

July 11, 1939.

V. S. PENOTE

2,165,299

CLEANER FOR TRENCHING MACHINES

Filed Oct. 7, 1937

3 Sheets-Sheet 1

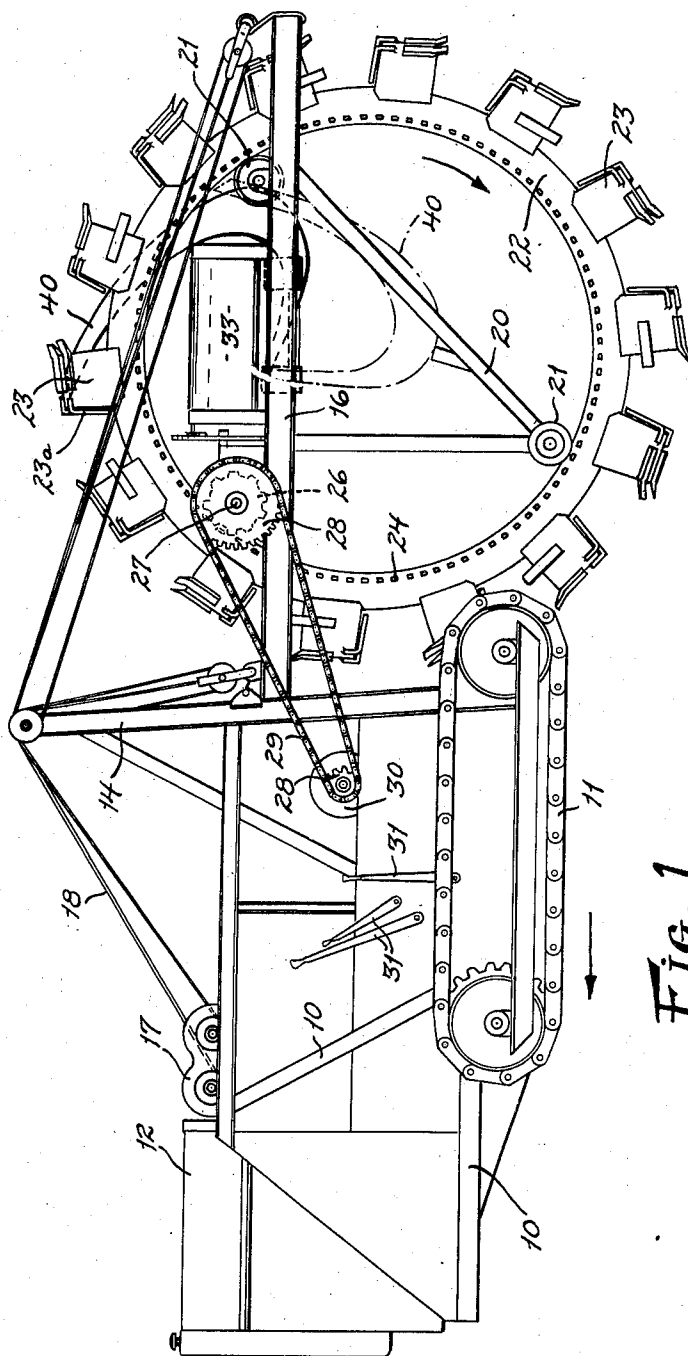


Fig. 1

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3 Sheets-Sheet 2

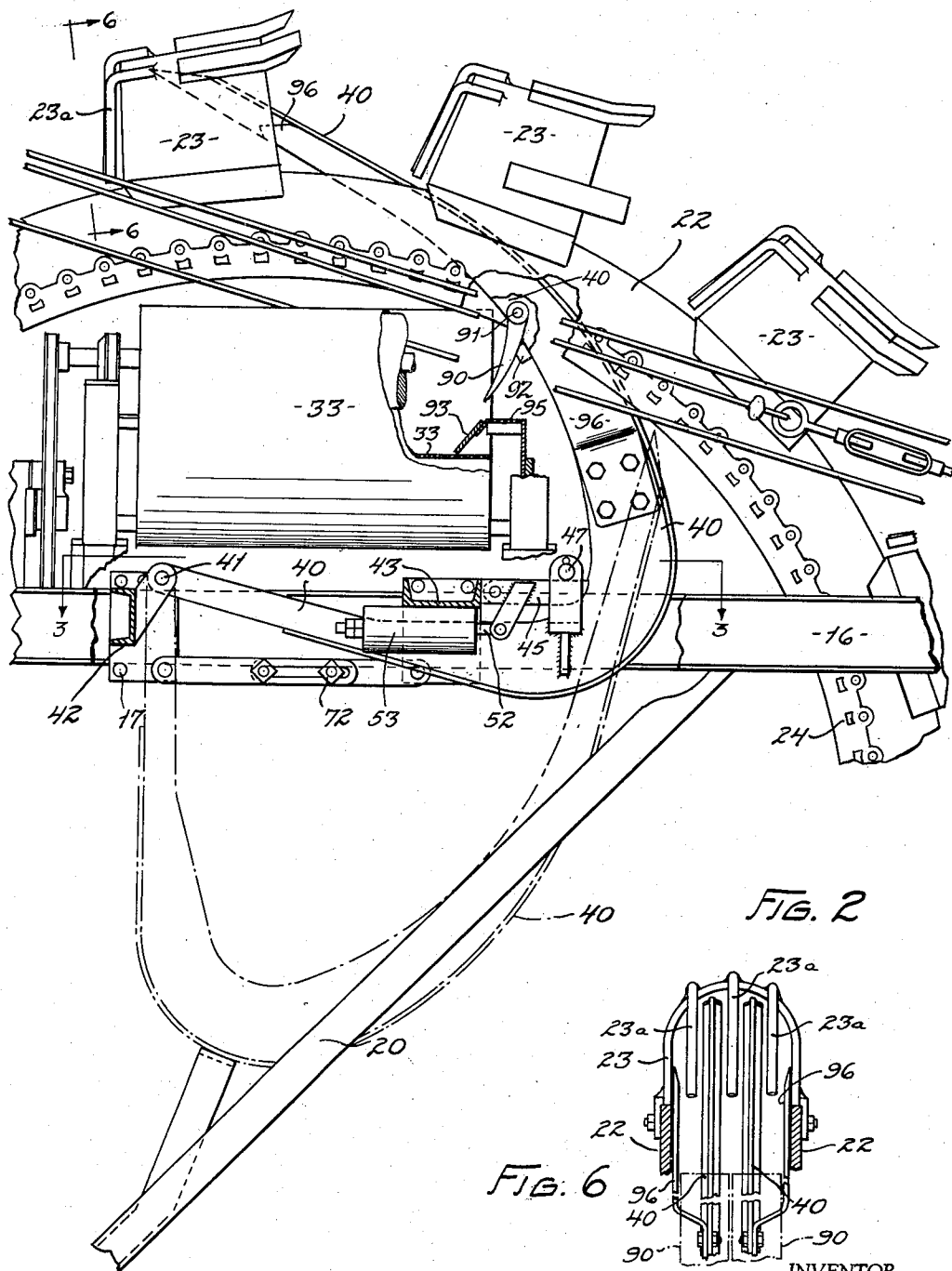


FIG. 2

FIG. 6

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3 Sheets-Sheet 3

