March 29, 1932. R. S. STEPHENS 1,851,333

DITCH SCRAPER

Filed Jan. 18, 1929 3 Sheets-Sheet 1

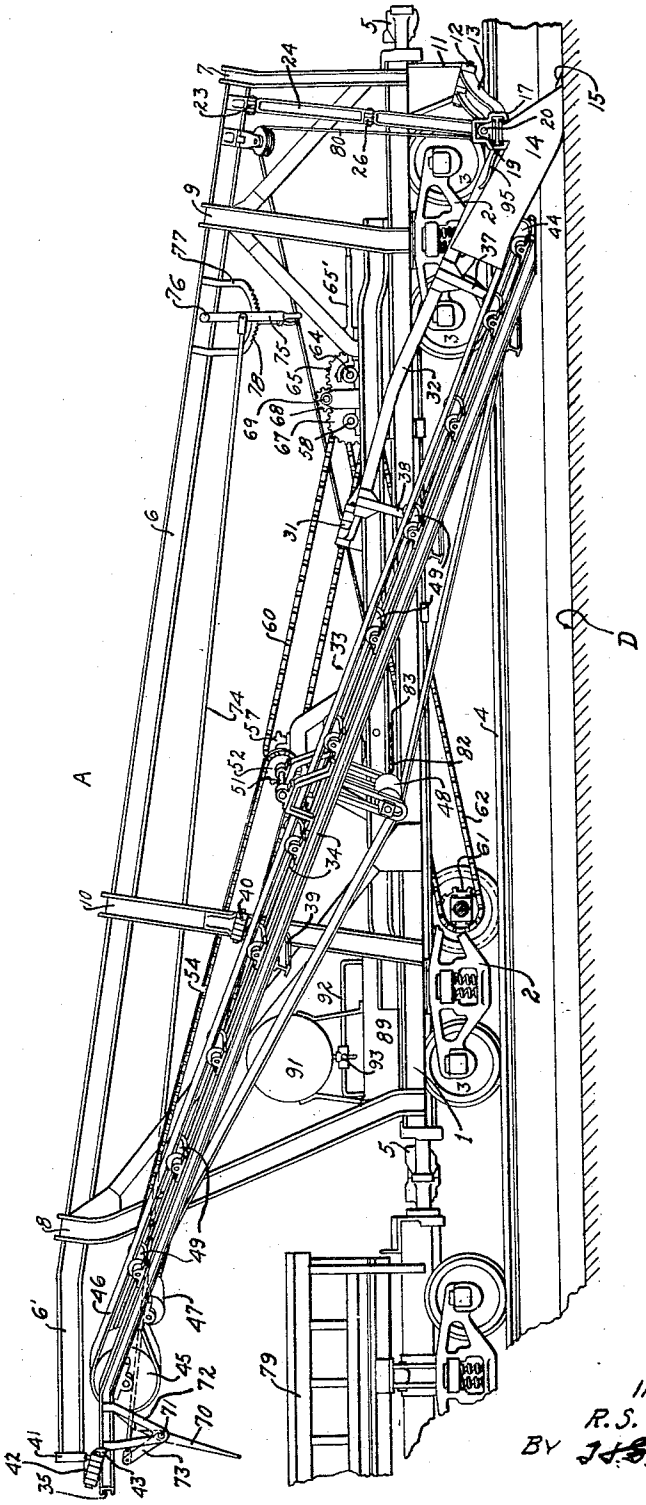

