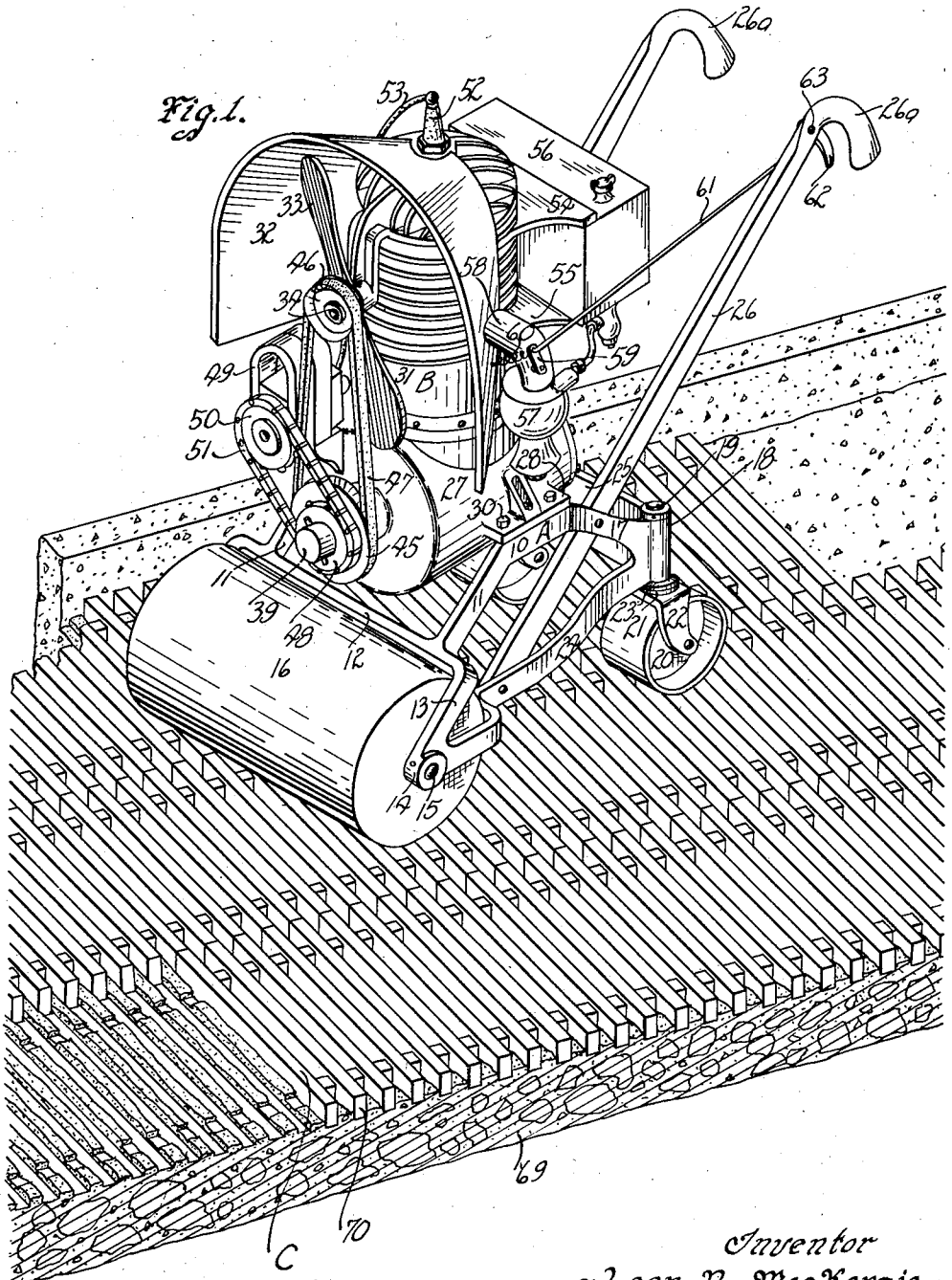
Jan. 17, 1933. L. R. MacKENZIE 1,894,408

IMPACTING MACHINE

Filed March 24, 1930 2 Sheets-Sheet 1

Fig. 1.



