Sept. 2, 1941. C. JACKSON 2,254,744

TAMPING MACHINE OR APPARATUS

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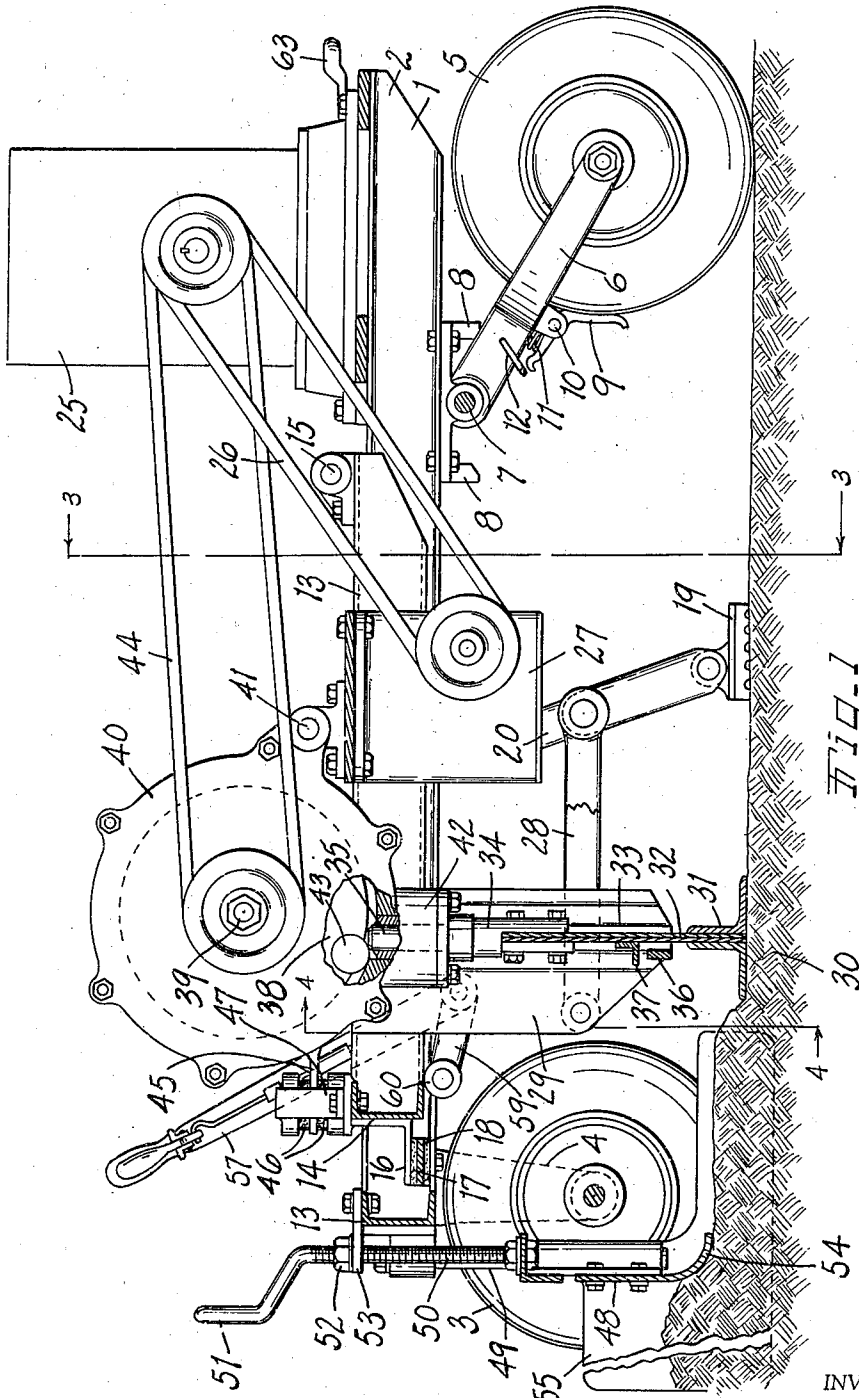


FIG. 1

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TAMPING MACHINE OR APPARATUS