Fig. 1

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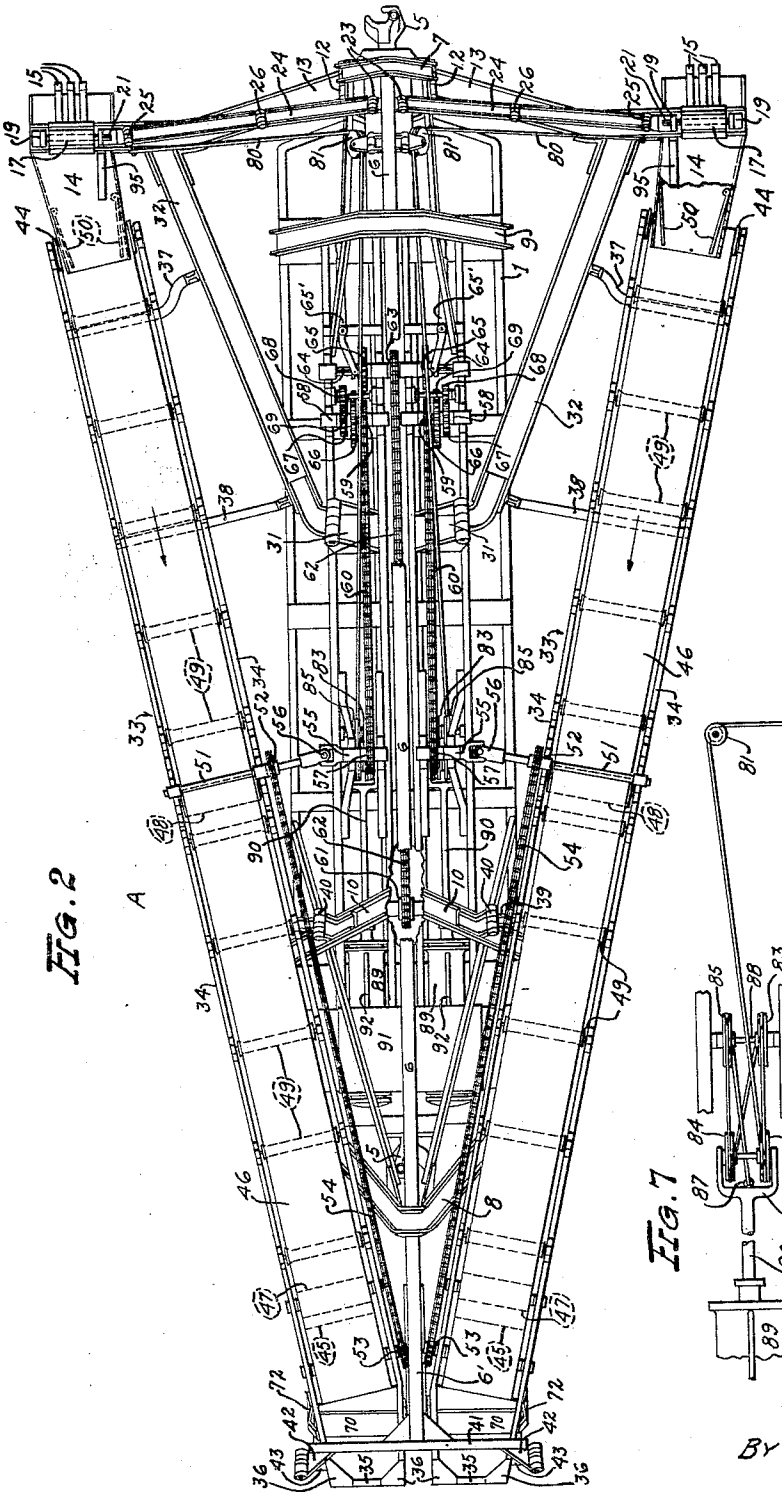

