April 17, 1945. E. L. HARRINGTON 2,373,828

METHOD OF AND APPARATUS FOR THE CONSTRUCTION OF ROADS

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[Diagram of construction apparatus]
This invention pertains to the art of paving and is for a method and apparatus for the spreading of concrete in the laying of roads or like paving operations.

The present practice in the building of concrete roads is to place form rails along each side of the lane to be paved after the grading has been completed. Sometimes the lane is the full width of the road to be constructed, but more frequently the road is constructed of parallel lanes 3 to 12 feet wide. Concrete is dumped between these rails, spread by any suitable means, and the surplus pushed forward by some kind of a strike-off so as to leave an approximately level but unfinished surface a few inches below the desired top surface. On this surface steel reinforcing rods or mesh are placed, and concrete then placed above, spread, and the surplus again pushed forward, usually by a “finishing machine” which at the same time smooths and irons the surface so closely as possible to the final requirement.

Hitherto it has been customary for preliminary spreading of the concrete to be done by apparatus on the concrete mixer itself; but recently, especially on large paving operations requiring the placing of a large yardage and employing more than one mixer, especially where the work is conducted in a narrow lane, the practice has grown customary for the mixer to dump the concrete more or less indiscriminately between the road rails, taking care only to provide a sufficient quantity and to avoid too large a surplus, leaving the spreading as well as the pushing forward of the surplus to be accomplished by other means.

Accordingly, lateral spreading is done by hand or special spreaders, and the striking off and moving forward of the surplus so as to leave the concrete approximately level for the steel reinforcement by strike-off members pushed by various means. The screeds of the finishing machines, which usually oscillate transversely of the road, push forward the surplus concrete for the final finishing process only; and as would be anticipated, the amount of this surplus concrete varies greatly both from point to point longitudinally along the road but also from point to point transversely of the road, when in contact with the screed. Because the material has some fluidity, it will rise back of the screed to some extent, depending on the height of the surplus material in front of the screed. Variations in the distribution of surplus material in front of the screed accordingly produces some corresponding variation in the surface back of the screed, these variations being manifested as transverse and longitudinal waves in the surface.

According to the present invention I provide an apparatus for spreading the concrete transversely over the distance between the rails. I also provide a method and apparatus whereby a pile of surplus concrete is moved back and forth across the surface of the road between the rails as the apparatus is advanced thus spreading and leveling the concrete. I prefer that this means for moving the concrete back and forth also work the pile of material forward in the direction of the movement of the apparatus as it is carried back and forth. Moreover, I prefer to provide a method and apparatus wherein a scraping or leveling operation in a forward direction follows the first transverse scraping of material, there being a screed or other transverse strike-off means back of the transversely moving scraper to further spread and even off the surface of the concrete, the back and forth scraping operation, however, being effected in such a manner as to prevent the building up of any undesirable surplus of concrete in front of the screed or strike-off whereby only a surplus of concrete is maintained in front of the screed sufficient for the most effective operation of the screed. By thus maintaining a controlled surplus in front of the screed, resistance to forward movement of the screed is substantially uniform, and since the depth of surplus material in front of the screed or strike-off is controlled and kept substantially constant along the length of the paving and crosswise of the screed, waves in the surface back of the screed due to variations in the distribution of material in front of the screed are substantially completely avoided.

According to a preferred embodiment of my invention there is provided a supporting frame mounted on wheels for movement along the form rails at each side of the roadway being built. This supporting frame is provided with a transverse runway along which a transversely movable carrier or trolley may be reciprocated. A scraping means depends from the carrier or trolley and means is provided for raising and lowering the scraping means so as to determine the thickness of the bed of concrete being laid. Power driven means is provided for moving the trolley back and forth along its runway, and mechanism is provided whereby as the trolley approaches each limit of its travel, the position of the scraping means with respect to the pile of material being scraped is shifted so that the
scraping means will be moved at the limit of movement of the trolley from a position where it is facing toward the outside rail of the road to a position where it is facing toward the middle of the road.

Mounted on the supporting frame back of the trolley is a vertically adjustable screed which is provided with a scraper being parallel to the runway along which the trolley moves and being positioned to the predetermined distance back of the path of travel of the scraper so that the transversely movable scraper is determined by the toe of the pile of surplus material in front of the screed. A power plant is mounted on the supporting frame and there are connections for transmitting power from the power plant to the trolley. There are also connections for driving the carriage along the rails operated from the same power plant whereby the back and forth movement of the trolley is correlated to the travel of the frame along the road bed. Another driving connection transmits power from the power plant to the vibrating screed.

