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R. HOPPENRATH
SELF-PROPELLING UNIT

3,256,790

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FIG. 1

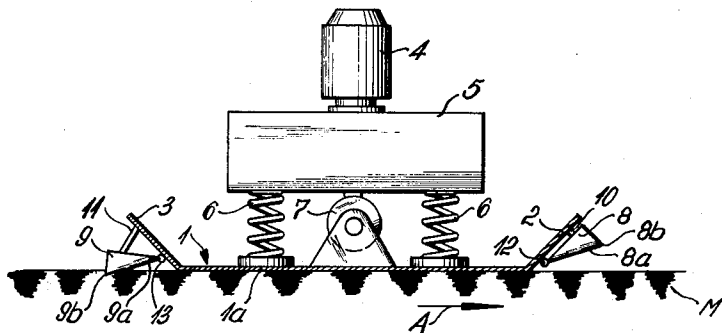


FIG. 2

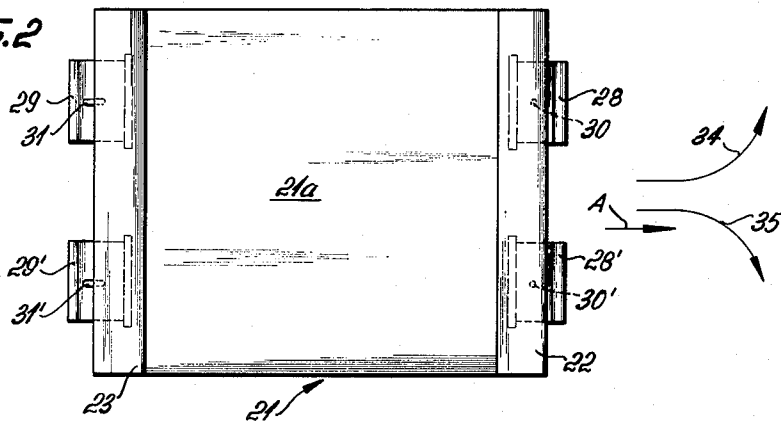


FIG. 3

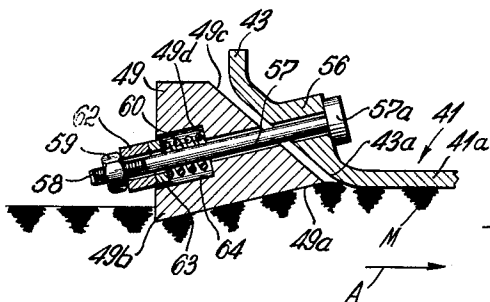
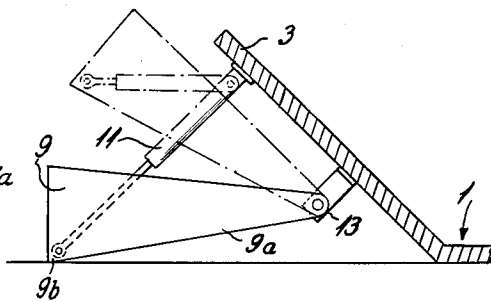


FIG. 4



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SELF-PROPELLING UNIT

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15 Claims. (Cl. 94-48)

The present invention relates to self-propelling units of the type which are equipped with one or more vibrator assemblies, and more particularly to an improved self-propelling unit which is especially suited for use as an apparatus for tamping earth or other types of comminuted, pulverulent or granular material.

It is an important object of my invention to provide a very simple self-propelling unit which may be equipped with a conventional vibrator assembly and which is capable of advancing forwardly, rearwardly, in a straight path, or in an arcuate path as long as the vibrator assembly tends to move it in parallelism with the surface of the ground.

Another object of the invention is to provide a self-propelling unit of the above outlined characteristics which may be rapidly and conveniently adjusted for movement in a selected straight or arcuate path as well as forwardly or rearwardly and which may be adjusted to vary its speed.

A further object of the invention is to provide a self-propelling tamping apparatus wherein the assembly which causes one or more tamping elements to compact the ground or another comminuted material simultaneously serves as a means for propelling the tamping elements in a selected direction.