FIG. 2

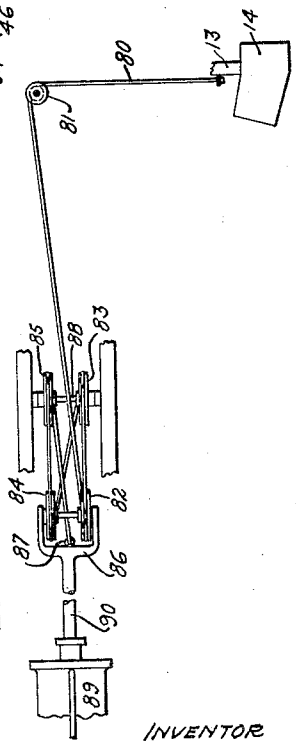

FIG. 7

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FIG. 3

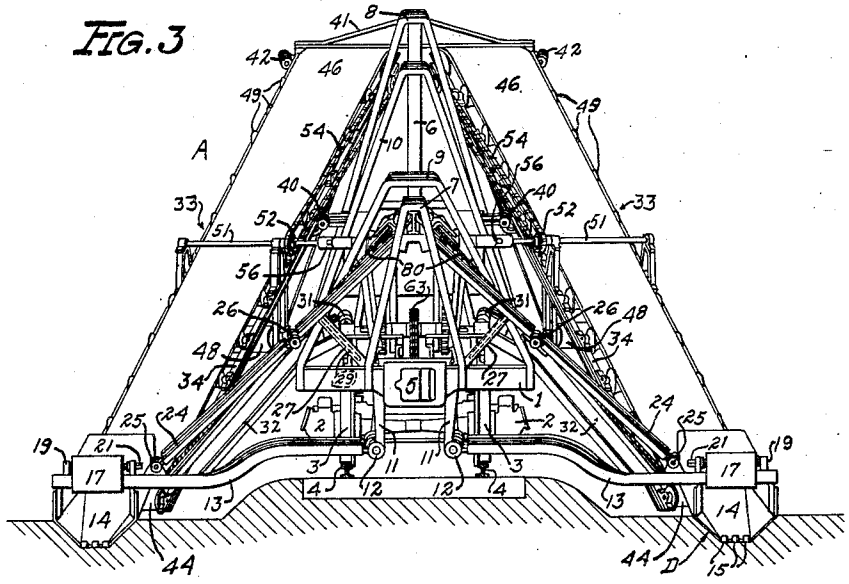


FIG. 4

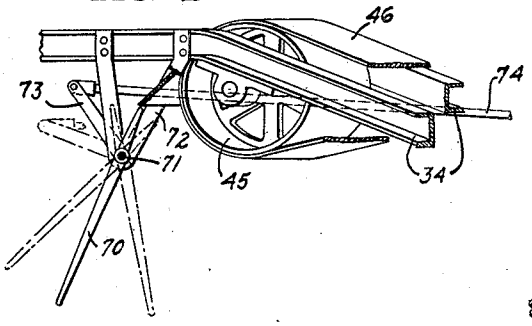


FIG. 6

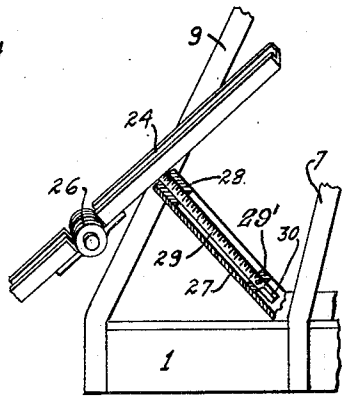
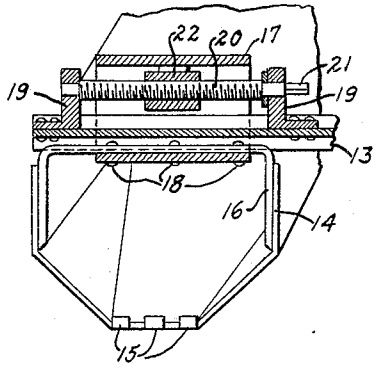


FIG. 5



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Patented Mar. 29, 1932 1,851,333

UNITED STATES PATENT OFFICE

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DITCH SCRAPER

Application filed January 18, 1929. Serial No. 333,277.

This invention relates generally to dirt scraping apparatus, and more specifically to an improved scraping machine adapted for use in the maintenance of the drainage ditches forming parts of railroad rights of way, the predominant object of the invention being to produce a portable apparatus of this type which may be attached to a steam locomotive or other movement initiating means and drawn along the right of way in a manner to cause the loose dirt and other matter which has accumulated in the drainage ditches to be removed therefrom.

Prior to this invention the task of maintaining drainage ditches of railroad rights of way free from accumulated matter has been a very expensive one, due to the absence of suitable equipment which would perform the task efficiently in an economical manner. In the use of my improved apparatus, the drainage ditches at both sides of the right of way are simultaneously scraped and the gathered material resulting from such scraping operations is automatically carried away from the scraping elements of the apparatus to a point remote therefrom, where said material is deposited in a suitable receptacle, which preferably is in the form of a dump car which travels along the right of way with the scraping apparatus.

Another important feature of the invention is to produce a scraping apparatus of the type referred to having widely extended portions adapted to support the scrapers at the opposite sides of the apparatus, which widely extended portions may be folded when not in use to permit passage of the scraping apparatus through restricted places along the railroad right of way, and to permit transportation of the apparatus from place to place.

With the foregoing and other objects in view, the invention comprises the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

Fig. 1 is a side elevation of a scraping apparatus constructed in accordance with my invention.

Fig. 2 is a plan view of the apparatus illustrated in Fig. 1.

Fig. 3 is a front elevation of my improved scraping apparatus.

Fig. 4 is an enlarged fragmentary detail illustrating a deflector forming a part of the apparatus.

Fig. 5 is an enlarged detail, partly in section and partly in elevation, showing the means for adjusting the scrapers to different transverse positions.

Fig. 6 is an enlarged detail illustrating the means for adjusting the scrapers vertically.

Fig. 7 is a fragmentary detail showing the arrangement of one of the cables utilized in moving the scrapers and dirt conveyors at opposite sides of the apparatus to folded positions.

