Feb. 11, 1936. R. J. NOBLE 2,030,315

RODDING AND TAMPING MACHINE FOR CONCRETE

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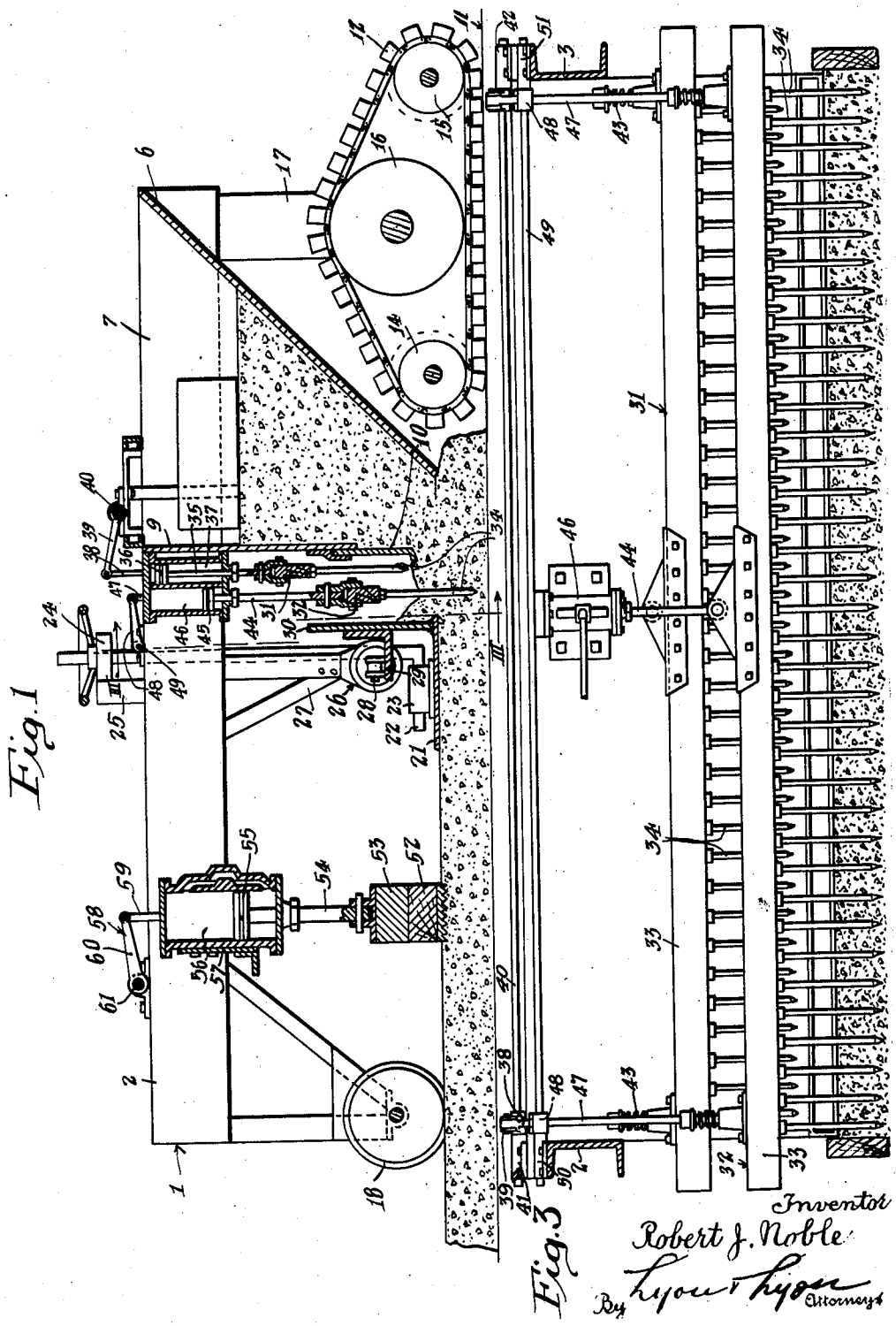