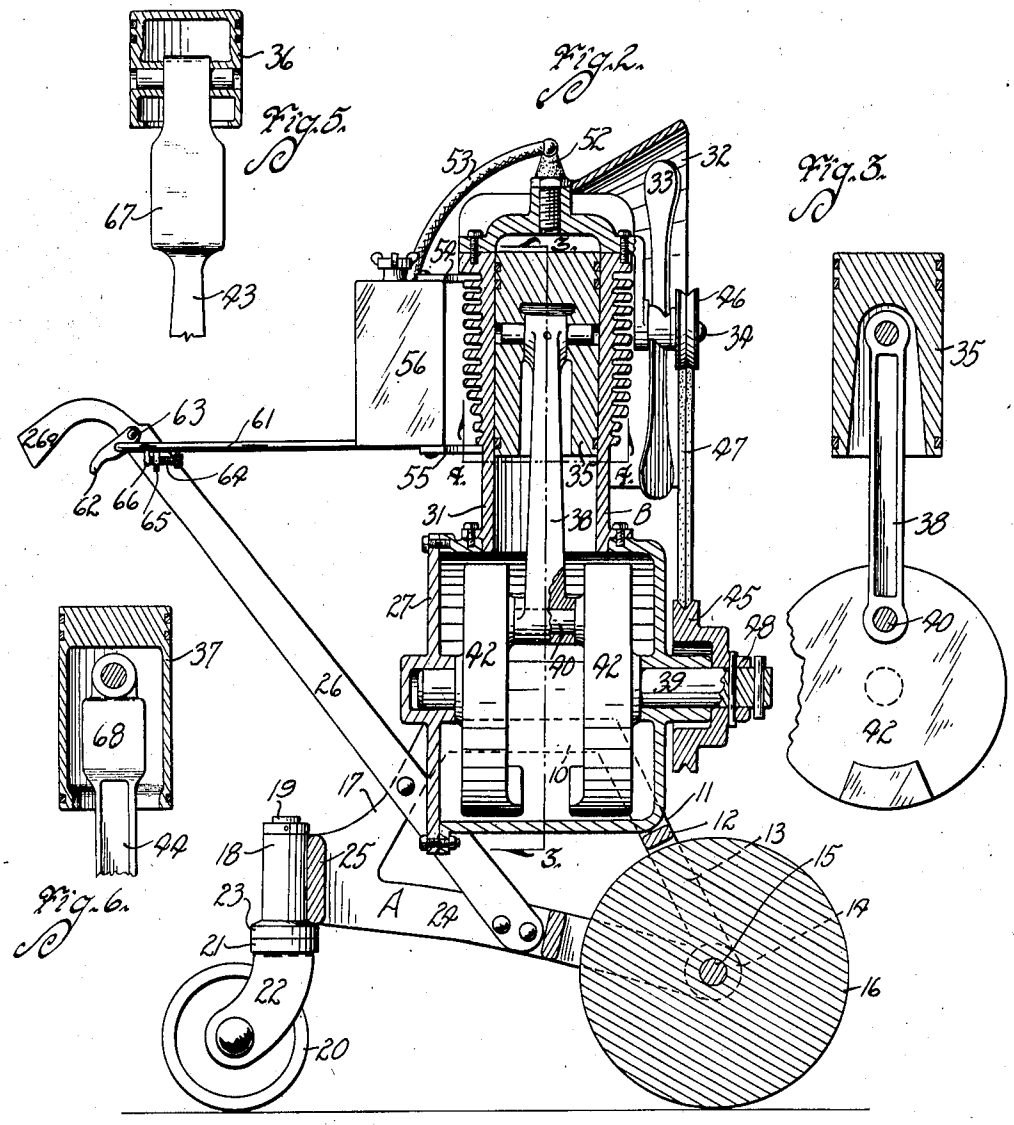
Witness
H. J. Munzenmaier

Inventor
~Leon R. MacKenzie~
by Bair, Freeman & Sinclair
Attorneys

Jan. 17, 1933. L. R. MacKENZIE 1,894,408

IMPACTING MACHINE

Filed March 24, 1930 2 Sheets-Sheet 2



Witness
W. Seeley

Inventor
Leon R. MacKenzie
By Bair, Freeman & Sinclair
Attorneys

Patented Jan. 17, 1933 1,894,408

UNITED STATES PATENT OFFICE

LEON R. MACKENZIE, OF DES MOINES, IOWA

IMPACTING MACHINE

Application filed March 24, 1930. Serial No. 438,603.

The purpose of my present invention is to provide an impacting machine of simple and durable structure particularly adapted for imparting direct vertical impacts to pavement, especially concrete pavement for making a product which is as close in nature to hard natural stone as it is possible to secure.

It has been discovered that a highly efficient method of making concrete pavement involves the placing upon the pavement while the concrete is still in plastic condition a plurality of impact conveying units in the form of slat-like platforms and then subjecting the platforms to a plurality of vertical impacts rapidly given by a freely mobile impacting machine. By this method the concrete is impacted, compacted and condensed by taking out surplus air and water for producing a product of maximum stone content and of maximum density.

The impact machine of the present invention is one designed for use with this method.

It is particularly my purpose to provide such an impacting machine, comprising an internal combustion engine mounted on wheels or rollers, so that it may be readily and easily pushed from place to place, so that each particular part of the pavement may be impacted for securing the best results according to the condition of such part of the pavement.

A further purpose is to provide such a machine using an internal combustion engine, which is of well-known construction, and modifying that construction by overweighting the piston or the piston rod for unbalancing the engine, and thus insuring the delivery of the vertical impacts.