In the drawings, A designates my improved scraping apparatus as a whole, said apparatus including a bed frame 1 supported on trucks 2 of the type usually found on railroad rolling stock. The trucks 2 are provided with the usual wheels 3 which operate over the railroad rails 4 forming a part of the railroad road bed, which road bed at its opposite sides is provided with the usual drainage ditches D. At its front and rear ends the bed frame 1 of the apparatus A is provided with coupler elements 5 whereby said apparatus may be coupled to other elements of railroad rolling stock for the purpose of conducting the apparatus along the railroad right of way.

Arranged above the bed frame 1 of the apparatus A is a beam 6 (Figs. 1, 2 and 3), said beam being supported from the bed frame 1 by a plurality of supporting elements which are approximately inverted V-shaped. One of these supporting elements, which is designated by the reference character 7, is located at the front end of the beam 6, another thereof, designated by the reference character 8, is positioned adjacent to the rear end of the beam 6, while a pair of said supporting ele-

ments designated by the reference characters 9 and 10, respectively, are located intermediate of said supporting elements 7 and 8, as shown clearly in Fig. 1. The major portion of the beam 6 inclines downwardly from the rear to the front portion of the apparatus, and the extreme rear portion 6′ of the beam is approximately parallel with the top surface of the bed frame and overhangs the rear end of said bed frame, as shown in Fig. 1. The beam 6 is secured in any suitable manner to the supporting elements 7, 8, 9 and 10, and these supporting elements are suitably attached to the bed frame 1.

Secured to and extended downwardly from the bed frame 1 of the apparatus A, at the front end thereof, is a pair of supporting members 11 (Fig. 3), these supporting members being spaced apart from each other laterally of the apparatus and each thereof being provided at its lower end with a hinge portion 12. Hingedly attached to the hinge portions 12 of the supporting members 11 are arms 13, said arms being extended in opposite directions from the members 11 as shown in Fig. 3, and being shaped so that the outer end portions thereof are in a lower plane than the inner end portions thereof when said arms are in their operative horizontal positions, as shown in Fig. 3. The arms 13 are preferably in the form of I-beams, and each thereof adjacent to its outer end supports a scraper 14 (Figs. 1 and 5), said scrapers being so positioned on the arms 13 as to coincide vertically with the drainage ditches D at the opposite sides of the railroad road bed.

The scrapers 14 comprise each a housing closed at its top, bottom and sides and open at its front and rear ends, the side walls of said housing at the front edge thereof being inclined from top to bottom, as shown in Fig. 1, and being provided at the lower portion of said front edge with sharpened scraping elements 15. The housings comprising the scrapers 14 extend rearwardly and inwardly with respect to the apparatus, as shown clearly in Fig. 2. At the extreme forward portion thereof each of the scrapers is open at its top and fixed to said scraper at said open top portion is an inverted U-shaped element 16 (Fig. 5), the side legs of said element being secured to the opposite side walls of the scraper and the intermediate leg thereof being extended across the top of the scraper. 17 designates hollow members open at their opposite ends, one of which is associated with the scraper, said hollow members having the irregular cross-sectional shape shown in Fig. 1. The inverted U-shaped element 16 associated with the scraper with which a particular hollow member 17 is associated extends through said hollow member 17, and also the associated arm 13 extends loosely through said hollow member. The hollow member of each scraper is rigidly fixed to the inverted U-shaped element of said scraper, as shown in Fig. 5, the means of attachment shown in this view being the rivets 18.

Fixed to each of the arms 13 adjacent to the scraper associated therewith is a pair of spaced brackets 19 which support for rotation a screw-threaded member 20. This screw-threaded member 20 is provided with a non-circular end portion 21 to which a suitable tool may be applied for the purpose of rotating said screw-threaded member. The associated hollow member 17 is provided with an internally screw-threaded element 22 arranged in fixed relation to said hollow member and the screw-threaded member 20 passes through said internally screw-threaded element 22.

In view of the arrangement just described, it is obvious that each of the scrapers 14 may be adjusted longitudinally of the arm 13 with which it is associated by merely rotating the associated screw-threaded member 20, the direction of movement of the scrapers depending on the direction of rotation of the screw-threaded members.

Secured to the beam 6 at opposite sides thereof are hinge elements 23, to each of which a downwardly inclined arm 24 is hingedly attached. At its opposite end each of the arms 24 is hingedly attached to a hinge element 25 which is secured to one of the horizontal arms 13. Also intermediate of its opposite ends each inclined arm 24 is provided with a hinge joint 26 by which the two arm portions of which each arm 24 is comprised are hingedly joined together. The inclined arms 24 aid in supporting the scrapers 14 and it is obvious that said scrapers may be swung upwardly and inwardly with respect to the apparatus, the arms 13 swinging on the hinges at the inner ends thereof, and the arms 24 breaking upwardly at the hinge joints 26 and the arm portions thereof swinging on the hinges at the outer ends thereof.