Fig. 1

Fig. 3

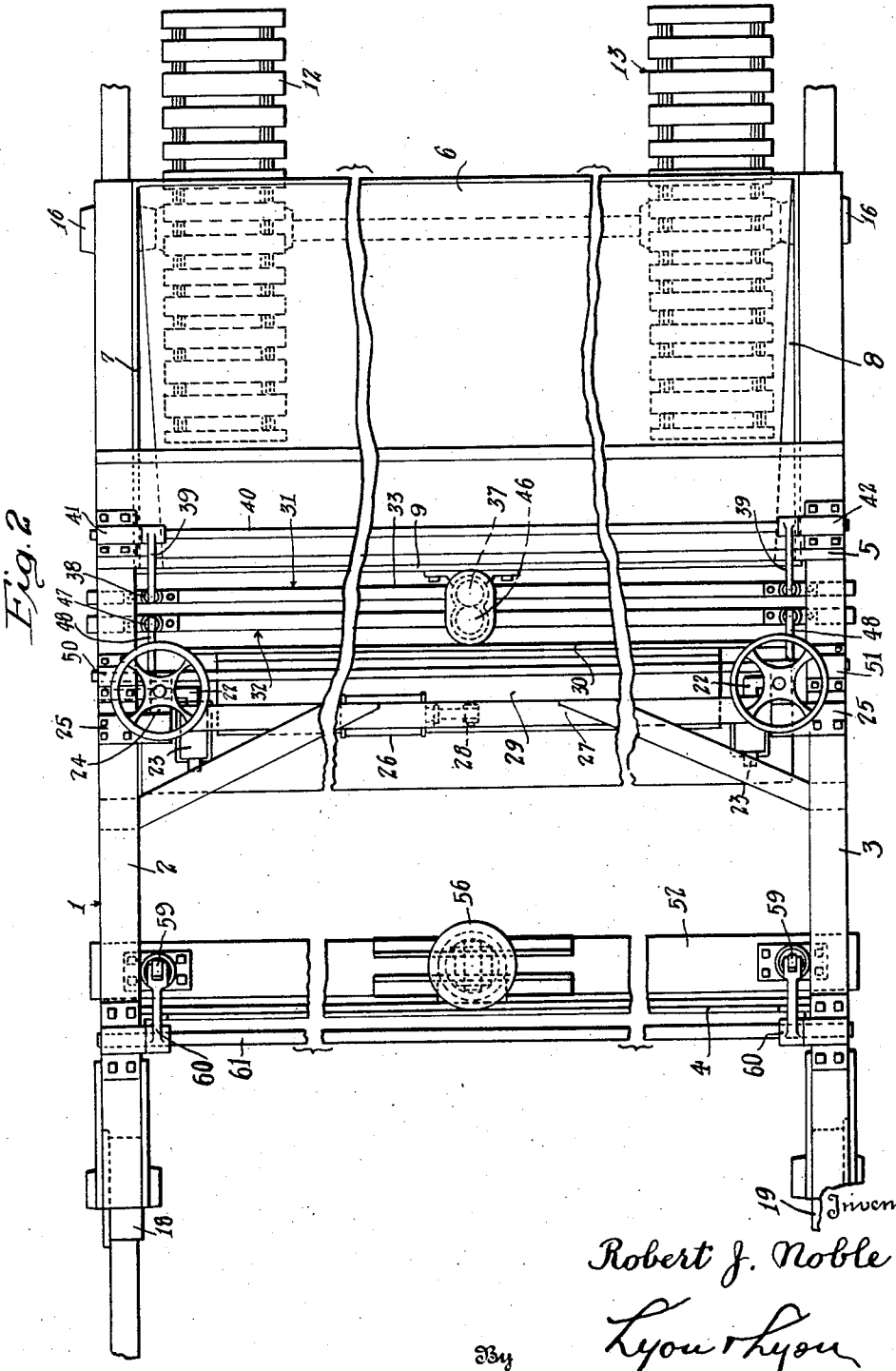
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Fig. 2



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2,030,315

RODDING AND TAMPING MACHINE FOR CONCRETE

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Application February 20, 1933, Serial No. 657,499

6 Claims. (Cl. 94—44)

My invention relates to road building mechanism, and has particular reference to a machine for applying concrete to a roadbed, and for compacting the same thereon.

In the copending application of Bert Noble, Serial No. 427,768, filed February 12, 1930, is disclosed a pavement laying and spreading machine which includes a hopper extending transversely of the roadbed, into which the concrete aggregate may be deposited, and which will distribute the concrete evenly over the roadbed, to be struck off by a "strike-off" bar ready to be tamped or compacted into place.

However, unless the mix is very wet, a considerable quantity of air will be entrapped with the aggregate, and even though this aggregate is tamped, air holes and weak places in the layer of concrete so formed, will be present, weakening the structure of the road.