An additional object of the invention is to provide an improved tamping apparatus of the just outlined characteristics which can be manufactured in many sizes and shapes, which may be constructed and assembled in such a way that one or more of its parts do not vibrate or are caused to vibrate to a minimal extent when the apparatus moves in a selected direction so that a person controlling the apparatus is not compelled to endure vibratory movements, and which can be arrested in a selected position if it becomes necessary to subject a selected area to a more intensive compacting action.

With the above objects in view, one feature of my invention resides in the provision of a self-propelling unit which comprises a ground-contacting element whose underside is arranged to come to rest on the surface of the ground (e.g., a material which must be compacted), a vibrator assembly mounted on the ground-contacting element and arranged to impart to this element reciprocatory movements in a direction parallel with the underside thereof so that the element tends to move rearwardly and forwardly along the surface of the ground, and arresting means provided on the element and arranged to engage the surface of the ground with a greater force when the element tends to move rearwardly and with a smaller force (which smaller force may be zero) when the element tends to move forwardly whereby the element is automatically compelled to propel itself in forward direction as soon as the vibrator assembly is started.

The self-propelling unit of my invention may assume the form of a tamping apparatus, of a toy which may be used as a vehicle on sand, on soil or on any other type of ground, and which may also serve many other useful purposes wherever it is necessary to advance a load along the ground at comparatively low speeds and when it is impractical to resort to wheels, rollers, caterpillar treads or similar rotary motion transmitting parts.

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The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved self-propelling unit itself, however, both as to its construction and its method of operation, together with additional features and advantages thereof, will be best understood from the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a schematic side elevational view of a self-propelling unit which assumes the form of a tamping apparatus and which is constructed in accordance with one embodiment of my invention;

FIG. 2 is a top plan view of a ground-contacting element which forms part of a modified self-propelling unit and which is provided with a series of transversely aligned arresting members;

FIG. 3 is a fragmentary longitudinal vertical section through a portion of a further self-propelling unit wherein an arresting member is connected with the trailing end portion of a ground-contacting element by means of a compressed helical spring; and

FIG. 4 is an enlarged side view of the arresting means shown in FIG. 1 in operative and inoperative positions.

Referring now in greater detail to the illustrated embodiments, and first to FIG. 1, there is shown a self-propelling unit which assumes the form of a tamping apparatus and which serves to compact a mass of granular, pulverulent or similar comminuted material (e.g., earth or the like). The apparatus comprises a plate-like tamping element 1 whose underside comes to rest on the surface of the material M to be tamped and which includes a centrally located major portion 1a, a leading end portion 2 whose underside is inclined upwardly and forwardly with respect to the underside of the major portion 1a, and a trailing end portion 3 whose underside is inclined upwardly and rearwardly with respect to the underside of the major portion 1a. The tamping element 1 supports a vibrator assembly which includes a mass or weight 5, springs 6 which support the mass 5 at a level above the upper side of the tamping element, a vibrator 7 of any known design, and a motor 4 which drives the vibrator. The vibrator assembly 4-7 is arranged to produce a vertical component of force which tends to reciprocate the tamping element 1 in a direction which is perpendicular to the underside of the major portion 1a whereby the tamping element compacts the material M. In addition, the vibrator assembly produces horizontal components of force which tend to reciprocate the tamping element in a direction which is parallel with the underside of the central portion 1a whereby the tamping element exhibits the tendency to move rearwardly and forwardly along the surface of the material M. In other words, rearward and forward movements are equal and alternate with each other. Of course, were the element 1 permitted to reciprocate back and forth in this manner, the tamping apparatus would remain above a selected portion of the material M and would fail to tamp the entire surface or the selected area of such material.

In accordance with one feature of my invention, there is provided an arresting means which includes an arresting member 9 mounted at the underside of the trailing end portion 3 and arranged to move into engagement with the surface of the material M and to penetrate into such material when the tamping element tends to move rearwardly whereby the tamping element is automatically compelled to propagate or to propel itself in forward direction which is indicated by an arrow A.