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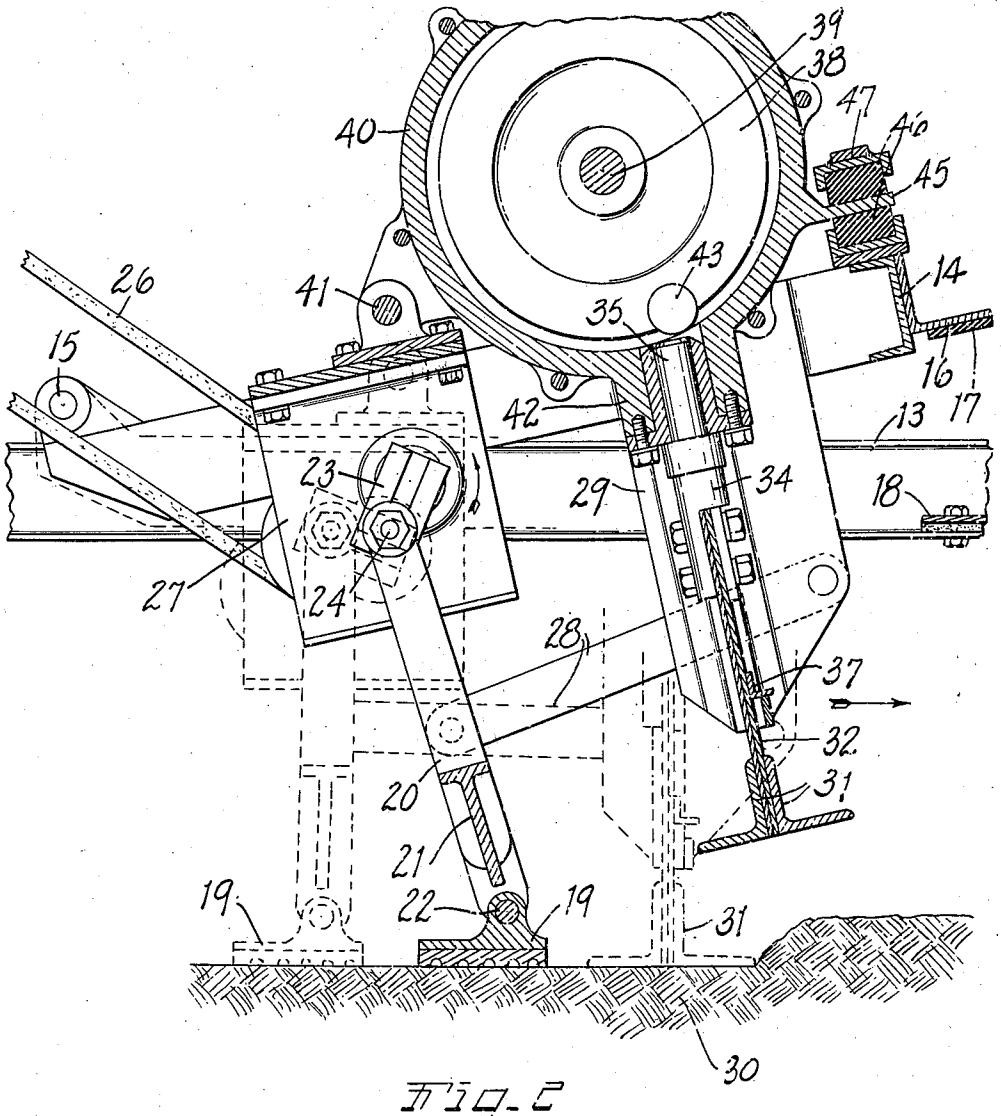


Fig. 2

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TAMPING MACHINE OR APPARATUS

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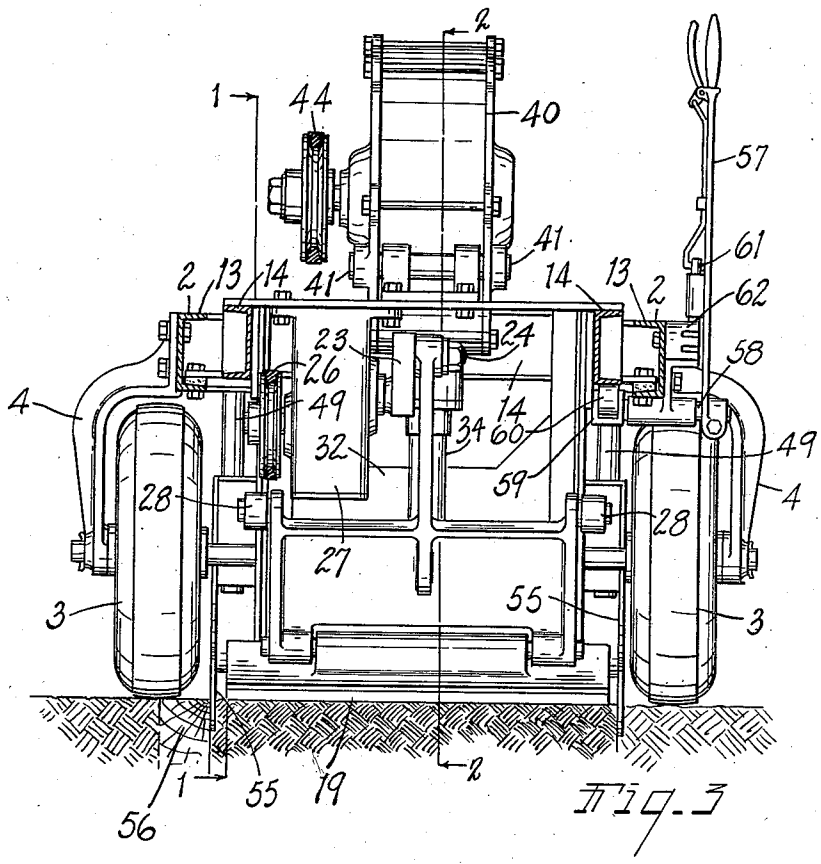