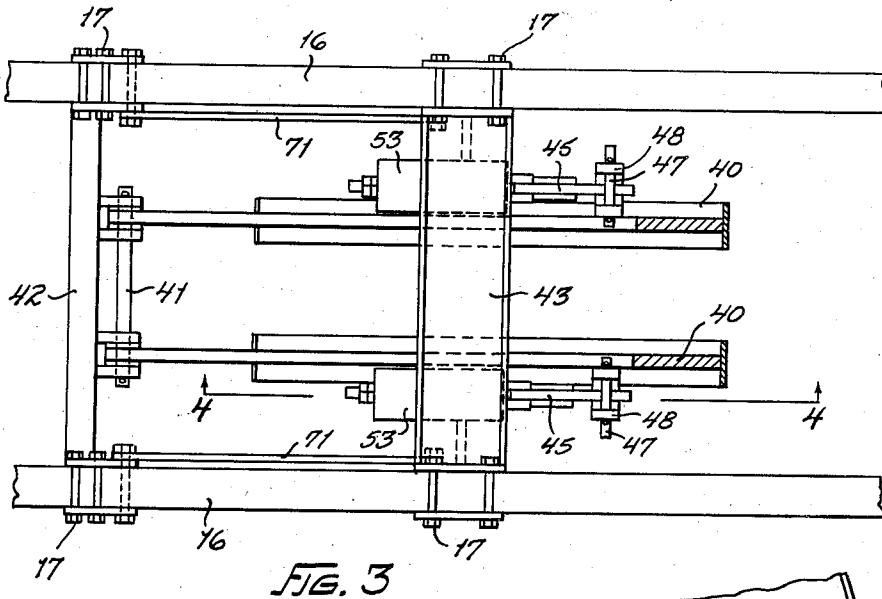


FIG. 3

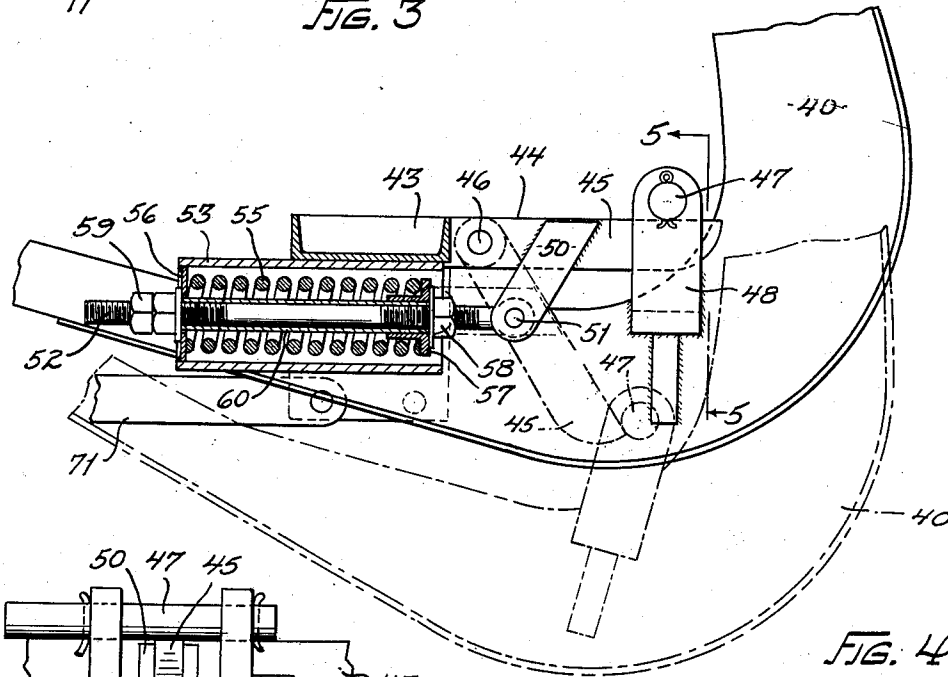


FIG. 4

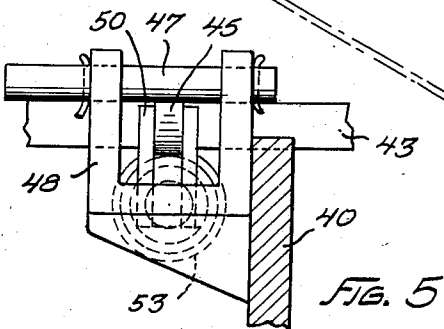


FIG. 5

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2,165,299

CLEANER FOR TRENCHING MACHINES

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Application October 7, 1937, Serial No. 167,752

17 Claims. (Cl. 37-97)

This invention relates to a trencher or trench-digging mechanism, and especially to a bucket cleaner for insuring removal of dirt and other matter from the trench digging bucket of the trenching mechanism. This, therefore, is the general object of the present invention.