The arresting member 9 assumes the form of a wedge which has an upwardly and forwardly inclined front face 9a and a sharp edge 9b which is located at the rear end of the front face 9a and which extends transversely

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of the tamping element. The forward end of this front face is pivotally secured to the trailing end portion 3 by means of a hinge 13 which permits the arresting member 9 to pivot about a horizontal axis which is perpendicular to the direction of forward movement of the tamping apparatus. The apparatus further comprises actuating means, here shown as a hydraulically or pneumatically operated cylinder and piston unit 11, which operates between the underside of the trailing end portion 3 and the arresting member 9 and which enables an operator to pivot the arresting member about the axis of the hinge 13 so that the front face 9a may be moved toward or away from the surface of the material M. In other words, the actuating means 11 enables the operator to move the front face 9a into actual contact with the surface of the material M whereby the sharp edge 9b penetrates into the material when the vibrator assembly tends to move the tamping element in a direction counter to that indicated by the arrow A.

In order that the tamping apparatus may reverse the direction of its movement, I prefer to provide a second arresting member 8 which is mounted below the underside of the leading end portion 3 and which is mirror symmetrical to the arresting member 9 with reference to a plane which is perpendicular to the plane of FIG. 1 and which passes transversely across the major portion 1a of the tamping member. This second arresting member comprises a face 8a which is the front face thereof when the apparatus is caused to move in a direction to the left, as viewed in FIG. 1, and a sharp edge 8b which extends transversely of the element 1 and which may penetrate into the surface of the material M when the arresting member is caused to pivot about the horizontal axis of the hinge 12 through the intermediary of a second arresting means 10 which is secured to the leading end portion 2. Thus, if the operator desires the tamping apparatus of FIG. 1 to propel itself in a direction counter to that indicated by the arrow A, the actuating means 11 is caused to move the arresting member 9 upwardly and out of contact with the material M. In the next step, the operator causes the actuating means 10 to pivot the arresting member 8 in a clockwise direction, as viewed in FIG. 1, and to move the face 8a into engagement with the surface of the material M. The apparatus is then compelled to move to the left because the edge 8b will penetrate into the material M whenever the vibrator assembly tends to move the tamping element 1 in the direction of arrow A. The end portion 2a now becomes the trailing end portion of the tamping element.

The springs 6 enable the mass 5 to remain at a given level when the tamping element 1 is caused to vibrate so that the mass 5 merely shares horizontal movements of the tamping member. The operator may occupy a seat (not shown) on the mass 5 and is not compelled to endure vibration when the apparatus is in use. The construction of the vibrator 7 (which may include suitable eccentrics or the like) is well known and by itself forms no part of my invention. All that counts is to provide a vibrator assembly which imparts to the tamping element reciprocatory movements in a direction at right angles to the surface of the ground and which tends to impart to this element reciprocatory movements in a horizontal direction (in parallelism with the surface of the ground) so that the tamping element will automatically propel itself forwardly or rearwardly, depending upon which of the two arresting members is in actual contact with the ground.

It goes without saying that the edge 8a or 9a may be replaced by a series of teeth or the like without in any way departing from the spirit of my invention. However, the arresting members must be constructed and mounted in such a way that they offer less resistance to horizontal movement of the tamping element in a first direction and that they offer greater resistance to horizontal movement of the tamping element in the opposite direction. Thus,

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there will be some friction between the front face 9a and the surface of the material M when the tamping element 1 is caused to move forwardly (arrow A), but such resistance is much smaller than the resistance which the edge 9b offers when the tamping element tends to move in a direction counter to that indicated by the arrow A. I also contemplate mounting the arresting member 9 in such a way that it pivots in synchronism with horizontal reciprocatory movements of the tamping element so that its surface 9a may be lifted above the material M when the tamping element moves forwardly in order to eliminate friction between the surface of the material to be tamped and the front face 9a.

If desired, the hinges 12, 13 may be omitted and the members 8, 9 may be caused to reciprocate, rather than pivot, toward and away from the ground.