My invention may be more fully understood by reference to the accompanying drawings in which:

Figure 1 shows a top plan view of a machine embodying my invention;

Figure 2 is a side elevation of the machine shown in Figure 1;

Figure 3 is a rear end view of the machine shown with the screed being broken away to show the scraper which is located in advance of it;

Figure 4 is a detail-view showing a part of the chain drive through which the trolley or carrier for the scraper is reciprocated; Figure 5 is a transverse section through the trolley and that portion of the machine which provides the runway for the trolley, the view being in substantially the plane of line V—V of Figure 1;

Figure 6 is a horizontal section in the plane of line VI—VI of Figure 5;

Figure 7 is a fragmentary view showing a front elevation of a portion of the frame of the machine with the trolley and scraper;

Figure 8 is a detail view of the scraper itself, the view being a side elevation of the scraping blade;

Figure 9 is a schematic view showing various portions of the scraper in relation to the travel of the trolley, the view being a top plan view;

Figure 10 is a diagrammatic view showing the swinging movement of the scraper from one position to the other, the view being also a plan view;

Figure 11 is a transverse vertical section through that portion of the machine which supports and braces the screed and through the screed itself;

Figure 12 is a front elevation showing a modified form of scraper in which the scraper has two blades instead of one;

Figure 13 is a transverse section through the mechanism shown in Figure 12, the view being substantially in the plane of line XXII—XXII of Figure 12;

Figure 14 is a side elevation of a machine embodying the construction shown in Figures 12 and 13;

Figure 15 is a front view showing another form of spreader or scraper;

Figure 16 is a section through one side of the mechanism shown in Figure 15 in which one of the spreader blades is shown in an elevated position.

Figure 17 is a similar section in which the opposite scraper blade is shown in elevated position.

Referring first to Figures 1 to 11 inclusive, the machine comprises a frame designated generally as 2, a trolley, the scraper carrier being broken away to show the scraper which is located in advance of it; Figure 4 is a detail view showing a part of the chain drive through which the trolley or carrier for the scraper is reciprocated; Figure 5 is a transverse section through the trolley and that portion of the machine which provides the runway for the trolley, the view being in substantially the plane of line V—V of Figure 1;

Figure 6 is a horizontal section in the plane of line VI—VI of Figure 5;

Figure 7 is a fragmentary view showing a front elevation of a portion of the frame of the machine with the trolley and scraper;

Figure 8 is a detail view of the scraper itself, the view being a side elevation of the scraping blade;

Figure 9 is a schematic view showing various portions of the scraper in relation to the travel of the trolley, the view being a top plan view;

Figure 10 is a diagrammatic view showing the swinging movement of the scraper from one position to the other, the view being also a plan view;

Figure 11 is a transverse vertical section through that portion of the machine which supports and braces the screed and through the screed itself;

Figure 12 is a front elevation showing a modified form of scraper in which the scraper has two blades instead of one;

Figure 13 is a transverse section through the mechanism shown in Figure 12, the view being substantially in the plane of line XXII—XXII of Figure 12;

Figure 14 is a side elevation of a machine embodying the construction shown in Figures 12 and 13;

Figure 15 is a front view showing another form of spreader or scraper;

Figure 16 is a section through one side of the mechanism shown in Figure 15 in which one of the spreader blades is shown in an elevated position.

Figure 17 is a similar section in which the opposite scraper blade is shown in elevated position.