Fig. 3

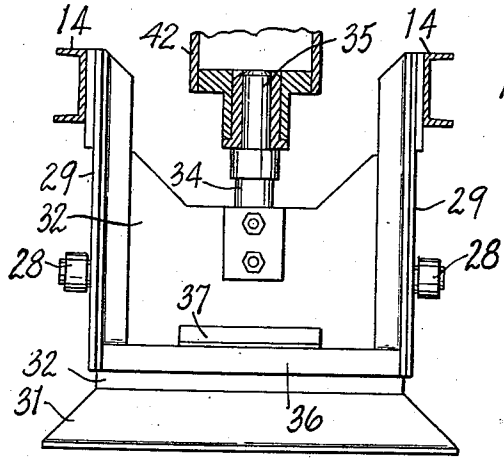


Fig. 4

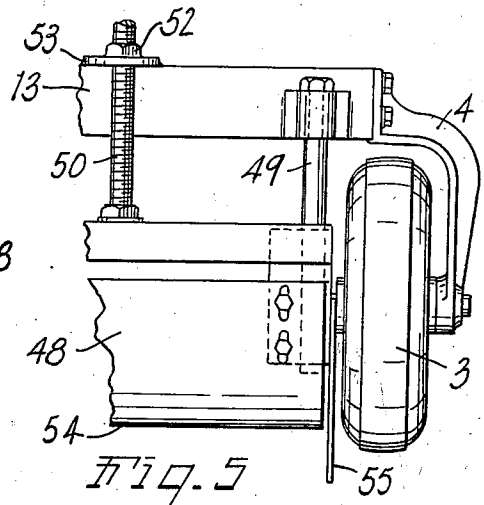


Fig. 5

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TAMPING MACHINE OR APPARATUS

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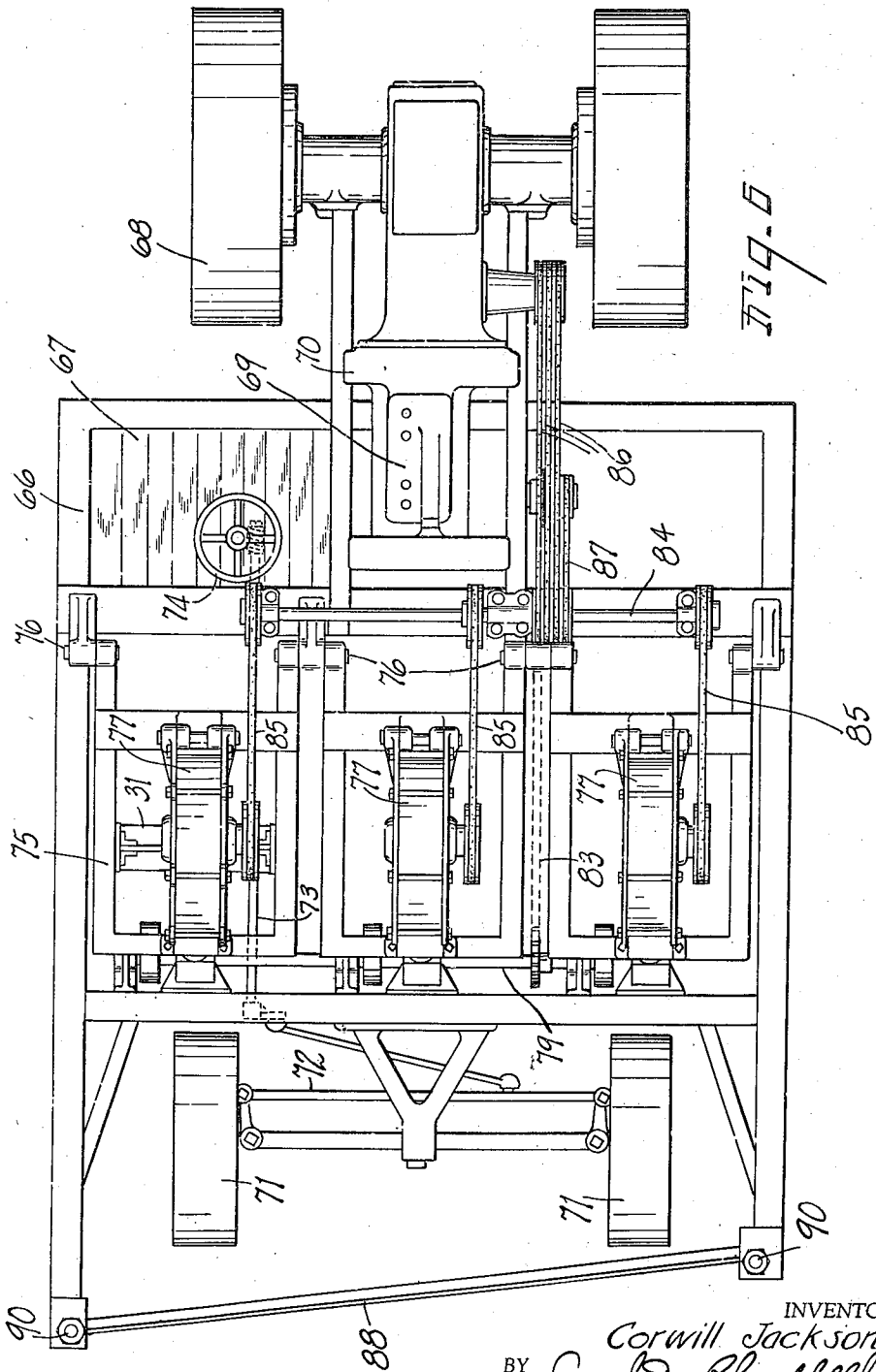