FIG. 2 illustrates a portion of a modified self-propelling unit which may assume the form of a toy vehicle or the like and which includes a plate-like ground-contacting element 21 corresponding to the tamping plate 1 of FIG. 1 and having a centrally located major portion 21a whose underside comes to rest on the ground, a transversely extending leading end portion 22 which is bent upwardly and forwardly in the same way as the leading end portion 2 of the plate 1, and a trailing end portion 23 which is parallel with the end portion 22 and whose underside is inclined upwardly and rearwardly with reference to the underside of the major portion 21a. In accordance with a more specific feature of my invention, the trailing end portion 23 supports two pivotable arresting members 29, 29' whose construction is identical with or analogous to that of the arresting member 9. An important advantage of this modified self-propelling unit is that, by selectively moving the arresting member 29 and/or 29' into contact with the surface of the ground, the operator may steer the unit so that the latter will move in a straight path, in an arcuate path which curves upwardly (arrow 34) or in an arcuate path which curves downwardly (arrow 35), depending upon whether the operator maintains both arresting members in contact with the ground, whether the arresting member 29 is lifted upwardly and away from the ground, or whether the arresting member 29' is moved away from the ground. Furthermore, by adjusting the extent to which the actuating means 31 or 31' pivots the respective arresting member relative to the trailing end portion 23, the apparatus may be caused to move in a number of additional arcuate paths in response to greater or lesser frictional engagement between the front faces of these arresting members and the surface of the ground. Such adjustments of the arresting members will also result in greater or lesser forward speed of the unit.

The leading end portion 22 supports two pivotable arresting members 28, 28' which are put to use when it is desired to propel the element 21 in a direction counter to that indicated by the arrow A. The manner in which the actuating means 31, 31', 30 and 30' pivot the respective arresting members may be the same as described in connection with FIG. 1. Each of such actuating means may assume the form of a rack and pinion or another mechanical device. It is also possible to provide manually operable actuating means for the arresting members.

Referring finally to FIG. 3, there is shown a portion of a different self-propelling unit which again comprises a tamping or ground-contacting element 41 having a major portion 41a whose underside comes into actual contact with the surface of the ground M, and a trailing end portion 43 which has an upwardly and rearwardly inclined underside 43a and which carries a boss 56 formed with a thorough bore for the stem of a rearwardly extending guide bolt 57. The head 57a of the bolt 57 abuts against the front face of the boss 56 and the rear end portion of this bolt is provided with external threads 58 which mate with a nut 59 serving to retain a wedge-shaped arresting member 49 in such a way that the latter

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is movable in the axial direction of the bolt 57 and that its face 49c may move into abutment with or away from the underside 43a. The unit of FIG. 3 further includes resilient means here shown as a compressed helical spring 60 which operates between an internal shoulder 49d of the arresting member 49 and one of two washers 62, 63 which are adjacent to the nut 59. The spring 60 is accommodated in a recess 64 provided in the rear face of the arresting member 49.

The self-propelling unit of FIG. 3 operates as follows:

The spring 60 normally maintains the face 49c in abutment with the underside 43a and the upwardly and forwardly inclined front face 49a of the arresting member 49 engages the surface of the ground. When the non-illustrated vibrator assembly causes the element 41 to move forwardly (arrow A), the spring 60 is compressed because the element 41 moves away from the arresting member 43. This will be readily understood since the frictional engagement between the inclined front face 43a and the ground is greater than the frictional engagement between the underside of the major portion 41a and the ground. When the vibrator assembly tends to move the element 41 rearwardly, the underside 49a bears against the face 49c and tends to move the member 49 rearwardly whereby the rearward displacement of the element 41 is reduced to a minimum, particularly if the ground is comparatively hard and if the arresting member has a good grip on the ground. While the element 41 moves forwardly and away from the arresting member 43, the spring 60 is compressed and stores energy so that, at the time the underside 43a is spaced through a predetermined distance from the face 49c, the spring expands as shown as it overcomes the friction between the ground and the front face 49a whereby the arresting member 49 strikes against the trailing end portion 43 and imparts to the element 41 an impulse which causes the latter to move forwardly (arrow A). In other words, the arresting member 43 may actually assist the vibrator assembly in advancing the ground-contacting element in a given direction.

If the operator desires to reverse the direction of movement of the element 41, the nut 59 is removed and the arresting member 49 is transferred to the leading end portion (not shown) of the element 41. It is obvious that the unit of FIG. 3 may be equipped with two or more arresting members at each of its ends so that such unit may be steered by moving one or more selected arresting members into contact with the surface of the ground. Furthermore, it is equally possible to install the arresting member or members beneath the major portion of a tamping or ground-contacting element without in any way departing from the spirit of any invention.