Associated with each of the inclined arms 24 is an adjusting means which comprises a member 27 rigidly fixed to the bed frame of the apparatus. The members 27 are each provided with an internally threaded element 28 (Fig. 6) through which a screw-threaded rod 29 extends, said element being fixed to the associated member 27. Each of the screw-threaded rods 29 at one end thereof is provided with a non-circular portion 30 and at its opposite end said screw-threaded rod projects beyond the adjacent element 28 and contacts with the adjacent inclined arm 24. Also, each screw-threaded rod 29 has a collar 29′ rigidly fixed thereon to guide same during movement thereof. It is obvious that by applying a tool to the non-circular end portions of the screw-threaded rods 29 and rotating same the lower portions of the arms 24 may be adjusted vertically to

regulate the vertical positions of the scrapers 14.

Fixed to the bed frame 1 of the apparatus is a pair of hinge elements 31 (Fig. 2) to each of which an arm 32 is hingedly attached. At the end of each of the arms 32, opposite to the end thereof which is attached to the associated hinge element 31, said arm is attached to one of the horizontal arms 13 which support the scrapers 14. The arms 32 serve to brace the scrapers 14 when same are in use, and because of the hinge joints at the rear ends of said arms 32 the forward portions thereof may swing upwardly when the scrapers and the elements associated therewith are moved to elevated positions.

Arranged at opposite sides of the apparatus is a pair of dirt conveyors 33 which extend from the respective scrapers 14 to a point beyond the rear end of the apparatus. The conveyors converge toward each other as they extend from front to rear of the apparatus as shown in Fig. 2, and when viewed in side elevation as shown in Fig. 1 said conveyors are each inclined upwardly from front to rear of the apparatus. Each conveyor 33 comprises a pair of frame members 34 which are spaced apart in a transverse direction and extend from one end of the conveyor to the other thereof. The frame members 34 at the extreme rear ends of the conveyors 33 are arranged approximately horizontally, as shown in Fig. 1, and the frame members of each conveyor are joined by an end frame member 35 which is secured to the associated side frame members by suitable gusset plates 36. Extended transversely of each of the conveyors 33 in a manner to secure the side frame members 34 together is a plurality of beams 37, 38 and 39. These beams, which are spaced longitudinally of the conveyors, extend inwardly beyond said conveyors and the beams 37 and 38 are turned upwardly at their inner ends and are rigidly fixed at said inner ends to the arms 32 already referred to herein (Fig. 2). The inner end of the transverse beam 39 associated with each conveyor 33 is hingedly attached to a hinge element 40 which is fixed to the supporting element 10, as shown in Figs. 1 and 2. At the extreme rear end of the beam 6 of the apparatus I rigidly secure a transverse bar 41 to which is fixed at the opposite ends thereof a pair of hinge elements 42. The respective hinge elements 42 have hingedly secured to them hinge elements 43 which are secured to the outer side frame members of the respective conveyors 33 whereby said conveyors are hingedly attached to said transverse bar 41.

Mounted for rotary motion in suitable bearings at the forward end of each conveyor 33 is a pulley 44, and mounted for rotary motion in suitable bearings at the rear of each conveyor is a relatively large pulley 45. 46 designates an endless belt which operates over the pulleys 44 and 45 of each conveyor 33, said belt being of substantial width as shown in Fig. 2. The endless belt 46 of each conveyor passes around the pulley 45 and over a pulley 47 (Fig. 1) arranged adjacent to said pulley 45, and from said pulley 47 said endless belt passes beneath a belt tightening pulley 48 which is arranged for adjustment toward and away from the associated conveyor, whereby any slack which develops in the endless belt may be taken up. Mounted for rotation in suitable bearings spaced longitudinally of the conveyors 33 are rolls 49 which serve to support the upper flights of the endless belts 46. As shown clearly in Figs. 1 and 2, the forward ends of the endless belts 46 are located immediately beneath the rear or discharge ends of the scrapers 14. Also, as indicated by Fig. 2, each scraper has pivotally supported therein a pair of deflectors 50, the function of which will be hereinafter set forth.