Referring first to Figures 1 to 11 inclusive, the machine comprises a frame designated generally as 2, a trolley, the scraper carrier being broken away to show the scraper which is located in advance of it; Figure 4 is a detail view showing a part of the chain drive through which the trolley or carrier for the scraper is reciprocated; Figure 5 is a transverse section through the trolley and that portion of the machine which provides the runway for the trolley, the view being in substantially the plane of line V—V of Figure 1;
At 28 is a transmission through which power from the engine is provided for moving the trolley back and forth along its runway, for driving the wheels 3 and 4, and for vibrating the screed. This drive which forms no part of my invention per se transmits power to two shafts 29 and 30 best shown in Figure 3. Shaft 30 drives a sprocket wheel 31 to drive a chain 32 (see Figure 2) which chain passes around sprocket wheels for driving the wheels 3 and 4 on one side of the machine. Shaft 29 drives a second sprocket 33 which is but a chain 32 for driving the other two wheels 3 and 4 on the other side of the machine. The wheels on one side of the machine are preferably geared to the source of power separately from the wheels on the other side of the machine in order that one side of the machine may be driven faster than the other in going around a curve. The power plant also drives a pulley 33 (see Figure 3) which drives belts 34 for transmitting power to the shaft 25 of the vibrator in the screed. This power constitutes no part of the present invention and is more fully shown and described in the said copending application of William M. Venable and is merely referred to here for the purpose of fully understanding the general construction of the machine.

In the construction of the machine illustrated in Figures 1 to 11 inclusive, the power plant serves to further drive a shaft 25 (see Figure 1) having a sprocket 37 thereon (see Figure 4) which sprocket drives a second sprocket 33 through a chain 35. The sprocket 33 is keyed to a disk 40 through a shear pin 41 (see Figure 1) so as to drive a short shaft 42 having a sprocket wheel 43 at its forward end. A trolley-operating chain 44 passes around the sprocket wheel 43. Adjacent to the opposite end of the runway for the trolley there is a sprocket wheel 45 around which the chain 44 passes, the sprocket wheel 45 being carried on an adjustable bracket 46 (see Figures 1 and 4) through which a proper tension on the chain 44 can be maintained.

The chain 44 is provided for moving the trolley 7 back and forth, and the transversely movable scraper for spreading the concrete is suspended from this trolley. The scraper may take a number of different forms and may be operated in a number of different ways. A particular scraper and drive for the trolley shown in the form of the machine illustrated in Figures 1 to 11 is fully shown and described in the copending application of Charles A. Long, Serial No. 353,860 filed August 10, 1940.

The trolley 7 comprises a suitably constructed frame 50. It is provided on its forward side with two spaced-apart rollers 51 which extend into the channel 5 and which roll along the inside of this channel as a trackway. The frame 50 is also provided with two flanged upper rollers 52 which travel along the top of the channel member 6. The frame 50 is likewise provided with two flanged rollers 53 positioned below the rollers 52 which bear against the underside of the channel 5. The frame and this arrangement show Figure 5 and by this arrangement the trolley may move back and forth along its runway but is restrained from vertical movement in the runway.

The trolley is provided with a vertical sleeve 84 at the center thereof. A post 85 passes through this sleeve. To the lower end of this post is secured a scraping blade 86. The top of the post 85 is threaded and there are two large hand wheels or nuts 87 and 88 through which the threaded upper end of the post 85 is screwed. The hand wheel 87 is provided for raising and lowering the post 85 to raise and lower the scraper 86, and the hand wheel 88 is provided as a lock nut for the hand wheel 87. To change the elevation of the scraper 86 the hand wheel 88 is first turned to back it away from the hand wheel 87 after which the hand wheel 87 is turned to raise or lower the post 85. When the scraper is at the desired elevation the hand wheel 88 is tightened down against the hand wheel 87. This arrangement allows the scraper to be adjusted vertically to any given elevation within the range provided for and leaves the post 85 free to rotate so that the position of the scraper may be changed.

For moving the trolley back and forth the chain 44 is provided with a special link which carries a transverse pin 60 which may be clearly seen in Figures 6, 8 and 9. Supported on the frame of the trolley is a vertical post 55 which passes through a sleeve 56 to the lower end of this post is securely a scraping blade 5. The post 55 is provided with a horizontally projecting...
the biasing force of the spring 68 until the shoulder 68c of the latch snaps over the arm. One or the other of these latches holds the arm to prevent the scraper from being turned. On the underside of the frame adjacent the striking plates 66A and 68B are cams 78. Secured to the underside of the frame of the machine, adjacent the striking plates 66A and 68B are cams 78A and 78B respectively. Each of the operating extensions 66B of the latches 68 is provided with a roller 68D for cooperation with one of these cams.