It is therefore an object of my invention to provide a device which may be employed to "rod" the aggregate after it has been spread upon the roadbed, and to thus permit the escape of entrapped air, as well as to assist in compacting the aggregate upon the road.

Another object of my invention is to provide a pavement laying and spreading machine in which the aggregate is distributed from a hopper across the area of the roadbed, and in which a rodding device is mounted immediately in the rear of the hopper so that the newly spread concrete will be compacted as it is spread from the hopper.

Another object of my invention is to provide a pavement laying and spreading machine in which a hopper and strike-off mechanism are mounted upon a movable carriage which may be drawn over the prepared roadbed, and in which the concrete is distributed from a hopper across the area of the roadbed with a vertically reciprocating rodding device carried by the carriage immediately in the rear of the hopper and spreading mechanism so that the newly spread concrete may be rodded and compacted as it is laid.

Another object of my invention is to provide a rodding device for concrete, particularly adapted for the compacting of a layer of concrete upon a roadbed, which includes a bar extending transversely of the roadbed and provided with a plurality of rods mounted thereon, to penetrate the newly laid concrete.

Another object of my invention is to provide a rodding mechanism set forth in the preceding paragraph, in which the bar is mounted for vertical reciprocation above the roadbed, and is operated by power mechanism to rapidly move the rods up and down in the newly laid concrete.

Other objects of my invention will be apparent from a study of the following specification read in connection with the accompanying drawings, wherein

Figure 1 is a vertical, sectional view through a pavement laying and spreading machine similar to that described in the copending application, Serial No. 427,768, and provided with the rodding mechanism constructed in accordance with my invention.

Figure 2 is a top plan view of the pavement laying and spreading machine illustrated in Figure 1, and

Figure 3 is a detail sectional view taken along the line III—III of Figure 1.

Referring to the drawings, I have illustrated my pavement laying and spreading machine as comprising a supporting frame 1 which is formed of a pair of side girders 2 and 3, cross connected by means of cross braces 4 and 5 to form a substantially rigid structure constituting a rectangular frame for mounting a concrete receiving and distributing hopper 6 which is formed of side walls 7 and 8, and having a substantially vertical front wall 9, the lower end of which is provided with a spreader plate 10 adjustably secured to the front wall 9 to permit its being raised or lowered.

The frame is illustrated as being supported at a predetermined height above a roadbed 11, by means of two separate traction devices. One of these traction devices comprises a pair of caterpillar chains 12 and 13, each of which is arranged to operate upon a set of guide wheels 14, 15 and 16, connected to the frame 1 by means of an upright 17. From an inspection of Figure 1, it will be observed that the arrangement of the caterpillar chains and the upright 17 is such that the caterpillar traction device may rest upon the prepared roadbed, and preferably supports the frame above the roadbed, in a position to bring the lower end of the hopper 6 just above the proposed height of the layer of concrete which is to be placed upon the roadbed.

The other of the traction devices comprises a pair of wheels 18 and 19, each of which is supported upon a suitable bracket 20 extending from the rear end of each of the side frame members 2 and 3.

As will be understood by those skilled in the art, and as is particularly described in the copending application, Serial No. 427,768, the wheels 18 and 19 are preferably flanged wheels which are arranged to operate upon the road edge de-

fining headers usually employed as forms between which the concrete section of the road is laid, such headers either being embedded in the concrete in the finished roadway, or removed after the section of concrete has been cured. The headers constituing the support for the wheels 18 and 19, will serve to hold the frame at a predetermined level above the roadway, and particularly will guide the bottom of the concrete hopper over the roadbed in accordance with the vertical contour of the desired finished road.

The concrete, as it is spread upon the roadway from the hopper, is arranged to be struck off by means of a strike-off bar 21 which is supported upon the lower ends of a pair of adjustable strike-off support rods 22. The rods 22 are arranged to pivotally connect with the strike-off bar 21, as by means of pivotal bearings 23, while the upper ends of the rods are mounted in horizontally pivoted bearing members 24 suitably supported upon brackets 25 attached to the side frame members 2 and 3, so that the bar 21 is supported at the desired level with respect to the frame, but will permit a lateral oscillatory movement to be given to the strike-off bar to assist in striking off and smoothing out the concrete as it is laid upon the roadbed.