A more specific object is to provide an improved form of bucket-cleaning mechanism for a trencher, to insure removal of the material from the digging bucket and at the same time prevent injury both to the trencher, including the mechanism which progresses the bucket, and to the bucket cleaner itself.

Another object of the present invention is to provide a trench-digging machine with a bucket cleaner arranged and adapted to remove material from the trench-digging bucket and deposit it upon the conveyor in such a manner that when an obstruction creating undue resistance is met, the cleaning mechanism will automatically be moved to an idle position, to be manually reset for active cooperation with the trencher buckets when the obstruction has been removed by the operator.

A further object of the present invention is to provide a trench-digging mechanism with a bucket cleaner, which may be adjusted relative to the buckets to facilitate the handling of various kinds of soil.

A further object of this invention is to provide a resiliently mounted bucket cleaner, which will enable the pressure of the cleaner to be regulated in such a manner that a predetermined maximum pressure cannot be exceeded.

Another object is to provide a bucket cleaner which will not only insure the removal of the material from the bucket, but which, in addition, will guide any material, that might follow the cleaner onto the conveyor and thus insure the carrying of such material away from the machine.

Other objects and advantages of the present invention will become more apparent from the following description, reference being had to the accompanying drawings. The essential features of the invention will be characterized in the claims.

Referring now to the drawings, Fig. 1 is a side elevation of a trench-digging mechanism, incorporating my improved bucket cleaner; Fig. 2 is an enlarged fragmentary elevation of the bucket cleaner, certain of the digging buckets and the cleaner, and certain portions of the frame of the machine being broken away to more clearly illustrate the arrangement of the bucket cleaner; Fig. 3 is a sectional detail, the plane

of the section being indicated by the line 3-3 on Fig. 2; Fig. 4 is a vertical section, as indicated by the lines 4-4 on Fig. 3; Fig. 5 is a sectional detail, as indicated by the line 5-5 on Fig. 4; and Fig. 6 is a sectional detail, as indicated by the lines 6-6 on Fig. 2.

Referring now to the drawings, wherein I illustrate my mechanism in connection with a machine built in accordance with Patent No. 1,527,438, issued to Augustus J. Penote, on the 25th day of February, 1925, it will be seen that there is shown a trench-digging mechanism comprising a frame 10, supported by suitable tractor treads 11, which are operably connected with a motor 12 carried adjacent the forward end of the frame 10. Adjacent the rear end of the frame, there is provided a mast 14, upon which a rearwardly extending beam or frame 16 is mounted for vertical movement. This frame 16 supports the digging buckets and is raised and lowered by the operation of a winding drum 17 to which the frame is connected by cables 18.

Secured to the frame 16 are a pair of triangular frames 20. These frames 20 are provided, at the vertices thereof, with rollers 21, adapted to engage a pair of spaced annular rings 22, between which are mounted a series of circumferentially spaced digging buckets 23. These buckets are in the nature of scoops and serve to secure the rings 22 together, forming a trench-digging wheel. At least one of the rings 22 is provided with teeth-like formations 24, which are engaged by a gear 26 secured to a shaft 27 and driven from the motor 12 by suitable driving mechanisms such as, for instance, gears 28, driving chain 29 and the speed reduction and transmission unit 30. The progress of the machine, as well as rotation of the digging wheel, are controlled by suitable hand levers 31.