As best shown by Figures 6 and 8, the roller 68D on the left-hand latch rides under the cam 78A, the latch terminal 68c of the latch will be raised out of engagement with the arm 64. This will occur at just the moment when the roller 68D on the end of the arm 64 is striking the abutment 66A. This releases the latch to permit the scraper to turn. When the scraper is nearing the opposite limit of its turning movement, the arm 64 will engage under the other latch, which in Figure 6 would be the right-hand latch, and the scraper would be moved to face the blade 75 of the opposite side of the casings 78a. Stones 44c (see Figure 6) prevent the arm 64 from swinging beyond the latching position.

As hereinafore stated, the specific mechanism for operating the trolley and for turning the scraper is the invention of Charles A. Long and is described in the copending application filed by him, it being contemplated in my invention that any type of scraper may be moved back and forth through any suitable mechanism so long as the scraper is manipulated in such a way as to pass from one side of the pile to the other adjacent the limits of travel of the trolley.

Another example of a scraping mechanism which may be used in my invention is illustrated in Figures 12, 13 and 14. In the modification shown in Figures 12, 13 and 14, there are provided so-called "shelves," so designated that it may be assumed that the chain 8 is traveling in the carriage clear of the chain. The chain 85 is provided with stop 88 positioned to be engaged by the terminal portions of the arch-shaped scraper 78, as is clearly shown in Figure 12. In the arrangement shown in Figure 12, it may be assumed that the chain 85 is traveling in the
direction of the arrow. At this time the right-hand scraper is elevated against its stop 88 and the left-hand scraper is in the scraping position. When the trolley reaches the limit of its travel, the direction of the chain is reversed. The reversing movement of the chain will first cause the sprocket 85 to be rotated to rotate the pinions 83 and thereby transmit a rotary motion to the shaft 77 in a clockwise direction. This will cause the right-hand scraper as viewed in Figure 12 to swing down and the left-hand scraper to swing up. When the left-hand scraper 78 has come up against the left-hand stop 88, the shaft 82 cannot rotate further and the chain 86 will then be effective for moving the trolley in the reverse direction. When the direction of travel of the chain is again reversed, the shaft 82 will be rotated in the opposite direction and the scraper returned to the position shown in Figure 12. A limited relative movement between the trolley and the reversible driving chain 86 is thus utilized for shifting the position of the scraper.

The arrangement shown in Figure 12 has an advantage over that previously described in that should it be desired, the position of the scraper can be shifted not only at the ends of the travel of the trolley, but at any intermediate point in the travel of the trolley.

It will be noted that with the arrangement shown in Figures 12, 13 and 14, when the left-hand scraper 78 swings upwardly and the right-hand scraper 79 swings downwardly, the right-hand scraper will come into position against the opposite side of the pile. In order to prevent any spilling over of the material with this type of scraper, a retaining plate 89 is provided at each side of the frame of the machine to extend from a point adjacent the form rail A to the underside of the frame.

For adjusting the scraper vertically I may raise and lower the runway for the trolley. This mechanism for raising and lowering the runway is shown in Figures 12 and 14 wherein there are threaded posts 176 at the end of the frame forming the runway which passes through nuts secured to the frame and the lower ends of which are mounted in bearings on the main frame 2 of the machine. Two posts are interengaged as illustrated so that by turning a crank 178 secured to the top of one of the posts, both of the threaded posts may be turned at the same time for raising or lowering the frame members which provide the runway.

My invention contemplates, therefore, that vertical adjustment of the scraper may be made either by adjusting the scraper vertically with respect to the trolley or by raising and lowering a portion of the machine, as for example, the runway on which the trolley is carried.

In the modification shown in Figure 15, 91 designates the runway for the trolley 92. This runway is provided with a shaft 93 having a sprocket 94 at each end thereof. There are two scrapers 95 and 96 each with an upwardly extending portion 95a and 96a respectively thereon. Each of these upwardly extending portions carries a rack 97. Guide rollers are provided at 98 and 99. The shaft 93 is provided with a pair of pinions 108 which engages the rack 97 on both extensions. The arrangement is such that when the sprockets are rotated in one direction, one of the blades is lowered and one of them is raised, and when the direction of rotation of the sprockets 94 is reversed, the position of the blades is correspondingly reversed. Each of the blades is provided with an adjustable stop 101 to limit the downward travel thereof so that after a blade has lowered to a predetermined extent, it will be stopped.