Fig. 6

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TAMPING MACHINE OR APPARATUS

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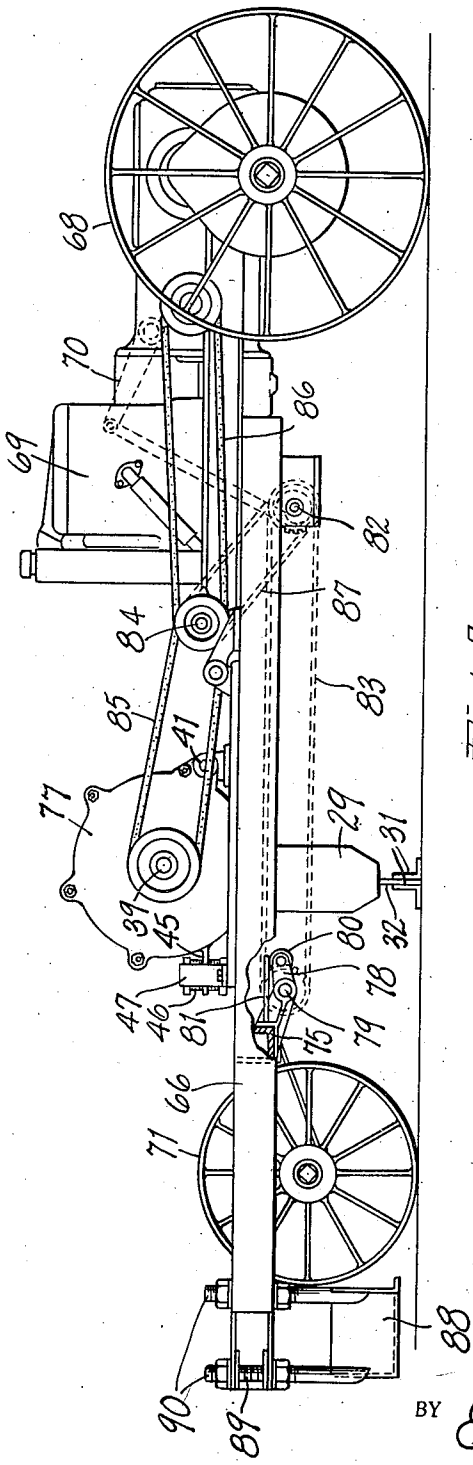


FIG. 1

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Patented Sept. 2, 1941 2,254,744

UNITED STATES PATENT OFFICE

2,254,744

TAMPING MACHINE OR APPARATUS

Corwill Jackson, Ludington, Mich.

Application August 11, 1939, Serial No. 289,595

14 Claims. (Cl. 94—49)

The main objects of this invention are:

First, to provide a tamping machine or apparatus which is well adapted for the tamping of road beds or walks or the like, or the sub-grades of pavements.

Second, to provide a machine of this character which is of large capacity and is highly efficient.

Third, to provide a machine which is largely automatic in operation requiring a minimum of manual labor in its operation.

Fourth, to provide a structure which is highly efficient and at the same time comparatively light in weight and strong and durable.

Fifth, to provide a structure having these enumerated advantages which may be quite economically produced.

Further objects and advantages pertaining to details and economies of construction and operation will appear from the description to follow. The invention is defined in the claims. Preferred embodiments of my invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a fragmentary view mainly in longitudinal section on line 1—1 of Fig. 3.

Fig. 2 is a fragmentary view mainly in longitudinal section on line 2—2 of Fig. 3 with the tamper member shown in raised position by full lines and in operative position by dotted lines, the material tamped being conventionally illustrated.

Fig. 3 is a fragmentary transverse section at the rear of the stepper on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary view partially in section on line 4—4 of Fig. 1.

Fig. 5 is a fragmentary front elevation showing details of the strike-off blade and its adjusting means.

Fig. 6 is a plan view of a modified form or embodiment of my invention in which the stepper feature is omitted, other step by step driving means being provided.

Fig. 7 is a side elevation of the structure shown in Fig. 6 with parts being broken away to disclose details thereof.