Extending through the digging wheel and supported by the frame members 16 is a transversely extending belt conveyor 33. This conveyor extends to either side of the machine, as is well known at the present time. The arrangement is such that as the digging wheel rotates and the trencher progresses in the direction of the arrows in Fig. 1, earth is removed and elevated until it reaches the upper part of the wheel, wherein it drops from the buckets 23 under the influence of gravity.

When the trencher is used in certain types of earth, such as wet soil, clays and the like, the buckets frequently do not discharge fully and at times do not discharge at all. The present invention is especially concerned with a mecha-

nism for insuring a complete discharge of these buckets without danger of damage to the digging wheel or its driving mechanism, and in such a manner that adjustments may be made to permit the most advantageous operation of the cleaner under various soil conditions.

As indicated in the drawings, and especially in Fig. 6, each bucket may be provided with a plurality of bars, such as those indicated at 23a. These form the back of the bucket. These bars however may be carried by a separate bracket not shown but which may be bolted to the wheel independently of but in the same manner as the buckets. The cleaning mechanism comprises a pair of T-shaped arms 40, which are rotatably mounted on a shaft 41, carried by a cleaner-supporting beam 42, which is secured to the frame member 16, as will be hereinafter more fully described. This beam underlies the conveyor and the cleaning arms 40 extend rearwardly therefrom and then upwardly and forwardly to a point above the rearmost end of the conveyor. The cleaner arms are arranged to pass between the bars 23a forming the back of the bucket.

It will be noted that from Fig. 6 the internal wall of the buckets are substantially a continuation of the inner faces of the digging wheel 22. Such wall and surfaces are cleaned by a pair of knifelike blades 96 which are secured to the outer cleaner arms by bolts 97 and are bent outwardly to the plane of such walls and then upwardly parallel and adjacent thereto. Thus, even excessive sticky soils such as gumbo may be removed from the bucket and the wheel.

The bucket cleaners may be mounted to swing as a unit or as shown they may swing individually. Thus, one cleaner may be released from the full line position to the dotted line position shown in Fig. 1, as will hereinafter be more fully described, while the other cleaner may remain in its active or full line position. The cleaners are maintained in their normal or active bucket-cleaning positions, namely, the full line positions of Fig. 1, by a resilient latch mechanism best shown in Figs. 3 and 4. Here it will be seen that a second beam 43 extends between the two frame members 16 and has secured thereto a pair of latch mechanisms generally indicated at 44.

Each latch mechanism comprises a latch 45, which is pivoted as at 46 to the beam 43. Each latch 45 engages a pin 47 carried in a yoke 48 which is welded to its respective bucket cleaner member 40, as indicated in Figs. 4 and 5. The latch member 45 is provided with a downwardly depending arm 50, which is pivotally connected, as at 51, to a threaded plunger 52. This plunger is mounted for reciprocation in a housing 53, secured to the frame member 43 as by welding. A comparatively heavy compression spring 55 encircles each threaded plunger 52 within its housing 53, and is interposed between the rear wall 56 of the housing and a sleeve 57, which is positioned on the rod 52 by suitable nuts 58, which when in position, may be welded in place.

When an obstruction is brought into contact with the upper end of either cleaner 40, rocking it about its pivot, at least one of the pins 47 presses downwardly on its latch member 45 against the action of the compression spring 55.

If the force of the spring is completely overcome by this downward movement of the cleaner, the pin 47 will slide off of the latch as indicated in the broken lines in Fig. 4, and the cleaner will drop to the dotted line position shown in Figs. 1 and 2, where it is out of the way of the

buckets and their load. If, however, the pressure on the spring is insufficient to completely overcome the tension thereof, the pin 47 simply moves along the latch 45 and the cleaner rocks a slight distance about its pivot. The tension of the cleaner springs 55 may be regulated by a pair of adjusting nuts 59. The maximum pressure of the spring, however, is limited by a tube 60, which is interposed between the spring and the rod, the maximum pressure of the spring, therefore, being limited by the length of such tube.