Parallel sprocket chains 102 are employed which are driven in unison and which are reversible. The chain at each side of the carriage is guided over guide sprockets and then over the main sprocket 94. When the chain is reversed in one direction the sprockets 94 are operated until the stop 101 on the descending blade contacts a part of the trolley when the sprocket cannot rotate further, and further operation of the chain serves to move the trolley along its runway. When the direction of the chains is reversed, the sprockets are turned in the opposite direction to reverse the blades, and after the sprockets have turned to reverse the blades, the pull of the chain is again utilized to move the trolley. In this modification as in the modification shown in Figures 12, 13 and 14 there is a relative movement between the chain and the trolley which is utilized for shifting the blades.

While the blades in the two modifications described are illustrated as being parallel with the direction of travel of the material, the blades are in the opposite direction to the direction of movement of the trolley, it will be apparent that in these modifications the blades may also be set at opposite oblique angles so as to push the material forward as well as sideways.

In using the machine, the scraper and the sprocket are set at the desired elevation, the latter preferably slightly lower than the former. The sprocket is generally tilted crosswise of its length to a very slight angle so that the leading edge is slightly higher than the trailing edge to more effectively iron or smooth out the material, the difference in elevation between the two edges being of the order of about 1/3 of an inch and the adjustable links 24 enable the adjustment to the proper angle to be established and maintained. Concrete is deposited between for perhaps twenty or thirty feet in advance of the machine and ample concrete is provided to assure of the desired depth of concrete being spread. It is contemplated that there will always be an excess of material for the machine to spread in order to assure of all voids being completely filled. The machine is then driven forward at a slow speed and as it is driven forward, the trolley is simultaneously driven back and forth to move the scraper transversely of the roadway. The forward speed of the machine is so correlated to the operation of the trolley that the scraper will make overlapping passes or swaths crosswise of the road as it travels back and forth. At any time the operator may stop the forward movement of the carriage and continue to operate the scraper, or he can move the carriage without the scraper operating, the transmission including various clutches forming part of this invention for securing such selective operation. As the scraper or spreader moves back and forth it accumulates a pile of material at the places where the concrete is piled up and spreads it into the valleys or recesses, completely filling in the space between the two forms to the desired depth. At each limit of travel of the trolley the spreader pulls away from one side of the pile that has accumulated and passes around or over the pile so that as the trolley is moved along in the opposite direction, the pile of materials is pushed along in the opposite direction,
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some slight shifting of the material in the pile taking place if the scraper or spreader is of the vertically pivoted blade type as the blade sweeps around to spread close to the side rails. This pushing of the material back and forth not only prevents the material from being left in heaps at the side of the pavement, but it produces a spreading action not unlike a troweling action which serves to compact the material. Because the spreader is a predetermined distance in front of the screen it will remove surplus material that would otherwise pile up in front of the screen. At the same time it does not prevent a slight excess from accumulating at the front of the screen as some excess is desirable. In the process of paving the screen is moved along as the material is worked back and forth, and a substantially controlled amount of surplus material is maintained in front of the screen uniformly across its width. As previously stated, this is important because in a paving operation the material rises to a slight extent to the rear of the screen or strike-off, and this varies according to the surplus in front of the strike-off. By maintaining a controlled volume of material in front of the strike-off and keeping it distributed uniformly across the front of the strike-off, the material back of the strike-off raises more uniformly, eliminating those transverse or longitudinal waves or ripples that result where the amount of material in front of the strike-off is continuously varying.

Usually in the laying of a roadway an initial layer of concrete will be put down to within perhaps 2" of the top of the forms after which reinforcing may be laid and then a finishing layer of up to a 1/2". By reason of the vertical adjustment of the spreader and the speed of the machine described, it is possible for the one machine to perform both operations or it is possible for a contractor to use two similar machines one following the other. With the machine of this invention the spreader, the screen and the material may be raised clear of the paved surface when the machine is traveling backward to the point where it begins to spread the second layer.

An important advantage of the present invention is the provision of a spreader which works the material back and forth transversely of the roadway. Another important advantage is that by making the spreader or scraper blade oblique to the direction of travel of the trolley, the material may be simultaneously worked sideways and forwardly. Still another advantage is that the scraper will spread the material clear up to the side rails but will not leave the material in heaps adjacent the side rails. It should be noted that while the carriage moves a distance less than the full distance between the rails, the spreader in any case reaches beyond the limits of travel of the carriage to the rails due to the relative movement which occurs between the carriage and the scraping means. It is by this over-reaching movement that the pile of material can be pushed across the full width of the area to be paved and then engaged from the opposite side and moved in the reverse direction. By combining the transversely moving scraper with a screed, particularly a vibrating screed, it is possible to prevent the uneven piling of material in front of the screen and at the same time assure of there always being a sufficient excess for the best results to be secured. The invention thus considerably facilitates the laying of roads and the carrying out of similar paving operations.

