

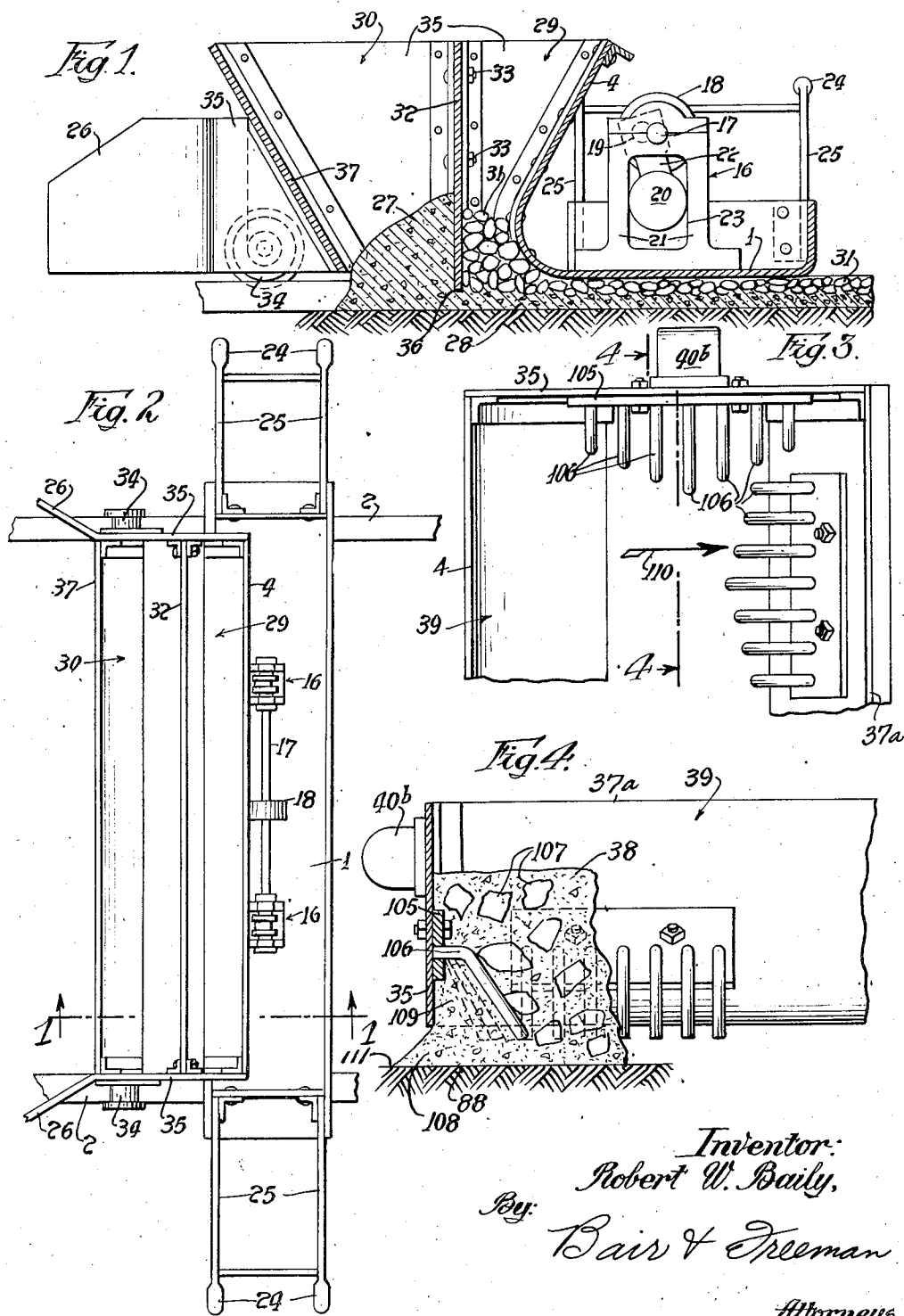
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R. W. BAILY

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APPARATUS FOR MAKING CONCRETE ROADWAYS

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Inventor:
Robert W. Baily,
By: *Bair & Freeman*
Attorneys

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APPARATUS FOR MAKING CONCRETE
ROADWAYS

Robert William Bailly, Narberth, Pa.

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3 Claims. (Cl. 94—46)

My invention relates to apparatus and methods for striking off or leveling the surface of a concrete or similar types of roadways and vibrating the latter to cause the concrete to become exceedingly dense and homogeneous and rid it of entrapped air and water.

It is one object of this invention to provide a novel method and means for striking off the surface of a concrete roadway through the use of a strike-off board or screed and intensively vibrating the concrete by mechanism carried by the screed so that the concrete becomes a dense practically fluid mass readily flowing to places of least resistance and causing the elimination of air and water entrapped in the concrete. Other objects are to provide an improved vibrating means, a novel face plate, bins and other minor elements.

A further object of my invention is to treat any material, the particles of which move relatively to each other when vibrated.