Referring again to FIG. 3, the bias of the spring 60 may be selected in such a way that this spring causes the arresting member 49 to impact against the trailing end portion 43 at the exact time when the element 41 completes its forward stroke. In this manner, I prevent any and all rearward displacements of the element 41. Otherwise, there might be some slight rearward movement at the time the edge 49b is caused to penetrate into the material of the ground, especially if the ground is comparatively soft (e.g., at the outset of a tamping operation). In the unit of FIG. 3, the arresting member 49 constitutes an additional mass or weight which normally tends to lag behind the ground-contacting element and which is intermittently accelerated to strike or to impact against the ground-contacting element at a characteristic frequency which is lower than the frequency of the ground-contacting element.

If the trailing end portion of the ground-contacting element carries two or more arresting members, the arresting members are preferably arranged mirror symmetrically with reference to a vertical plane which intersects the ground-contacting element and which is parallel with the direction of forward movement of the unit.

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In conventional tamping apparatus which are equipped with a vibrator assembly, it happens again and again that the apparatus comes to rest because the rearward and forward movements caused by the vibrator assembly are of equal magnitude. This can happen when a tamping apparatus is used on slippery terrain (mud) so that the apparatus actually sinks into the ground if the vibrator continues to operate.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of this invention, and therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A self-propelling unit comprising a ground-contacting element having an underside arranged to come to rest on the surface of the ground; a vibrator assembly mounted on said element, said assembly being arranged to at least impart to said element alternate reciprocatory movements substantially parallel with said underside first in one direction and then in a direction opposite said one direction whereby the element tends to move alternately rearwardly and forwardly along the surface of the ground; and arresting means supported by and movable with reference to said element between an inoperative position in which said arresting means is spaced from the surface of said ground and an operative position in which said arresting means engages said surface of said ground, said arresting means having a ground-engaging portion having a rear edge and being inclined forwardly so as to only slidably engage the surface of the ground when the element together with said arresting means is moving forwardly while said arresting means is in said operative position thereof, whereas said rear edge blockingly engages the surface of the ground when said element together with said arresting means moves rearwardly while said arresting means is in said operative position thereof, whereby during said reciprocatory movement of said element movement of the same forwardly is made possible by said sliding engagement of said arresting means with the ground during such movement, and movement of said element rearwardly is blocked by said blocking engagement of said rear edge of said arresting means with said surface of the ground so that the element is compelled to propel itself forwardly during reciprocatory movements thereof while said arresting means is in said operative position.

2. A self-propelling tamping apparatus comprising a tamping element having an underside arranged to come to rest on the surface of the material to be tamped; a vibrator assembly mounted on said tamping element, said assembly being arranged to impart to said tamping element reciprocatory movements in a direction substantially perpendicular to said underside whereby the tamping element compacts the material, and to impart to said element alternate reciprocatory movements substantially parallel with said underside first in one direction and then in a direction opposite said one direction whereby the tamping element tends to move alternately rearwardly and forwardly along the surface of the material to surface of the ground; and arresting means supported by and movable with reference to said element between an inoperative position in which said arresting means is spaced from the surface of said ground and an operative position in which said arresting means engages said surface of said ground, said arresting means having a ground-engaging portion having a rear edge and being inclined forwardly so as to only slidably engage the surface of the ground when the element together with said arresting means is moving forwardly while said arresting means

is in said operative position thereof, whereas said rear edge blockingly engages the surface of the ground when said element together with said arresting means moves rearwardly while said arresting means is in said operative position thereof, whereby during said reciprocatory movement of said element movement of the same forwardly is made possible by said sliding engagement of said arresting means with the ground during such movement, and movement of said element rearwardly is blocked by said blocking engagement of said rear edge of said arresting means with said surface of the ground so that the element is compelled to propel itself forwardly during reciprocatory movements thereof while said arresting means is in said operative position.