The pavement is thus submitted to direct vertical impacts and also simultaneously to pressure for securing the desired result.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my impacting machine, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of one of my machines in use on impact conveying units laid on a plastic pavement slab.

Figure 2 is a vertical, sectional view through the machine.

Figure 3 is a vertical, sectional view of the overweighted piston, showing the piston rod connected therewith, taken on the line 3—3 of Figure 2.

Figure 4 is a detail, sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a detail, sectional view of the piston of another form of my device, in which the ordinary piston is used and the piston rod is provided with a weight which puts the machine out of balance.

Figure 6 is a vertical, sectional view similar to that shown in Figure 5 and taken at right angles to the view shown in Figure 5; and

Figure 7 is a vertical, sectional view of another type of piston and piston rod in which both piston and piston rod are somewhat overweighted to secure the unbalanced effect.

The machine which is the subject matter of my present invention is used in the impact method of making pavement, which is the subject matter of my Patent No. 1,718,863, issued June 25, 1929, although I do not want to limit myself to the use of my machine with that method only.

The machine consists of a suitable frame indicated by the reference character A, which preferably, has the two side members 10 spaced laterally from each other and formed with the downwardly and forwardly projecting arms 11.

The arms 11 are connected by a cross member 12, which projects beyond them at its ends, as shown in Figure 1, and has the downwardly projecting arm portions 13, having journals 14 formed at their ends for receiving the spindles 15 of a roller 16.

At the rear ends of the side frame members 10 are rearwardly extending curved arms 17, which have at their rear ends journals 18 for the upright spindles 19 of the castor wheels 20.

At the lower ends of the spindles 19 are flanges 21, below which are yokes 22. The

lower ends of the journals 18 have flanges 23 resting above the flanges 21, and it will be understood that the usual ball bearing devices may be interposed between the flanges 21 and 23 if desired or these flanges may represent suitable ball bearing structures.

The lower ends of the arms 17 and 13 at each side of the frame are connected by fore-and-aft extending arms 24.

The rear ends of the arms 17 and 24 on the respective sides of the frame are connected by a cross bar or frame member 25. Handles 26 are fastened to the arms 24 and 17 and are inclined upwardly and rearwardly on opposite sides of the machine. These handles terminate in downturned handle portions 26*a* at their upper ends.

An internal combustion engine B has a crank and fly wheel case 27 provided with flanges 28 which rest upon the frame members 10 and are suitably secured thereto by means of screw bolts 30 or in any suitable way.

Extending upwardly from the crank case 27 is a cylinder 31 preferably of the air-cooled type. The front half of the cylinder is provided with a forwardly projecting hood 32, under which is mounted a fan 33 on a suitable stub shaft 34.

In the cylinder 31 is a piston 35.

In Figures 5 and 6, I have shown slightly different forms of cylinders indicated by the reference numerals 36 and 37.

Connected with the piston 35 in the usual way is a piston rod 38.

Journaled in the walls of the crank and fly wheel case 27 is a crank shaft 39, having the usual crank pin 40 connecting the fly wheels 42.

In Figures 5 and 7, I have shown slightly different forms of piston rods 43 and 44.

Mounted on the crank shaft 39 outside the casing 27 is a gear member 45, which may be a pulley wheel as indicated. On the fan shaft 34 is a pulley 46. A belt 47 travels on the pulleys 45 and 46 for running the fan 33. On the forward end of the crank shaft is a sprocket 48. Suitably mounted on the engine is a timing and ignition mechanism 49 including the sprocket 50.

A sprocket belt or chain 51 travels on the sprockets 48 and 50.

Mounted in the head of the cylinder is the usual spark plug 52, which is connected by a wire 53 with the timing and ignition system.

Supported on suitable brackets 54 and 55 on the engine is a fuel supply tank 56 from which fuel is furnished to the carburetor 57 and thence through the manifold 58 to the cylinder.

The fuel supply system has a throttle structure 59. A spring 60 normally holds the throttle closed and an operating rod 61 extends to the outer end of one of the handle members where it is pivoted to an operating lever 62, which is pivoted at 63 on the handle and projected into position readily accessible to the hand grasping the handle member 26*a*.

For setting the throttle to position partially open, there may be provided a set screw 64 threadedly adjustable in a small bracket 65 on the arm 26 and adapted to abut against a lug 66 on the rod 61 as best illustrated in Figure 2. It will, of course, be obvious that by adjusting the throttle the speed of the engine may be regulated and consequently the number and force of the impacts imparted by the engine to the frame may be regulated. The piston 35 is overweighted substantially.

In Figure 5, I have shown an ordinary piston with a piston rod 43 overweighted as at 67.

In Figure 7, I have shown a piston 37 and a piston rod 44, the latter being overweighted as at 68.