Another object of my invention is to provide means and a method to prevent the segregation or separation of the material before and during treatment.

This application is a continuation in part of my copending application, Serial No. 428,747, filed February 15, 1930.

Attention is called to my copending applications, Serial No. 514,124, filed February 7, 1931; Serial No. 256,249, filed February 13, 1939; Serial No. 74,114, filed April 13, 1936; Serial No. 166,822, filed September 7, 1937; Serial No. 114,877, filed December 8, 1936; Serial No. 228,625, filed September 6, 1938, and Serial No. 257,295, filed February 20, 1939.

Referring to the accompanying drawing:

Figure 1 is a transverse vertical section of a second form of my apparatus, the section being taken on the line 4—4 on Figure 2;

Figure 2 is a plan view of the latter form of my apparatus;

Figure 3 is a top plan view of another form of my apparatus; and

Figure 4 is a vertical transverse section taken on the line 7—7 of Figure 3.

Referring first to the drawing, 1 designates a screed extending from one side of the roadway to the other and resting at its ends on the side forms 2.

The screed 1 has on its upper side any suitable vibrating mechanism. By way of example, I have shown the mechanism now to be described. The screed has attached to its upper face a suitable number of standards 16 supporting the rotary

shaft 17 arranged transversely of the screed. The shaft may be driven by any suitable power, such as a gas engine, gasoline engine, electric motor or other prime mover which may be mounted on the screed or elsewhere. I show the pulley 18 on the shaft 17 merely to indicate that power of some kind is to be applied to rotate the shaft. The shaft has at each standard a crank 19 to which a T-shaped weight 20 is connected. The middle leg 22 of each weight is connected to its respective crank while the ends of the cylindrical head of the weight is guided vertically by the slot 23 in the members 21.

The important features of my invention are that the screed 1 always remains in contact with the concrete or any top finish thereon, as broken stone, and that the vibration produced by the weight 20 shall have high frequency or impulses in excess of 900 per minute and preferably exceeding 2500 frequencies or impulses per minute. My invention does not tamp or pound the concrete, but imparts to it very rapid intensive vibration causing what might otherwise be a stiff harsh mass to become practically a fluid and hence to flow easily. The concrete is violently agitated by the weights or whatever vibratory means is used, causing the air entrapped in the concrete to rise to the surface and escape, leaving a dense and homogeneous mass. I do away with the necessity for providing means for the escape of entrapped air, such as grids, slots, small openings, transmitting platforms and the like, because the entrapped air escapes from the concrete before the face-plate 4 passes beyond it.

The face-plate 4 receives considerable vibration not only operating vertically but also horizontally. The face-plate imparts to the concrete below the necessary vibration to cause it to flow to position and to be freed of entrapped air, so that the concrete beneath the screed is free from air and excess water.

The described apparatus may be moved backward or forward as desired by the handles 24 carried at the outer ends of the handle bars 25, but any other suitable means may be used for moving the same.

One portion of the leveling apparatus may be propelled at a different rate from the other end so that the lower face of the apparatus will move in a horizontal curved path. One end of the apparatus may be propelled in one direction while the other end is propelled in the opposite direction, so that the lower face of the apparatus will move in horizontal curved paths. Likewise the direction of movement of each end may be suc-

cessively and simultaneously reversed so that the lower face will move in reversing horizontally curved paths.

In order to keep the concrete between the form 2, the end plates 35 of the apparatus have the wings 26 which are inclined inwardly and rearwardly.

The intensity of the described vibration may be varied by the substitution of weights of different mass, using cranks of different throws, or changing the number of revolutions of the cranks per minute.

27 designates the concrete in front of the face-plate 32 while 28 denotes the dense concrete roadway slab after it has been vibrated into a dense homogeneous mass without air or excess water.

The screed has at its front edge the two bins 29 and 30, the former attached to the screed and the latter attached to the former. The bin 30 may be used to contain concrete which is struck off to form the roadway 28, while the bin 29 may contain wear-resisting top stone layer 31 mixed if desired with colored mortar or concrete so that the road surface will not have the usual white or glaring surface. The face-plate or partition 32 between the bins may be adjusted vertically by removing the bolts 33, raising or lowering the face-plate 32 and its lower screed portion 36 and replacing the bolts. It may be necessary particularly when the concrete is hard or dry to have the lower screed portion 36 of the face-plate 32 extend down, as shown in Figure 1, so as to form the upper surface of the concrete at a slightly lower level than the finished road surface to provide sufficient room for the stone layer 31. The vibration will be transmitted from face plate 4 through end plates 35 to the member 32 and the portion 36, also to the front plate 37, and the lower portion 36 and front plate 32 will vibrate the material 27, and lower portion 36 will vibrate material 27 and 31 and will cause the top stone layer 31 to be embedded slightly in the concrete and will cause the mortar or cement to rise between the various fragments of top stone with sufficient excess of mortar to provide the usual smooth surface finish. The stones for the top stone layer 31 may be fed to the surface of the concrete by any suitable means, my invention being then used to vibrate the stone surface layer and the concrete below. In case the concrete mass is soft and plastic it may be necessary to raise the face-plate or gage 32 so that its lower edge is above the desired finish of the roadway.