The machine of my invention is adapted for the compacting of various materials, for example the mixture of clay and gravel having a moisture content sufficient to cause cohesion of the particles when subjected to pressure or impact. Mixtures of asphaltic oil with gravel or rock particles, or mixtures of Portland cement, sand or gravel of low water content may be thoroughly compacted. Likewise it is desirable before laying concrete pavements and the like to provide a thoroughly compacted sub-grade. Rollers of different types are largely used for such purposes and many passes or trips over the material are necessary in order to compact it suitably by such methods and usually it is necessary to alternate with such trips scrapers or other leveling means in order to obtain properly shaped grades or surfaces.

My improved machine is designed to perform the work of compaction with a high degree of compactness and in a relatively short time by imparting to the material a series of rapid compacting impulses, and experience has demonstrated that one passage of the machine over properly prepared material is satisfactory, even in layers to a depth or thickness of six or eight inches.

The embodiment of my invention illustrated in Figs. 1–5 inclusive is designed to be manipulated manually, that is so far as general control of the machine is concerned. The structure illustrated comprises a main frame designated generally by the numeral 1, comprising suitable side members 2 and connecting cross pieces suitably provide a rigid frame. The front wheels 3 are carried by wheel brackets or hangers 4 which are rigidly secured to the frame. The rear wheels 5 are mounted on brackets or hangers 6 which are pivoted at 7 so that the rear wheels may be swung to the operative working position shown in Fig. 1, or to a forward position for transporting the machine and for manipulation in some types of work.

The frame is provided with rests 8 against which the wheel supports engage in either of their adjusted positions. The rear wheels are provided with automatic friction clutch members 9 pivoted at 10 and urged into engaging position with the wheels by means of the springs 11, the purpose of these clutches being to prevent retrograde movement of the machine when in operation while permitting its forward movement. Catches 12 are provided for holding these clutch members or brake members in disengaged position.

An auxiliary frame comprising the side members 13 and front cross member 14 is pivotally mounted on the main frame at 15 so that this frame may be swung up and down on its pivot for purposes which will hereinafter appear. The front cross member is provided with a stop or rest 16 provided with a cushion 17 adapted to rest on the cross piece 18 mounted on the main frame and which is itself cushioned. This auxiliary

frame carries the stepper and also the tamper. The stepper of the embodiment illustrated comprises the stepper foot 19 which is pivotally mounted on the lower end of the connecting rod 20, the connecting rod having a cross head 21 at its lower end to which the foot is mounted by means of the pivot 22. The connecting rod 20 is carried by the crank 23, the crank pin being shown at 24. This crank is driven from the engine or motor, conventionally shown at 25, through the belt 26 and suitable reducing gears housed within the transmission housing 27. The transmission gear is not illustrated as the details form no part of this invention.

To cause proper actuation of the stepper and also to raise and lower the auxiliary frame on its pivot, the connecting rod or member 20 is connected by the link 28 to the way or guide members 29 depending from the auxiliary frame, see Figs. 1 and 2. This mechanism functions to advance the machine step by step and to raise or lower the auxiliary carriage in timed relation to this advancement.

By reference to Fig. 2, it will be observed that the actuation of the upper end of the connecting rod in a circular path through one stroke of the crank will lift it from the compacted surface indicated at 30 and, owing to the connection through the link 28 to the auxiliary frame, cause the foot to swing forward and downward in an advance step and also to lift the auxiliary frame during a portion of the cycle and return it to operative tamping position during another portion of the cycle.

The tamper or foot member 31 is provided with a web or body portion 32 slidably mounted in the ways 33 of the guides 29. The tamper member is provided with an anvil or impact member 34 with which the tappet 35 coacts. To limit the downward movement of the tamper, the guide members are provided with a cross piece 36 which constitutes a stop with which the stop 37 on the tamper coacts. This provides for a limited reciprocatory movement of the tamper relative to the auxiliary frame by which it is carried. Impulses or blows are imparted to the tamper by means of the impact wheel or rotor 38 which is supported by the shaft 39 within the housing 40. This housing is pivoted at 41 and is provided with a thrust head 42 which engages the head of the anvil 34 when the parts are in tamping position.

In Fig. 1, the auxiliary frame is in its lowered position while in Fig. 2 it is in its raised position, and it will be noted that in its raised position the tamper is supported by the coacting stops 36 and 37 and that the tappet is out of position to be engaged by the impact roller 43. The impact wheel 38 is driven from a belt 44 from the motor 25 or other suitable source of power. While the housing 40 is swung or moved with the auxiliary frame, it has splined individual movement on its pivot 41, it being provided opposite its pivot with an arm or extension 45 positioned between a pair of resilient blocks 46 carried by a suitable support designated by the numeral 47, see Figs. 1 and 2.

The impact wheel is preferably driven at considerable speed and it imparts a series of blows or impulses to the tamper while the same is subjected to a substantial load of the auxiliary frame. It will be understood that when the tamper first engages the uncompacted mass, a very substantial weight or thrust is applied to the tamper and this, in combination with the rapid impulses or blows imparted thereto, is found to be highly effective in compacting the material.