Mounted for rotation in suitable bearings supported by the side frame members of each conveyor is a shaft 51 which extends transversely of the conveyor, each of said shafts having a sprocket wheel 52 fixedly mounted thereon. Fixed to the shaft on which the pulley 45 of each conveyor 33 is mounted is a sprocket wheel 53, and operating over the sprocket wheels 45 and 53 of each conveyor is a sprocket chain 54. Each of the shafts 51 is connected to a short transverse shaft 55 (Fig. 2), suitably supported for rotation, by means of a universal joint 56, and each of said short transverse shafts 55 has a sprocket wheel 57 mounted thereon for rotation therewith. 58 designates a second pair of short shafts which are mounted for rotation in suitable bearings, said shafts 58 being extended transversely of the apparatus and being alined with each other, also the respective short shafts 58 are alined longitudinally of the apparatus with the short shafts 55, as shown in Fig. 2. Fixedly mounted on each of the short shafts 58 is a sprocket wheel 59, said sprocket wheel being alined longitudinally of the apparatus with the respective sprocket wheels 57 on the shafts 55, and operating over each pair of longitudinally alined sprocket wheels 57 and 59 is a sprocket chain 60.

By referring to Figs. 1 and 2, it will be noted that an axle of one of the trucks 2 of the apparatus has fixed thereto a sprocket wheel 61 over which a sprocket chain 62 operates. This sprocket chain also operates over a sprocket wheel 63 (Fig. 2) mounted on a shaft 64 extended transversely of the apparatus. The shaft 64 is mounted for rotary motion in suitable bearings supported by the bed frame of the apparatus. 65 designates a pair of gear wheels which are keyed to the shaft 64 so that they will rotate with said shaft

while being permitted to move longitudinally with respect thereto, each of said gear wheels 65 having a pivoted operating lever 65′ associated therewith by means of which said gear wheels may be shifted longitudinally of the shaft. Fixedly mounted on the shaft 58 is a pair of gear wheels 66 and fixedly mounted on said shaft 58 at points outwardly of the gear wheels 66 is a pair of gear wheels 67. The gear wheels 67 are arranged in mesh with intermediate reversing pinions 68 which are mounted on short transverse shafts 69 supported for rotation in suitable bearings. In Fig. 2 the gear wheels 65 are shown in inoperative positions, but it is obvious that by moving the levers 65′ said gear wheels may be shifted longitudinally of the shaft 64 to cause same to mesh either with the gear wheels 66 or the intermediate reversing pinions 67.

In the operation of the apparatus, rotary motion is transmitted from the axle on which sprocket wheel 61 is mounted to the shaft 64 through the instrumentality of the sprocket chain 62. When the gear wheels 65 are in mesh with the gear wheels 66 it is plain that motion of the shaft 64 will be transmitted through said gear wheels to the shafts 58, which motion will in turn be transmitted from the shafts 58 to the shafts 55 by the sprocket chains 60. Motion of the shafts 55 will then be transmitted through the universal joints 56 to the shafts 51, thence to the sprocket wheels 53 through the instrumentality of the sprocket chains 54, whereby the pulleys 45 will be rotated to impart movement to the endless belts 46.

Located at the rear or discharge end of each of the endless belts 46 is a deflector 70 which is pivoted at 71 to suitable supporting elements 72 which depend from the frame members 34 of the respective conveyors. Each deflector comprises a flat blade which is of the approximate width of the associated endless belt and the pivot pin of each deflector has fixed thereto an arm 73 (Fig. 1). Attached to the outer end of each of the arms 73 is a rod 74 which extends longitudinally of the apparatus, and is attached at its forward end to an operating lever 75, said operating lever being pivotally secured to the beam 6 at the point designated by the reference character 76. Each of the operating levers 75 has associated with it a member 77 provided with an arcuate face 78 with which a suitable detent cooperates to lock the operating lever in positions to which it has been adjusted.

Attached to the apparatus A in the usual manner by coupling elements is a car 79 adapted to receive the dirt or other material removed from the drainage ditches by the apparatus (Fig. 1), said car 79 being of ordinary construction and being disposed immediately beneath the deflectors 70.

Associated with each of the conveyors 35 is a cable 80, by means of which the conveyors may be drawn upwardly so that the apparatus may be moved from place to place and may pass through restricted places along the railroad right of way. Each cable 80 is attached to the arm 13 associated with one of the scrapers 14, as shown in Fig. 7, and said cable passes upwardly from said arm to a sheave 81 over which the cable passes. The cables 80 pass from the sheaves 81 toward the rear of the apparatus, where each of said cables passes around a sheave 82 from the bottom to the top thereof and then passes to a sheave 83, around which it passes from top to bottom. Each cable 80 then passes around a sheave 84 from bottom to top thereof and passes then to a sheave 85, around which it passes from top to bottom. The sheaves 82 and 84 associated with each cable 80 are rotatably supported by a shaft carried by a yoke 86, and after passing around the sheave 85 as described, each cable passes to the associated yoke 86 to which the cable is rigidly attached, as shown at 87 in Fig. 7. The sheaves 83 and 85 associated with each cable are rotatably mounted on a shaft 88 suitably supported by the bed frame of the apparatus A.