The strike-off bar is arranged to be oscillated laterally across the roadbed, by means of suitable power mechanism 26 which is illustrated herein as comprising a compressed air piston and cylinder, the cylinder being supported upon a suitable bracket 27 connected to the side frames 2 and 3, while the piston is arranged to be connected as at 28 to an angle bar 29 which is attached to the vertical plate 30 forming a part of the strike-off bar 21. Thus the application of compressed air to the piston and cylinder mechanism 26 will cause the bar 21 to be oscillated across the roadbed.

By referring particularly to Figure 1, it will be observed that the strike-off bar 21 is spaced rearwardly some considerable distance from the rear edge of the hopper 6, so that there is a free strip of distributed concrete between the rear edge of the hopper and the front edge of the strike-off bar.

As is well known by those skilled in the art of laying concrete, the mix of cement, sand, stone and water which is employed, includes a considerable quantity of air which is entrapped in the mix, and which, when the concrete is cured, forms holes or air pockets within the finished concrete, thus weakening the slab of concrete sometimes to the extent that it is relatively fragile and will break under the strains of traffic passing over such slab.

The air which is entrapped may be readily removed however, and the concrete mix compacted upon the roadbed if openings are made in the concrete mix to permit the escape of the entrapped air.

For this purpose I have illustrated a pair of rodding devices 31 and 32, each of which comprises an elongated bar 33 which extends laterally across the machine substantially the full width of the rectangle which is formed by the frame 1. Each of the bars is provided with a number of vertically depending teeth 34 spaced evenly along its length, so that if the bar 33 is reciprocated vertically, the teeth will be driven into the free section of concrete, forming a number of holes therein, which will permit the entrapped air to escape; and if the rodding operation is repeated with considerable rapidity, the entire mass of concrete will be compacted prior to the time that it is struck off by the strike-off bar 21. This is particularly advantageous because after the concrete has been struck off to the proper level, any compacting of the mass will lower the level of the finished concrete road surface, and it is difficult to insure that the level of the finished road will be even.

The rodding device 31 is illustrated as being supported upon and carried by a piston rod 35 which is connected to a piston 36 operating in a cylinder 37, so that the rodding device may be reciprocated vertically by power. However, in order to insure that both ends of the relatively long bar 33 will always be positioned at the same relative height above the roadbed, I prefer to connect the outer ends of the bar to a vertical link 38 which is in turn connected to a crank arm 39, the two crank arms 39 being rigidly connected to a shaft 40 which is rotatably mounted in suitable bearings 41 and 42 upon the side frame members 2 and 3 respectively. Thus, while the piston and piston rod mechanism may be connected to the bar 33 at any point intermediate its ends (preferably at the center), the movement will be evenly distributed throughout the length of the bar, since it is impossible for one end of the bar to move relative to the other by reason of the connection of the ends of the bar to the shaft 40. I prefer however, to interpose springs 43 between the bar 33 and its links 38, so that some small relative movement between the bar and the links is permitted in the event that the teeth of the bar should strike some immovable obstruction.

The rodding device 32 is similarly secured to a piston rod 44 which is in turn connected to a piston 45 operating in a cylinder 46, which is identical in all respects to the cylinder 37, so that this rodding device may be given a vertically reciprocating motion entirely independent of the motion of the bar 33. Preferably, however, the control of the application of compressed air or other power flud to the cylinders 37 and 46, is such that the lifting of one of the bars is accompanied by the descent of the other bar. Again the outer ends of the bar 33 forming a part of the rodding device 32, are connected through links 47 and crank arms 48, to a shaft 49 which, like the shaft 37, extends across the frame 1 and is repeatedly journalled in bearings 50 and 51 upon the side frame members 2 and 3 respectively.

While the operation of the rodding devices 32 and 33 will compact the concrete, it may be desirable to provide a tamping mechanism 52 similar to that which is illustrated in the copending application of Bert Noble, Serial No. 427,770, filed February 12, 1930, in which the tamping mechanism is described as including a bar 53 which extends laterally across the roadbed and is supported upon the frame 1 by means of connecting the same to a piston rod 54, which is in turn connected to a piston 55 operating in a compressed air cylinder 56 carried by a cross bar 57 secured to the frame members 2 and 3. This tamping bar 53 may, like the rodding devices 32 and 33, be provided with an equalizing mechanism 58 including links 59, crank arms 60, and a shaft 61, which extends across the frame 1 of the machine.