While I have described and shown certain embodiments of my invention, it will be understood that this is by way of illustration and that various changes and modifications may be made in the machine within the contemplation of my invention and under the scope of the following claims.

I claim:

1. A spreader for concrete paving operations comprising a mobile supporting frame, a spreader mounted on the frame for movement back and forth across the frame transverse to the direction in which the frame is moved, means for raising and lowering the elevation of the spreader, means for driving the spreader, and means for imparting an overreaching movement to the spreader relative to said driving means adjacent each limit of its back and forth travel to transpose the position of the spreader from one side of the pile of material being spread to the opposite side.

2. A spreader for concrete paving operations comprising a wheeled supporting frame, the wheels of which are adapted for travel along rails at each side of the spreader back and forth, and automatic means for shifting the spreader relatively to the material being pushed by the spreader to extend the effective sweep of the spreader at the limits of its travel beyond the range of the actual back and forth movements thereof.

3. A spreader for concrete paving operations comprising a mobile supporting frame, a carriage on the frame and movable back and forth across the frame, means for moving the carriage back and forth, spreading means carried by the carriage and means for shifting the spreader relatively to the carriage to another operating position more remote from the center of the road adjacent each limit of travel of the carriage.

4. A spreader for concrete paving operations comprising a mobile supporting frame, a carriage on the frame and movable back and forth across the frame, means for driving said carrier back and forth, spreading means depending from said carrier, means for shifting the spreader adjacent each limit of travel of the carrier and relatively to the carrier from one position to another position more remote from the center of the road than the first position, and confining plates depending from each side of the frame at each end of the path of travel of the spreader to prevent the pushing of material past the path of movement of the spreading means.

5. A paving machine comprising a mobile supporting frame, a trolley on said frame movable back and forth across the width thereof, scraper means pivotally carried on the trolley, and means for turning the scraper means about its pivotal axis to substantially reverse the position of the scraper means end-for-end adjacent the limits of travel of the trolley.
7. A paving machine comprising a mobile supporting frame, a trolley on said frame movable back and forth across the width thereof, scraper means pivotally carried on the trolley, means for driving the trolley back and forth, and means for moving the scraper means about its pivot adjacent the limits of travel of the trolley and before the trolley reaches the limit of its travel.

8. A paving machine of the class described, comprising a wheeled frame having a strike-off member extending transversely across it, a spreader movable transversely back and forth in front of the strike-off at a spaced distance therefrom but sufficiently close thereto to engage excess surplus material that accumulates in front of the strike-off, said spreader being set oblique to its direction of travel with the end of the spreader closest the strike-off being normally in advance of the opposite end, means for driving the spreader and means for reversing the angular position of the spreader with its change in direction of travel.

9. A road paving machine comprising a mobile truck adapted to travel on forms at each side of the area to be paved, a transverse runway on the truck, a carrier movable along the runway, a support depending from the carrier, a paddle-like spreader on the support set edgewise to the surface to be paved, means for moving the carrier back and forth whereby the spreader is caused to effect a preliminary distribution of the paving material which may be irregularly heaped in the space between the side forms, said spreader being movable relatively to the carrier in a manner such as to overreach the travel occasioned by the back and forth movement of the carrier, and means for imparting such relative movement to the spreader adjacent the limits of travel of the carrier to thereby project the spreader beyond the pile of material being pushed by it and engage it from the opposite direction.

10. In a concrete paving machine having a supporting frame spanning a strip to be paved and movable along said strip, a carriage mounted on said frame for movement transversely of said strip, mechanism carried by said carriage and adapted to push a deep pile of concrete in a direction having a component in the direction of movement of said carriage, said mechanism being shiftably mounted in said carriage to selectively engage said pile from either side of said pile, means for moving said carriage to-and-fro across said frame, and means for shifting said mechanism to engage the opposite side of said pile when said carriage is adjacent the limits of its travel.

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