected to the other frame, a pair of housings connected to each side of said cylinder, a pivot pin carried by and extending transversely of said plunger, a bracket carried on each end of said pivot pin, and a spring within each of said housings, one pair of said springs coacting with each bracket.

6. In a scraper, relatively movable front and rear frames mounted for transportation along the ground, a scraper blade suspended from one of said frames, a hydraulic jack including a cylinder interposed between said frames for relatively moving the same to raise said blade, a housing connected to said cylinder, and a spring having a part received in and coacting with said housing cooperating with said jack to assist the same in elevating said blade and to cushion the lowering movement thereof.

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