It has been found advantageous to move the bucket-engaging portion of the cleaner back and forth relative to the conveyor 33 to compensate for various soil conditions. It is likewise desirable that movement of the cleaner may be accomplished without changing the pressure required to release the cleaner. For this reason the beams 42 and 43, to which the cleaner and the latch mechanism are respectively secured, are each clamped in place on the frame member 16 by suitable clamping bolts 17, which when loosened, permits the cleaner and latch mechanism to be slid as a unit forwardly or rearwardly along the frame members 16.

To maintain the spacing between the cleaner and the latch carrying beams 42 and 43, suitable links 71 are provided which interconnect these two beams, as shown especially in Fig. 2. These links may be connected to the cross-member 43 with a pin and slot connection, or the links may each be extensible, as indicated at 72 on Fig. 2, thus enabling the cleaner and the latch mechanism to be adjusted relative to the cleaner pivot. This is highly advantageous in that it regulates the angular distance through which the cleaner may swing before the latch mechanism is tripped to permit the cleaner to drop to an idle position. As the latch mechanism is moved forwardly, this angle increases, whereas, when it is moved rearwardly, the angle decreases, the arrangement being such that this distance enables the positioning of the device throughout the entire operative range of the cleaner.

Material, dislodged from the buckets by the cleaner, at times may follow the cleaner and become wedged between the cleaner and the conveyor frame or other relatively stationary part of the machine thus tripping the cleaner prematurely or interrupting the progress of the conveyor. To prevent this, the cleaner arms may be provided with deflector plates 90 which serve to deflect any material, which might follow the cleaner onto the conveyor belt 33. As shown in Fig. 2, these plates may be pivoted to their respective cleaner arms as at 91 and their downward swinging movement limited by stops 92 carried by the arms. These plates may overhang the conveyor or a sloping conveyor side plate 93 as shown in Fig. 2. However, when the cleaners are swung about their pivots to the dotted line position, these plates engage a frame member 95 and swing freely about their pivots permitting the swinging of cleaner arms. When the arms are repositioned the deflector plates are first swung about their pivots to their uppermost position whereupon the cleaner arms may be reset and the deflector plates swung to the active position shown in Fig. 2.

From the foregoing description, it will be seen that I have provided a bucket-cleaning mechanism for removing material from the buckets and digging wheel, which mechanism is so arranged relative to the conveyor and the machine

that it may be adjusted so as to easily engage the soil carried by the digging bucket at any desired point relative to the conveyor. Also, that I have provided an improved mechanism for resiliently latching the cleaner in an operative position, so arranged that when the cleaner has yielded a predetermined amount, it will become unlatched and dropped to an idle position, and I have so arranged the mechanism as to enable the adjusting of the latching mechanism so that the angular distance through which the cleaner yields before becoming unlatched may be adjusted, as desired by the operator, thus providing a cleaning mechanism which is well adapted for use in any kind of soil and under practically all types of operating conditions. Furthermore, my improved mechanism includes a guide to deflect material removed from the buckets onto the conveyor belt.

I claim:

1. In a trencher, a frame, a series of digging buckets supported by said frame, power means to progress said buckets through the soil, a yieldable bucket cleaner mounted on said frame, a conveyor supported by said frame and adapted to receive soil discharged from said buckets by said cleaner, and means whereby said cleaner may be adjusted bodily relative to said conveyor, to change the operative relation between the cleaner and the conveyor.

2. In a trencher, a frame, a series of digging buckets supported by said frame, power means to progress said buckets, a pair of bucket cleaners, individual means to resiliently maintain respective bucket cleaners in operative position relative to said buckets, a conveyor supported by said frame and arranged and adapted to receive material discharged from said buckets by said cleaners, and means whereby both of said cleaners and their resilient means may be moved bodily as a unit relative to said conveyor.