3. In a self-propelling tamping apparatus, in combination, a tamping element having an underside arranged to come to rest on the surface of the material to be tamped; a vibrator assembly mounted on said tamping element, said assembly being arranged to impart to said tamping element alternate reciprocatory movements substantially parallel with said underside first in one direction and then in a direction opposite said one direction whereby the tamping element tends to move alternately rearwardly and forwardly along the surface of the material to be tamped; and arresting means supported by said tamping element at the rear end thereof and extending rearwardly and downwardly therefrom and having a rearwardly facing rear edge which slides over the surface of the material to be tamped when said tamping element moves forwardly and which tends to penetrate spaced from said tamping element into said material to be tamped when said tamping element tends to move rearwardly whereby said tamping apparatus propels itself forwardly.

4. A self-propelling tamping apparatus comprising a tamping element having an underside arranged to come to rest on the surface of the material to be tamped, said tamping element having a leading end portion and a trailing end portion, at least one of said end portions having a bottom face which is inclined upwardly with respect to said underside of said element; a vibrator assembly mounted on said tamping element, said assembly being arranged to impart to said tamping element alternate vertical and horizontal components of force so as to cause reciprocatory movements in a direction substantially perpendicular to said underside whereby the tamping element compacts the material, and reciprocatory movements in a direction substantially parallel with said underside whereby the tamping element tends to move alternately rearwardly and forwardly along the surface of the material to be tamped; and arresting means supported by said tamping element at said trailing end portion thereof and extending rearwardly and downwardly therefrom and having a rearwardly facing rear edge which slides over the surface of the material to be tamped when said tamping element moves forwardly and which tends to penetrate spaced from said tamping element into said material to be tamped when said tamping element tends to move rearwardly whereby said tamping apparatus propels itself forwardly.

5. A self-propelling tamping apparatus comprising a tamping element having an underside arranged to come to rest on the surface of the material to be tamped, said element having a leading end portion and a trailing end portion, at least one of said end portions having a bottom face which is inclined upwardly with respect to said underside of said element; a vibrator assembly mounted on said tamping element, said assembly being arranged to impart to said tamping element first reciprocatory movements in a direction substantially perpendicular to said underside whereby the tamping element compacts the material, and to impart to said element second reciprocatory movements substantially parallel with said underside first in one direction and then in a direction opposite said one direction whereby the tamping element tends to move alternately rearwardly and forwardly along the

surface of the material to be tamped; and arresting means provided at the rear of said tamping element and arranged to penetrate into the surface of the material to be tamped only when the tamping element tends to move rearwardly whereby said tamping element is compelled to propel itself forwardly, said arresting means comprising a wedge-shaped arresting member having a front face which is inclined forwardly and upwardly relative to said underside of said tamping element so as to slide along the surface of the material to be tamped without penetrating thereinto when the tamping element moves forwardly and having a rear face inclined to said underside at an angle sharper than said front face for penetrating the surface of the material to be tamped when said tamping element tends to move rearwardly.

6. A self-propelling tamping apparatus comprising a tamping element which includes a major portion having an underside arranged to come to rest on the surface of the material to be tamped and a trailing end portion having an underside which is inclined upwardly and backwardly with respect to the underside of said major portion; a vibrator assembly mounted on said tamping element, said assembly being arranged to impart to said tamping element first reciprocatory movements in a direction substantially perpendicular to the underside of said major portion whereby the tamping element compacts the material, and to impart to said element second reciprocatory movements substantially parallel with the underside of said major portion first in one direction and then in a direction opposite said one direction whereby the tamping element tends to move alternately rearwardly and forwardly along the surface of the material to be tamped; and arresting means supported by and movable with reference to said tamping element between an operative position in which it engages the surface of the material to be tamped and an inoperative position in which it is spaced from said surface, said arresting means being located at a level below the underside of said trailing end portion, and comprising a wedge-shaped arresting member having a front face inclined to said underside, and a rear face inclined to said underside at a sharper angle than said front face and arranged to penetrate in the operative position thereof into the surface of the material to be tamped only when the tamping element tends to move rearwardly whereby the tamping element is compelled to propel itself forwardly.