89 designates a pair of compressed air cylinders which are mounted on the bed frame of the apparatus, each of said cylinders having a reciprocatory piston mounted therein (not shown) with which a piston rod 90 is associated. The yokes 86 already referred to are located at the outer ends of the piston rods 90, whereby on movement of the pistons within the cylinders 89 said yokes 86 and the sheaves 82 and 84 associated therewith will receive like movement. 91 designates a compressed air reservoir, which is connected to the compressed air cylinders by suitable conductors 92, passage of compressed air through said conductors being controlled by a valve 93 (Fig. 1).

In the use of my improved apparatus the scrapers 14 are arranged so that the lower forward portions thereof fit into the drainage ditches D, and when this is being accomplished the scrapers may be adjusted vertically by the screw-threaded members 29, or transversely with respect to the ditches by the screw-threaded members 20 (Figs. 3, 5 and 6). When the scrapers have been properly positioned with respect to the ditches D, the apparatus will be drawn forward by the locomotive or other movement imparting means to which the apparatus is attached. Immediately before movement is imparted to the apparatus, the operating levers 65′ are operated to move the gear wheels 65 into mesh with the gear wheels 66, and therefore on forward movement of the apparatus the endless belts 46 will be driven so that the top flight thereof moves rearwardly of the apparatus, as indicated by the arrows in Fig. 2. With

the endless belts operating as described, it is obvious that dirt scraped from the drainage ditches D will pass upwardly and rearwardly through the scrapers 14 and said dirt will be deposited on the endless belts 46, and as a result of the movement of said endless belts the dirt will be conveyed to the rear of the apparatus, where it will be discharged from the endless conveyors into the car 79 which is attached to the apparatus. The dirt which is conveyed to the rear of the apparatus by the conveyors 46 slides along the deflectors 70, as it is discharged from the endless belts, and therefore by adjusting the positions of the deflectors by manipulation of the operating levers 75 the dirt discharged into the car 79 may be distributed therein.

The scrapers 14 are adjustable transversely of the apparatus with respect to the forward ends of the endless belts, and to insure deposit of the dirt being scraped from the drainage ditches on said endless belts, I utilize the pivoted deflectors 50. These deflectors are adjustable to different positions so that the dirt will pass from the scrapers onto the endless belts, even though the discharge ends of the scrapers are not in exact alinement with the endless belts. The upper edges of the deflectors 50 contact closely with the top walls of the scrapers, whereby friction will retain said deflectors in the positions to which they have been adjusted.

It may be necessary, in the use of the apparatus, to move same rearwardly for short distances, and to prevent the direction of movement of the endless belts 46 from being reversed when this is done, so that any dirt which may be on said endless belts would be carried forwardly, I employ the intermediate reversing pinions 68 already referred to. When the apparatus is to be moved rearwardly the operating levers 65′ will be moved to shift the gear wheels 65 into mesh with the intermediate pinions 68, whereby, in spite of the rearward movement of the apparatus, the endless belts will be operated in the direction indicated by the arrows in Fig. 2.

When it is desired to transport the apparatus from place to place, or when it is necessary for same to pass through restricted places along the railroad right of way, the scrapers 14, together with the conveyors 33, may be folded upwardly and rearwardly. This may be accomplished by operating the compressed air controlling valve 93 to permit compressed air to pass into the air cylinders 89 in a manner to move the pistons therein rearwardly. This rearward movement of the pistons within the cylinders will result in like rearward movement of the yokes 86 associated with said pistons, and because the cables 80 associated with the respective scrapers are secured to said yokes and to the arms 13, said arms will be moved upwardly on their hinges, in the manner already described, to elevate the scrapers. The hinged arms 32 shown clearly in Fig. 2 are attached to the arms 13, as already described, and the conveyors 33 are attached to these arms 32 by means of the members 37 and 38, hence when the arms 13 are raised to elevate the scrapers 14 the conveyors 33 will be likewise elevated, said conveyors hinging at the hinge elements 31, 40 and 42 shown in Fig. 2. Also, hinging action will take place at the universal joints 56, thus permitting the shafts 51 to move with the conveyors. It is plain, therefore, that on introduction of compressed air into the air cylinders 89 the scrapers 14 and conveyors 33 will be elevated upwardly and inwardly with respect to the apparatus, substantially reducing the width of said apparatus.