The material to be compacted is preferably struck off and preliminarily leveled by the strike-off blade 48 which is mounted on the vertical guides 49 and made vertically adjustable by means of the screw 50 provided with a crank 51 at its upper end. A nut 52 is provided for coaction with the bracket 53 for holding the adjusting screw in its adjusted position. The bottom of the strike-off blade is preferably curved rearwardly as shown at 54 which results in some compactness of the material and also in a somewhat more effective distribution thereof. The side wings or side plates 55 serve to support the material as it is screeded or struck off and also serve as guides traveling along the side of the form member 56 which is positioned to grade. In Fig. 3, one wheel is traveling upon the form member and the other is traveling upon a previously compacted surface. It will be understood that when the first strip is laid, if more than one strip is required to secure the desired surface, two of the form members are employed and properly set to grade. Where shoulders or extensions are provided for pavements, the edge of the pavement constitutes the guide and support for one pair of wheels.

When it is desired to transport the structure, the auxiliary frame is lifted by means of the manually operated lever 57 mounted on the shaft 58 which is provided with a crank arm 59 having a roller 60 thereon engaging the front end of the auxiliary frame, see Figs. 1 and 3. The detent 61 on the lever coacts with a suitable segment 62 for holding the parts in their adjusted position. Handles 63 are provided at the rear end of the machine for manipulation. In transporting, the brake 9 is disengaged and the wheel hangers 6 swung to a forward position. This brings the weight of the motor at the rear of the rear wheels and the machine can be tilted and manipulated on the rear wheels. When the brake is engaged, it prevents retrograde movement of the machine while the stepper is operating to advance the machine and also holds it during each tamping step.

With the parts arranged as in the embodiment of Figs. 1 to 5 inclusive, the machine is automatically advanced with a step by step movement, the tamping steps being synchronized so that the tamper is in raised position during the advancement of the machine and is brought into operative position to the work at the conclusion of the advancing step.

In the embodiment of my invention shown in Figs. 6 and 7, I show my improvements in a larger machine in which the main frame is designated by the numeral 66 and is provided with a platform 67 for the operator. The rear wheels 68 are the propelling or driving wheels connected to the motor 69, shown conventionally, through a transmission and clutch control designed to advance the machine step by step. The clutch control lever is indicated at 70. The details of the clutch are not illustrated as they form no part of this invention.

The forward wheels 71 are steering wheels. The steering gear is generally designated by the numeral 72 and includes the shaft 73 and the hand steering wheel 74. A series of three auxiliary frames 75 are provided, each pivoted to the main frame at 76, each auxiliary frame carrying a tamping unit designated generally by the numeral 77, the several units being arranged in alignment. These units are individually substantially the same as that described for the

embodiment of Figs. 1 to 5, and therefore they are not detailed. Only one of the tampers 81 is shown in Fig. 6. Other details are omitted for convenience in illustration. The auxiliary frames 75 are raised and lowered in timed relation to the advancement of the machine by means of the arms 78 on the shaft 79, these arms being provided with rollers 80 engaging the members 81 on the auxiliary frames as the shaft rotates and this alternately raises and lowers the auxiliary frames to move the tamper units to and from the work.

The shaft 79 is driven from a jack shaft 82 through the sprocket chain 83 and suitable sprockets. The rotors are driven from the shaft 84 through driving connections 85. A series of belts 86 are used for driving the shaft 84 and the shaft 82 is driven by the belt 87. A series of belts are used merely for the purpose of securing the desired driving friction, belts of the V-type being preferably used. In this embodiment, the strike-off blade 88 is mounted at the front of the machine, it being supported for vertical adjustment by means of the threaded hangers 89 and the adjusting screws 90.

In Figs. 6 and 7, I have omitted various details which are, however, disclosed in Figs. 1 to 5 inclusive. The machine of Figs. 6 and 7 embodies the same tamping features as that of Figs. 1 to 5, the main departures being in the matter of driving and raising and lowering the tamping unit.

Tamping or compacting machines embodying my invention are highly efficient and are desirable for use in various relations; also highly efficient in the matter of results, that is, the thoroughness and uniformity with which the material is compacted and also in the matter of capacity.

I have illustrated and described my improvements in embodiments which I have found very satisfactory. I have not attempted to illustrate or describe other embodiments or adaptations as it is believed that this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine of the class described, the combination with a main frame, of an auxiliary frame pivotally mounted on said main frame, a driven crank on said auxiliary frame, a stepper foot, a connecting rod for said stepper foot to said crank, opposed depending tamper guide members on said auxiliary frame, a link connecting said stepper connecting rod with said guide members whereby the auxiliary frame is alternately raised and lowered in timed relation with the action of the stepper, a tamper disposed in advance of said stepper foot mounted on said guide members for limited reciprocatory movement and provided with an impact head and with a tappet coacting therewith, said guide members and tamper being provided with coacting stops limiting the downward movement of the tamper relative to the guide members, an impact wheel housing pivotally mounted on said auxiliary frame and adapted to engage said tamper impact head when the auxiliary frame is in lowered position, and an impact wheel within said wheel housing provided with an impact member cooperating with said tappet as the wheel is rotated when said tappet is projected into the path thereof by the engagement of the tamper with the work.