The amount of overweight of the piston 37 is less than that of the piston 35 and the amount of overweight of the rod 44 is less than that of the rod 43.

I have thus shown three slightly different ways in which the overweighted feature can be secured for giving the out-of-balance action to the engine;—First—an overweighted piston,—second—an overweighted piston rod, and third—an overweighted piston combined with an overweighted piston rod.

I will now refer to the practical operation and use of my improved impacting machine.

In the use of a machine of this kind, a layer of plastic concrete 69 is placed on a prepared sub-grade or base in any ordinary known way. While the concrete is still plastic, I place thereon a plurality of impacting units C. These may be of the kind shown in my co-pending application on a pavement grid structure, Serial No. 304,788, filed September 8, 1928. These grid units each comprise a plurality of cross bars or the like 70 secured together and spaced apart in a suitable way.

These impact conveying units C serve to form a platform upon which the impacting machine may be readily and easily and conveniently moved from place to place. They impose some weight on the plastic slab and can be advanced by units after any particular portion of the pavement has been impacted to the extent required by its condition.

The operator pushes the machine over the platform formed by the units C lengthwise, cross-wise and diagonally of the highway. The operator watches the pavement closely and with experience can readily determine when the impacting has been complete for the purpose of removing surplus air and water and compacting the concrete to its greatest density.

There are many advantages arising from the use of a machine of this kind. Concrete can be impacted and compacted by vertical

impacts for securing a more dense and solid structure than is otherwise possible. By using the vertical impact machine, there is a minimum loss of force. There is no dissipation by a force by directing the blows in diagonal directions. The direct vertical impacts do not tend to apply any forces which would tend to spread or split the concrete or to cause cracks therein, such as might occur with machines for instance of the out-of-balance fly wheel type.

One purpose of my machine is to avoid any tendency to pull the grids horizontally from their proper places, which would result in pulling the top surface of the concrete horizontally and thus separating the component parts of the pavement, pulling them apart and serving to compact and condense the mass, which is so highly desirable.

Also with the vertical impact type of machine, there is no tendency to rock the impact conveying units as occurs with other machines.

A machine of this kind can be made of less weight and bulk than an out-of-balance fly wheel machine, because of the fact that the blows are directed vertically and therefore the labor necessary for handling the machine is reduced to a minimum.

Quicker work can be done with this type of machine, because there is no waste of power. Fewer blows are necessary. The machine therefore requires a minimum amount of time for accomplishing its work.

The direct impact machine also has a minimum wear on the parts.

The use of the impact method produces a better product, as is more fully explained on page 4 of my issued Patent, No. 1,718,863.

It is of course obvious that changes could be made in the construction and arrangement of the parts of my improved impacting machine without departing from the real spirit and purpose of my invention, and it is my desire to cover by my claims any modified forms of structure or use of equivalents, which may be reasonably included within their scope and the scope of my real invention.

I claim as my invention:

1. In an impacting machine, a frame having rotary members for affording free mobility in any direction, an internal combustion engine mounted on the frame having a fixed vertical cylinder, a vertically reciprocating piston element actuated by fuel explosions and a piston rod element associated with the piston, one of said elements being abnormally overweighted to cause the engine to deliver vertical impacts only.

2. In an impacting machine, a frame having rotary members for affording free mobility in any direction, an internal combustion engine mounted on the frame having a fixed vertical cylinder, a vertically reciprocating piston element actuated by fuel explosions and a piston rod element associated with the piston, the piston being abnormally overweighted to cause the engine to deliver vertical impacts only.

3. In an impacting machine, a frame having rotary members for affording free mobility in any direction, an internal combustion engine mounted on the frame having a fixed vertical cylinder, a vertically reciprocating piston element actuated by fuel explosions, a piston rod element pivoted to the piston, said piston rod having a weight thereon close to the piston to cause the engine to deliver vertical impacts only.

4. In an impacting machine, a frame having rotary members for affording free mobility in any direction, an internal combustion engine mounted on the frame having a fixed vertical cylinder, a vertically reciprocating piston element actuated by fuel explosions, and a piston rod element associated with the piston, both of said elements being substantially overweighted, the combined weight of the piston and the piston rod being sufficiently abnormal to cause the engine to deliver vertical impacts only, the excess weight of the piston rod being close to the piston.

5. In an impacting apparatus for the treatment of plastic material, an internal combustion engine having a vertical cylinder, a vertically reciprocating piston element actuated by fuel explosions in the cylinder, a piston rod element associated with the piston, one of said elements being abnormally overweighted to cause the engine to deliver vertical impacts only, a frame supporting said engine and transmitting the impacts, and rotary elements for supporting the frame and the engine thereon, giving the apparatus free mobility in any direction.

Des Moines, Iowa, March 14, 1930.

LEON R. MacKENZIE.