It is obvious that the associated scraper and conveyor at either side of the apparatus may be operated while the scraper and conveyor at the opposite side thereof is elevated or is maintained inoperative, as each associated scraper and conveyor is operated independently of the opposite scraper and conveyor. Also it is plain that the scrapers 14 need not have the precise shape shown, as scrapers adapted for use in ditches having different shapes would be shaped correspondingly.

By referring to Fig. 2 of the drawings it will be noted that I employ a pair of springs 95 which preferably, though not necessarily, comprise leaf springs. One of these leaf springs is associated with each of the scrapers 14, said leaf spring being fixed at one of its ends to one of the arms 13 and the opposite end portion thereof being extended from said arm 13 and being in contact with the top wall of the associated scraper. The scrapers 14 are suspended from the screw-threaded members 20, and in the absence of means for preventing such movement, contact of the forward edges of the scrapers with the ground when the apparatus is in motion would cause the scrapers to pivot rearwardly about the screw-threaded members 20. However, the pressure of the springs 95 acting against the top walls of the scrapers prevents such movement of the scrapers unless the scrapers strike some immovable object, such as a large rock, and in this event the springs 95 will yield, permitting the scrapers to swing rearwardly a sufficient distance to pass over the obstruction.

While throughout this specification I have stated that my improved apparatus is intended particularly for use in maintaining drainage ditches, it is obvious that the apparatus may be used to dig the drainage ditches in the first instance. Also, I wish to state, when I use the term "dirt" herein I refer to any material which may be handled by the apparatus as a result of scraping or digging operations.

I claim:

1. A ditch scraper comprising a portable apparatus adapted for attachment to motive means movable along a railroad right of way, said apparatus including a scraper arranged to be extended into a drainage ditch at a side of said railroad right of way and being movable therethrough during movement of the apparatus, means for adjusting said scraper laterally of the apparatus, a conveyor for conducting material from said scraper to a point remote therefrom, and a deflector at the discharge end of said scraper for guiding the material discharged from said scraper onto said conveyor.

2. A ditch scraper comprising a portable apparatus adapted for attachment to motive means movable along a railroad right of way, said apparatus including a scraper arranged to be extended into a drainage ditch at a side of said railroad right of way and being movable therethrough during movement of the apparatus, means for adjusting said scraper laterally of the apparatus, a conveyor for conducting material from said scraper to a point remote therefrom, and a pivoted deflector at the discharge end of said scraper for guiding the material discharged from said scraper onto said conveyor.

3. A ditch scraper comprising a portable apparatus adapted for attachment to motive means movable along a railroad right of way, said apparatus including a scraper arranged to be extended into a drainage ditch at a side of said railroad right of way and being movable therethrough during movement of the apparatus, means for adjusting said scraper laterally of the apparatus, a conveyor for conducting material from said scraper to a point remote therefrom, and a pair of pivoted deflectors at the discharge end of said scraper for guiding the material discharged from said scraper onto said conveyor.

4. A ditch scraper, comprising a portable apparatus adapted for attachment to motive means movable along a railroad right of way, said apparatus including a scraper arranged to be extended into a drainage ditch at a side of said railroad right of way and being movable therethrough during movement of the apparatus, a conveyor for conducting material from said scraper to a point remote therefrom, a support for said scraper, means whereby said scraper may be adjusted transversely of the apparatus, and yieldable means adapted to oppose pivotal movement of said scraper with respect to said support.

5. A ditch scraper comprising a portable apparatus adapted for attachment to motive means movable along a railroad right of way, said apparatus including a scraper arranged to be extended into a drainage ditch at the side of said railroad right of way and being movable therethrough during movement of the apparatus, a conveyor for conducting material from said scraper to a point remote therefrom, a support for said scraper, and means associated with said support for pivotally supporting said scraper, said means serving to adjust said scraper transversely of the apparatus.

6. A ditch scraper comprising a portable apparatus adapted for attachment to motive means movable along a railroad right of way, said apparatus including a scraper arranged to be extended into a drainage ditch at the side of said railroad right of way and being movable therethrough during movement of the apparatus, a conveyor for conducting material from said scraper to a point remote therefrom, a support for said scraper, means associated with said support for pivotally supporting said scraper, said means serving to adjust said scraper transversely of the apparatus, and means adapted to oppose pivotal movement of said scraper with respect to said support.

In testimony that I claim the foregoing I hereunto affix my signature.

ROBERT S. STEPHENS.