7. A self-propelling tamping apparatus comprising a tamping element which includes a centrally located major portion having an underside arranged to come to rest on the surface of the material to be tamped, a front end portion having an underside which is inclined upwardly and forwardly with respect to the underside of said major portion, and a trailing end portion having an underside which is inclined upwardly and backwardly with respect to the underside of said major portion; a vibrator assembly mounted on said tamping element and comprising a rotating vibration-producing means having an axis of rotation parallel to said underside and extending transversely of the direction of elongation of said tamping element, said assembly being arranged to impart to said element first reciprocatory movements in a direction substantially perpendicular to the underside of said major portion whereby said tamping element compacts the material, and to impart to said tamping element second reciprocatory movements substantially parallel with the underside of said major portion first in one direction and then in a direction opposite said one direction whereby the tamping element tends to move alternately rearwardly and forwardly along the surface of the material to be tamped; arresting means including a first and a second arresting member respectively located beneath the underside of said trailing end portion and said leading end portion so as to permit reversal of direction of said apparatus, each of said arresting members having a blocking portion arranged to penetrate into the material to be

tamped only when said apparatus moves in rearward direction; and actuating means for moving said arresting members with respect to said tamping element toward and away from the surface of the material to be tamped so that the arresting element which is disposed beneath the underside of said trailing end portion may be lowered into contact with the surface of the material to be tamped for penetrating therein only when said element tends to move rearwardly to prevent rearward movement of said tamping element whereby the latter is compelled to propel itself forwardly.

8. A self-propelling tamping apparatus comprising a tamping element having an underside arranged to come to rest on the surface of the material to be tamped, said tamping element including a trailing end portion having a side inclined upwardly and rearwardly with respect to said underside; a vibrator assembly mounted on said tamping element, said assembly being arranged to impart to said tamping element first reciprocatory movements in a direction substantially perpendicular to said underside whereby the tamping element compacts the material, and to impart to said tamping element second reciprocatory movements substantially parallel with said underside first in one direction and then in a direction opposite said one direction whereby the tamping element tends to move alternately rearwardly and forwardly along the surface of the material to be tamped; and arresting means including an arresting member located next to said trailing end portion and having a first face adjacent to the side of said trailing end portion a ground engaging second face inclined to said underside, and an edge portion rearwardly spaced from said first face, said edge portion of said arresting member penetrating into such material only when said tamping element tends to move rearwardly whereby said element is compelled to propel itself forwardly, and resilient means arranged to bias the face of said arresting member against the side of said trailing portion, the bias of said resilient means increasing when said tamping element moves forwardly with respect to said arresting member whereby the arresting member is entrained by said resilient means and its face impacts against the side of said trailing portion to assist the propulsion of said tamping element.

9. An apparatus as set forth in claim 8, wherein said resilient means comprises at least one compressed helical spring.

10. A self-propelling unit comprising an elongated ground-contacting element having an underside arranged to come to rest on the surface of the ground; a vibrator assembly located at a level above said element and including a mass, resilient means disposed between said mass and said element, motor means mounted on said mass, and a vibrator driven by said motor and operatively connected with said element, said vibrator including a rotating eccentric having an axis parallel to said underside and extending transversely of the direction of elongation of said element being arranged to at least impart to said element reciprocatory movements substantially parallel with said underside first in one direction and then in a direction opposite said one direction whereby the element tends to move rearwardly and forwardly along the surface of the ground; arresting means provided on said element and adapted to slidably engage the surface of the ground when said element tends to move forwardly and to blockingly engage the surface of the ground when the element tends to move rearwardly whereby the element is compelled to propel itself forwardly, said arresting means comprising a face inclined to said underside in forward direction so as to slide over said surface during forward movement, and a trailing edge as said face which blockingly engages said surface during rearward movement of said element; and selective means for selectively placing said arresting means into engagement with the ground.

11. A unit as set forth in claim 10, wherein said ground-contacting element comprises a trailing end portion and wherein said arresting means comprises a plurality of substantially wedge-shaped arresting members located at said trailing end portion and arranged in a row extending transversely of the direction of forward movement of said element, each of said arresting members being provided with an inclined face and a rear edge, and wherein said selective means comprises actuating means for selectively moving said elements into and away from contact with the ground so that the unit may be steered to advance in a desired path in response to movement of the respective rear edges of selected arresting members into blocking contact with the ground.