3. In a trencher, a frame, an annular ring rotatably supported thereby and carrying a series of spaced digging buckets on its periphery, means to rotate said ring, a conveyor carried by said frame and extending through said ring in an axial direction whereby material removed from said buckets may drop by gravity into said conveyor, a bucket cleaner having a pivotal connection with said frame below said conveyor and formed to extend above said conveyor and project into the buckets at a point directly thereabove, resilient means to maintain said cleaner in a bucket engaging position, and means whereby said cleaner and its resilient means may be moved as a unit relative to said conveyor to change the operative relation between the cleaner and the conveyor.

4. In a trencher, a frame, an annular ring rotatably supported thereby and carrying a series of spaced digging buckets on its periphery, means to rotate said ring, a conveyor carried by said frame and extending through said ring in an axial direction whereby material removed from said buckets may drop by gravity into said conveyor, a bucket cleaner comprising a pair of arms having pivotal connections with said frame below said conveyor, each arm extending rearwardly to a point beyond the conveyor and then forwardly and upwardly to project into the buckets at a point directly above said conveyor, resilient means to maintain each cleaner arm in a bucket engaging position, and means whereby both cleaner arms, their pivotal connections and resilient means may be moved as a unit relative to said

conveyor to change the operative relation between the cleaner and the conveyor.

5. In a trencher, a frame, an annular ring rotatably supported thereby and carrying a series of spaced digging buckets on its periphery, means to rotate said ring, a conveyor carried by said frame and extending through said ring in an axial direction, whereby material removed from said buckets may drop by gravity into said conveyor, a pivotally mounted bucket cleaner having a pivotal connection with said frame below said conveyor and formed to project into the buckets at a point directly above said conveyor, a latch, resilient means acting on said latch to normally maintain said cleaner in a bucket engaging position, said latch being adapted and arranged to be released by the angular movement of the cleaner about its pivot, means whereby the pressure of said resilient means may be regulated, and means to regulate the amount of angular movement of said cleaner about its pivot required to trip said latch.

6. In a trencher, a frame, a series of digging buckets carried thereby, a means to progress said buckets, a conveyor carried by said frame and adapted to receive material discharged from said buckets, a pivotally mounted bucket cleaner adapted to remove material from said buckets, a latch carried by said frame to maintain said cleaner in an operative position, and means whereby said latch and cleaner may be moved as a unit relative to said cleaner.

7. In a trencher, a frame, a series of digging buckets carried thereby, means to progress said buckets, a pivotally mounted bucket cleaner adapted to remove material from said buckets, a latch carried by said frame to maintain said cleaner in an operative position, and means whereby said latch may be moved relative to said cleaner and independent of said cleaner.

8. In a trencher, a frame, a series of digging buckets carried thereby, means to progress said buckets, a conveyor carried by said frame and adapted to receive material discharged from said buckets, a pivotally mounted bucket cleaner adapted to remove material from said buckets, a latch carried by said frame to maintain said cleaner in an operative position, means whereby said latch and cleaner may be moved as a unit relative to said cleaner, and means whereby said latch may be moved relative to said cleaner and independent of said cleaner.

9. A bucket cleaner for a trench digging mechanism, comprising a pair of independently pivoted cleaner arms, arranged and adapted to rock about their pivots to an idle position under the influence of gravity, a pair of latches, resilient means to retain respective engagement with respective cleaners, and thereby maintain the cleaners in an operative position, means to adjust the pressure of said resilient means to regulate the pressure required to release said latches, and means independent of said last-named means to regulate the amount of angular movement of the cleaners about their pivots required to release said latches.

10. A bucket cleaner for a trench digging machine, comprising a pivoted cleaner arm arranged and adapted to rock about its pivot to an idle position under the influence of gravity, a pin carried by said arm, a latch carried by a stationary part of the machine and coacting with said pin to maintain the cleaner in an operative position, a plunger pivotally connected to said latch, resilient pressure means acting on said plunger to

maintain said latch in an operative position, means to adjust the pressure of said resilient means, and means to maintain the adjustment of such pressure below a predetermined maximum.