2. In a machine of the class described, the combination with a main frame, of an auxiliary frame pivotally mounted on said main frame, the swinging end of said auxiliary frame being provided with resilient cushioning means on said main frame, a driven crank on said auxiliary frame, a stepper foot, a connecting rod for said stepper foot to said crank, opposed depending tamper guide members on said auxiliary frame, a link connecting said stepper connecting rod with said guide members whereby the auxiliary frame is alternately raised and lowered in timed relation with the action of the stepper, a tamper disposed in advance of said stepper foot mounted on said guide members for limited reciprocatory movement and provided with an impact head and with a tappet coacting therewith, said guide members and tamper being provided with coacting stops limiting the downward movement of the tamper relative to the guide members, an impact wheel housing pivotally mounted on said auxiliary frame and adapted to engage said tamper impact head when the auxiliary frame is in lowered position and provided with cushioning members on said auxiliary frame opposite its pivot, and an impact wheel within said wheel housing provided with an impact member cooperating with said tappet as the wheel is rotated when said tappet is projected into the path thereof by the engagement of the tamper with the work.

3. In a machine of the class described, the combination with a main frame, of an auxiliary frame pivotally mounted on said main frame, the swinging end of said auxiliary frame being provided with resilient cushioning means on said main frame, a driven crank on said auxiliary frame, a stepper foot, a connecting rod for said stepper foot to said crank, means for rotating the crank to advance the stepper intermittently, a link connecting said stepper connecting rod with said auxiliary frame whereby it is alternately raised and lowered in timed relation with the action of the stepper, a tamper disposed on said auxiliary frame in advance of said stepper foot for alternate engagement and disengagement with the work as the auxiliary frame is lowered or raised and mounted for limited reciprocatory movement thereon, said tamper being provided with an impact head and with a tappet coacting therewith, an impact wheel housing pivotally mounted on said auxiliary frame and adapted to engage said tamper impact head when the auxiliary frame is in lowered position and provided with cushioning members on said auxiliary frame opposite its pivot, and an impact wheel within said wheel housing provided with an impact member cooperating with said tappet as the wheel is rotated when said tappet is projected into the path thereof by the engagement of the tamper with the work.

4. In a machine of the class described, the combination with a main frame, of an auxiliary frame pivotally mounted on said main frame, a driven crank on said auxiliary frame, a stepper foot, a connecting rod for said stepper foot to said crank, means for rotating the crank to advance the stepper intermittently, a link connecting said stepepr connecting rod with said auxiliary frame whereby it is alternately raised and lowered in timed relation with the action of the stepper, a tamper disposed on said auxiliary frame in advance of said stepper foot for alternate engagement and disengagement with the work as the auxiliary frame is lowered or raised and mounted for limited reciprocatory movement thereon, said tamper being provided with an impact head and with a tappet coacting there-

with, an impact wheel housing pivotally mounted on said auxiliary frame and adapted to engage said tamper impact head when the auxiliary frame is in lowered position, and an impact wheel within said wheel housing provided with an impact member cooperating with said tappet as the wheel is rotated when said tappet is projected into the path thereof by the engagement of the tamper with the work.

5. In a machine of the class described, the combination with a main frame, of an auxiliary frame pivotally mounted on said main frame, the swinging end of said auxiliary frame being provided with resilient cushioning means on said main frame, means for raising and lowering said auxiliary frame, opposed depending tamper guide members on said auxiliary frame, a tamper mounted on said guide members for limited reciprocatory movement and provided with an impact head and with a tappet coacting therewith, an impact rotor housing pivotally mounted on said auxiliary frame and adapted to engage said tamper impact head when the auxiliary frame is in lowered position and provided with cushioning members on said auxiliary frame opposite its pivot, and an impact rotor within said housing provided with an impact member cooperating with said tappet as the rotor is rotated when said tappet is projected into the path thereof by the engagement of the tamper with the work.

6. In a machine of the class described, the combination with a main frame, of an auxiliary frame pivotally mounted on said main frame, means for raising and lowering said auxiliary frame, opposed depending tamper guide members on said auxiliary frame, a tamper mounted on said guide members for limited reciprocatory movement and provided with an impact head and with a tappet coacting therewith, an impact rotor housing pivotally mounted on said auxiliary frame and adapted to engage said tamper impact head when the auxiliary frame is in lowered position, and an impact rotor within said housing provided with an impact member cooperating with said tappet as the rotor is rotated when said tappet is projected into the path thereof by the engagement of the tamper with the work.