From the foregoing construction it will be observed that the pavement laying and spreading machine herein described, will permit the employment of a concrete mix of any desired consistency, which may be dumped into the hopper 6, and will be distributed by the hopper across the entire width of that section of the roadbed defined

by the side frame members 2 and 3. It will also be observed that such distributed concrete will be leveled off by the spreader plate 10, with a little excess concrete being provided above that necessary for the formation of the slab of concrete to the desired height.

By providing the rodding devices 32 and 33 to reciprocate into the mix immediately at the rear of the hopper, the free mass of concrete is compacted not only by the vertical forces exerted by the teeth 34 of the rodding devices as they penetrate the mix, but also the rods or teeth will permit the escape of the entrapped air, and at the same time will insure the puddling of any excess moisture upon the surface of the concrete. Thus the rapid curing of the slab of concrete is greatly facilitated, since the greater portion of the moisture, particularly the excess moisture in the mix, is brought to the surface where it may readily evaporate.

It will be observed that I have provided for the tamping of the concrete in advance of striking-off the same, which produces a more compact mass than has been possible heretofore.

Again attention is called to the fact that the rodding or compacting of the mass occurs prior to the time the strike-off bar engages, and smoothes off the surface of the concrete, so that without the employment of any further tamping a relatively dense slab of concrete is laid by the machine. However, further compacting of the mass may be provided by the employment of the tamping device 52, if such further compacting is desired.

While I have shown and described the preferred embodiment of my invention, I do not desire to be limited to any of the terms shown or described herein, except as defined in the appended claims.

I claim:

1. In a road building machine a carriage for movement over a prepared roadbed, means on said carriage for distributing concrete over said roadbed in a layer of predetermined thickness, means on said carriage spaced rearwardly of said distributing means for striking off said distributed concrete, and means interposed between said distributor and said strike-off means including a plurality of elongated rods mounted in spaced relation to each other in a direction transversely of said roadbed, and power means for moving said rods toward and away from said roadbed to penetrate and tamp said layer of concrete.

2. In a road building machine a carriage for movement over a prepared roadbed, means on said carriage for distributing concrete over said roadbed in a layer of predetermined thickness, means on said carriage spaced rearwardly of said distributing means for striking off said distributed concrete, and means interposed between said distributor and said strike-off means for rodding said distributed concrete to compact the same, said rodding means comprising a bar extending across said roadbed and having a plurality of rods extending downwardly therefrom and in spaced relation to each other.

3. In a road building machine a carriage for movement over a prepared roadbed, means on said carriage for distributing concrete over said roadbed in a layer of predetermined thickness, means on said carriage spaced rearwardly of said distributing means for striking off said distributed concrete, means interposed between said distributor and said strike-off means for rodding said distributed concrete to compact the same, said rodding means comprising a bar extending across said roadbed and having a plurality of rods extending downwardly therefrom and in spaced relation to each other, and means for reciprocating said bar vertically above said roadbed.

4. In a road building machine a carriage for movement over a prepared roadbed, means on said carriage for distributing concrete over said roadbed in a layer of predetermined thickness, means on said carriage spaced rearwardly of said distributing means for striking off said distributed concrete, and means interposed between said distributor and said strike-off means for rodding said distributed concrete to compact the same, said rodding means including a pair of bars extending across said roadbed, each having a plurality of rods extending downwardly therefrom and spaced along the length of the associated bar.

5. In a road building machine a carriage for movement over a prepared roadbed, means on said carriage for distributing concrete over said roadbed in a layer of predetermined thickness, means on said carriage spaced rearwardly of said distributing means for striking off said distributed concrete, means interposed between said distributor and said strike-off means for rodding said distributed concrete to compact the same, said rodding means including a pair of bars extending across said roadbed, each having a plurality of rods extending downwardly therefrom and spaced along the length of the associated bar, and means for reciprocating said bars vertically above said roadbed in alternate sequence relative to each other.

6. In a road building machine a carriage for movement over a prepared roadbed, means on said carriage for striking off a layer of concrete deposited on said roadbed, and means in advance of said strike-off means for rodding the concrete prior to its engagement by said strike-off means, said rodding means comprising a plurality of elongated rods mounted in spaced relation relative to each other in a direction transversely of said roadbed, and means for moving said rods toward and away from said roadbed to penetrate and compact said layer of concrete.

ROBERT J. NOBLE.