11. A bucket cleaner for a trench digging mechanism, comprising a pair of independently pivoted cleaner arms arranged and adapted to rock about their pivots to an idle position under the influence of gravity, each arm having a pin removably secured thereto, a pair of releasable latches, resilient means acting on said latches to maintain them in engagement with respective cleaners, and thereby maintain the cleaners in an operative position, means to adjust the pressure of said resilient means to regulate the pressure required to release said latches, and means independent of said last-named means to regulate the amount of angular movement of the cleaners about their pivots required to release said latches.

12. A bucket cleaner for a trench digging machine, comprising a pivoted cleaner arm arranged and adapted to rock about its pivot to an idle position under the influence of gravity, a pin removably carried by said arm, a normally horizontal elongated latch pivoted to a stationary part of the machine and on which said pin rests when the cleaner is in an operative position, a plunger pivotally connected to said latch and slidably mounted on said machine, a spring encircling said plunger to maintain said latch in an operative position, means carried by said plunger to adjust the pressure of said spring and a sleeve interposed between said plunger and spring to maintain the adjustment of such pressure below a predetermined maximum.

13. In a trencher, a frame, a series of digging buckets supported by said frame, power means to progress said buckets through the soil, a yieldable bucket cleaner pivotally mounted on said frame, a conveyor supported by said frame and adapted to receive soil discharged from said buckets by said cleaner, and means whereby said cleaner may be adjusted bodily relative to said conveyor, means whereby angular movement of said cleaner will cause the cleaner to assume an idle position, and means whereby the amount of such angular movement so required may be adjusted as desired.

14. A bucket cleaner for a trencher having a plurality of movable digging buckets carried by a relatively stationary frame, comprising a pair of transverse frame members slidably connected to said frame, a link interconnecting said frame members whereby they may be moved as a unit relative to said frame, means whereby one of said members may be moved relative to said frame and the other member, means to clamp said mem-

bers in position on said frame, a bucket cleaner arm pivotally mounted on one of said frame members, a housing secured to the other member, a link pivoted to said last-mentioned frame member, a pin removably connected to said cleaner arm and adapted and arranged to slide along the upper surface of said lever consequent upon the rocking of the arm about its pivot, a plunger slidably mounted in said housing, a pivotal connection between said plunger and said lever, a spring encircling said plunger and interposed between the housing and a fixed abutment of said plunger, means carried by said plunger to tension said spring, and means to maintain the tension of said spring below a predetermined maximum.

15. In a trencher, a frame, a series of digging buckets supported by said frame, power means to progress said buckets through the soil, a bucket cleaner mounted on said frame, a conveyor supported by said frame and adapted to receive soil discharged from said buckets by said cleaner, and a deflector pivotally mounted on said cleaner to deflect material from the cleaner onto said conveyor.

16. In a trencher, a frame, a series of digging buckets supported by said frame, power means to progress said buckets, a pair of bucket cleaners, respective bucket cleaners in operative position relative to said buckets, a conveyor supported by said frame and arranged and adapted to receive material discharged from said buckets by said cleaners and individual deflectors pivoted to respective ones of said cleaners to guide material removed from the buckets onto said conveyor.

17. In a trencher, a frame, an annular ring rotatably supported thereby and carrying a series of spaced digging buckets on its periphery, means to rotate said ring, a conveyor carried by said frame and extending through said ring in an axial direction whereby material removed from said buckets may drop by gravity into said conveyor, a bucket cleaner having a pivotal connection with said frame below said conveyor and formed to extend from beneath said conveyor to a position thereabove, in which position the cleaners project into the buckets, resilient means to maintain said cleaner in a bucket engaging position, a deflector pivotally connected to said cleaner intermediate its ends and projecting outwardly therefrom to a position over said conveyor to guide material onto the conveyor, a stop on said conveyor, said deflector being free to swing upwardly relative to the cleaner consequent upon the movement of the cleaner from a bucket engaging position.

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