7. In a structure of the class described, the combination with a carriage, of an auxiliary frame pivotally mounted on said carriage for raising and lowering movement, a tamper mounted on said auxiliary frame, means for imparting a series of impacts to said tamper when said auxiliary frame is in lowered position to present the tamper to the work, said frame being operatively connected to and supported at least in part by the tamper in said last named position whereby to apply a weighting thrust to said tamper while it is subject to such impacts, a stepper for advancing said carriage step by step, and operating connections for said stepper to said auxiliary frame whereby the auxiliary frame is actuated by said stepper to lift the tamper from the work during the advancing movement of the carriage.

8. In a structure of the class described, the combination with a carriage, of an automatic brake operatively associated with one of the wheels of the carriage and adapted when set to prevent rearward rotation thereof while permitting forward rotation thereof, an auxiliary frame pivotally mounted on said carriage, a tamper mounted on said auxiliary frame, means for actuating said tamper when said auxiliary frame is in lowered position to present the tamper to the work, a stepper for advancing said carriage step by step, with operating connections for said stepper to said auxiliary frame whereby the auxiliary frame is actuated by said stepper to lift the tamper from the work during the advancing movement of the carriage.

9. In a structure of the class described, the combination with a carriage, of an automatic brake operatively associated with one of the wheels of the carriage and adapted when set to prevent rearward rotation thereof while permitting forward rotation thereof, an auxiliary frame pivotally mounted on said carriage, a tamper mounted on said auxiliary frame, means for actuating said tamper when said auxiliary frame is in lowered position to present the tamper to the work, means for advancing said carriage step by step provided with operating connections to said auxiliary frame whereby the auxiliary frame is actuated to lift the tamper from the work during the advancing movement of the carriage.

10. In a structure of the class described, the combination with a carriage, of an auxiliary frame pivotally mounted on said carriage for raising and lowering movement, a tamper mounted on said auxiliary frame, means for imparting impulses to said tamper when said auxiliary frame is in lowered position to present the tamper to the work, and means for advancing said carriage step by step, said advancing means being provided with operating connections to said auxiliary frame actuated by the advancing means whereby the auxiliary frame is actuated to raise and lower the tamper from and to engagement with the work during the advancing movement of the carriage.

11. In a machine of the class described, the combination with a carriage, of an auxiliary frame swingably mounted on said carriage for raising and lowering movement on the carriage as the latter advances, a stepper on the carriage coacting with the work for advancing the carriage, means for intermittently advancing the stepper to advance the carriage, operating connections for said auxiliary frame to said stepper actuated by advancement of the latter whereby the auxiliary frame is alternately raised and lowered during the advancement of the carriage, a tamper mounted on said auxiliary frame for limited vertical reciprocatory movement relative thereto and having a tappet element for receiving impulses and transmitting the same to the tamper, an impact member support mounted on said auxiliary frame, and a traveling impact member mounted on said support and coacting with said tappet when the auxiliary frame is lowered and the tappet is projected vertically into the path of the impact member by the engagement of the tamper with the work, said tappet element being out of the path of said member when the auxiliary frame is raised and the tamper retracted vertically out of engagement with the work.

12. In a machine of the class described, the combination with a carriage having means for advancing the same, of an auxiliary frame pivotally mounted on said carriage for raising and lowering movement, means connected to and actuated by said advancing means for raising and lowering said auxiliary frame in timed relation to the advance of the carriage, a tamper mounted on said auxiliary frame for limited reciprocatory movement thereon in accordance with the raising and lowering of the frame, an impact

rotor housing mounted on said auxiliary frame and operatively connected to and supported at least in part by the tamper to impart downwardly acting thrusting weight to the tamper when the auxiliary frame is in lowered position and the tamper elevated relative thereto by engagement with the work, an impact rotor within said housing provided with an impact member acting upon said tamper as the rotor is rotated and the tamper is in engagement with the work so as to be projected upward into the path of said member, whereby to impart a series of impulses to the tamper, and means for rotating said rotor as the carriage is advanced.

13. In a machine of the class described, the combination with a carriage, of a tamper, an auxiliary supporting frame for said tamper pivotally mounted on said carriage for raising and lowering adjustment, means for advancing said carriage step by step, means actuated by said last named means as the carriage advances for raising and lowering said auxiliary frame and tamper for alternate engagement and disengagement of the tamper with the work in timed relation to the advancement of the carriage, said auxiliary frame being operatively connected to and supported at least in part by the tamper when the auxiliary frame is in lowered work engaging position to apply its weight to the tamper, and means on said auxiliary frame for imparting a series of impulses to the tamper while it is pressed upon the work by such weight.

14. In a machine of the class described, the combination with a carriage and means for advancing the same, of a tamper, an auxiliary supporting frame for said tamper mounted on said carriage for raising and lowering adjustment, means actuated by said advancing means for raising and lowering said auxiliary frame for alternate engagement and disengagement of the tamper with the work as the carriage advances, said auxiliary frame being operatively connected to and supported at least in part by the tamper when the auxiliary frame is in lowered position and the tamper is in work engaging position to apply its weight to the tamper, and means for imparting a series of impulses to the tamper while it is pressed upon the work by such weight.

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