12. A self-propelling tamping apparatus comprising a tamping element having an underside arranged to come to rest on the surface of the material to be tamped and having a front edge and a rear edge having respective bottom faces upwardly inclined relative to said underside; a vibrator assembly mounted on said tamping element and including a rotating eccentric having an axis of rotation parallel to said underside and extending transversely of the direction of elongation of said element, said assembly being arranged to impart to said tamping element alternate vertical and horizontal components of force whereby the material to be tamped is compacted and said element tends to move forwardly and rearwardly along the surface of said material; arresting means supported by said element and including wedge means movably mounted on said front and rear edges of said element; said wedge means having one face inclined upwardly and forwardly relative to said surface and having at its trailing end another face inclined upwardly relative to said surface at a greater angle than said one face and adapted to blockingly engage the surface of said material to be tamped when said element tends to move rearwardly; and means for selectively raising and lowering said edge portion of said wedge means into blocking engagement with the surface of the material to be tamped when the tamping element tends to move rearwardly whereby said element is compelled to propel itself forwardly.

13. A self-propelling tamping apparatus comprising a tamping element having an underside arranged to come to rest on the surface of the material to be tamped and having a front edge and a rear edge having respective bottom faces upwardly inclined relative to said underside; a vibrator assembly mounted on said tamping element and including a rotating eccentric having an axis of rotation parallel to said underside and extending transversely of the direction of elongation of said element, said assembly being arranged to impart to said tamping element alternate vertical and horizontal components of force whereby the material to be tamped is compacted and said element tends to move forwardly and rearwardly along the surface of said material; arresting means supported by said element and including wedge means movably mounted on said front and rear edges of said element, said wedge means having a first surface upwardly inclined relative to said underside and having an edge portion adapted to blockingly engage the surface of said material to be tamped when said element tends to move rearwardly, said wedge means further having a second surface upwardly inclined relative to said underside of the element at a lesser angle than said first surface when said edge portion of the wedge means is in engagement with the material to be tamped; and means for selectively raising and lowering said edge portion of said wedge means into blocking engagement with the surface of the material to be tamped when the tamping element tends to move rearwardly so that said lower surface of said wedge means offers less resistance to forward motion of said element than the blocking engagement of said edge portion with the surface of the material to be tamped offers

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to rearward motion of said element, whereby said element is compelled to propel itself forwardly.

14. A self-propelling tamping apparatus comprising a tamping element having an underside arranged to come to rest on the surface of the material to be tamped and having a front edge and a rear edge having respective bottom faces upwardly inclined relative to said underside; a vibrator assembly mounted on said tamping element and including a rotating eccentric having an axis of rotation parallel to said underside and extending transversely of the direction of elongation of said element, said assembly being arranged to impart to said tamping element alternate vertical and horizontal components of force whereby the material to be tamped is compacted and said element tends to move forwardly and rearwardly along the surface of said material; arresting means supported by said element and including a ground-engaging portion adapted to blockingly engage the surface of said material to be tamped only when said element tends to move rearwardly; and means for selectively raising and lowering said ground-engaging portion of said arresting means into blocking engagement with the surface of the material to be tamped when the tamping element tends to move rearwardly, said ground-engaging portion having a first surface upwardly inclined relative to said underside and defining an edge portion, and a second surface upwardly and forwardly inclined to said underside at a lesser angle than said first surface, said ground-engaging portion being arranged to offer less resistance to forward

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movement of said element than to rearward movement thereof during which latter it blockingly engages the surface of the material to be tamped, whereby said element is compelled to propel itself forwardly.

15. An apparatus as set forth in claim 14, wherein said arresting means includes a plurality of arresting members each having a ground-engaging portion, each of said members being hinged to said tamping element and each being formed with a front face which is inclined upwardly and forwardly with respect to the surface of the material to be tamped when said ground-engaging portions of said members are moved into contact with such material and with a rear face which is inclined with respect to said surface of said material at a greater angle than said front face, said ground-engaging portions extending transversely of said tamping element and being located at the rear of the respective front face of said members.

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