When broken stone is not used for the top of the roadway, the bin 29 may be used for a top layer of colored concrete or for applying fresh concrete to the subgrade. The bin 30 may be removed if desired if the bin 29 is sufficiently wide to feed concrete fast enough. My apparatus is very advantageous when two layers of different composition are to be used. Thus, fresh concrete may be fed by the bin 30 while top stone or other finish may be fed by the bin 29, as shown in Figure 1.

In case the weight of concrete in the bin 30 is so great that it tends to tilt the apparatus forwardly, rollers 34 may be provided, carried by the bin and running on the side forms 2.

As the screed is supported on the side forms 2, it strikes off the concrete to a predetermined grade line. In Figure 1 the screed strikes off the concrete and broken material into two strata, the top of the upper stratum being the wearing surface at the finished grade line.

In Figure 3 and 4 I show another form of my apparatus.

On the end wall 35 of bin 39 I provide the vibrating mechanism 40—b and on the sides and ends are the holder bars 105 carrying the inwardly and downwardly projecting internal vibrators 106 receiving their vibrations from the mechanism 40—b.

In the material 38 occur the particles 107 of substantial volume, the spacing of vibrators 106 being such that particles 107 may not pass between vibrators 106 as the material 38 is deposited on the supporting medium 88, but must move laterally away from wall 35 while the mortar 109 flows down upon the supporting medium 88 leaving the zone 108 free from particles 107 in order that no particles 107 may be freed from the mortar 109 nor arrive at location 111. Bin 39 is moving in direction of arrow 110 of Figure 3.

I have found that when a material such as concrete is flowing from a traveling hopper for deposit upon a roadway, subgrade or other supporting medium, the larger particles of the concrete tend to separate from the mixture at the sides of the pile or deposit and to roll down the inclined surface of the pile forming ridges or elongated piles of large particles, in the interstices of which there is a marked deficiency of bonding mortar. These ridges may subsequently be covered over by normal material, but the interstices mentioned are not always filled with mortar. These ridges or accumulations of coarse aggregate, not being filled with bonding mortar, become weak spots or areas in the concrete, some times resulting in cracking or surface failures in the slab.

I have found that when the vibrating fingers 106 are provided, they deflect the larger particles 107 into the interior of the mass 38, and they prevent concentration of these large particles, with a deficiency of mortar, at the lower boundaries of the slab adjacent to the forms 2. Likewise the later cracking and disintegration of the slab along the edges, which might otherwise occur, is avoided. With the use of my method and apparatus, such segregated and lean masses will not occur.

Likewise I have found that as the bin 39 of Figure 3 travels in the direction of arrow 110, in the absence of some preventing means, some of the larger particles 107 separate from the mass 38 and roll down the forward slope of the material during deposit of the material upon the subgrade. In roadway slabs there are transverse joints at frequent intervals, formed of suitable expansion or contraction joint material which may take the form of a board standing on edge, in contact with the subgrade, and extending from one side of the road at the form 2 to the opposite side at form 2. As the bin face 37 approaches the joint material, there is deposited against the joint, a quantity of the coarse particles 107, in which there is a deficiency of mortar, as previously described. This deficiency is not remedied even by vibration, and many times results in failure of the slab at transverse joints, on account of inadequate bonding of the concrete with the longitudinal dowel bars connecting the ends of adjacent sections of the roadway slab, because of such segregation. With my method and apparatus, the vibrating fingers 106 on the front wall 37 of the apparatus prevent the coarser particles of the mixture from leaving the mass, and permit the placement of a richer mix against the

transverse joint material, this rich material being like mass 109 of Figure 4.

The function of fingers 106 of Figures 3 and 4 is not only to apply internal vibration to the mass of concrete, but also to guide the large particles 107 of the concrete into the interior of the mass 38, to prevent the undesirable accumulation of such particles 107 in positions where there would otherwise be segregation of larger aggregate and a deficiency of bonding mortar.

It is obvious that my method may be used with Portland cement concrete, bituminous concrete, or any other materials to which it is adapted.

I claim:

1. In an apparatus for handling material, a hopper having a discharge orifice at its lower end, a plurality of spaced means projecting inwardly and inclined downwardly from a wall of the hopper, for permitting passage of material particles of certain sizes and for guiding material particles of larger sizes inwardly away from the hopper wall, said means being of such length as to permit the larger particles to pass freely over

their inner ends and means for vibrating the hopper wall and the means.

2. In an apparatus for handling material, a hopper having a discharge orifice at its lower end, a plurality of spaced means projecting inwardly and inclined downwardly from a wall of the hopper, for permitting passage of material particles of certain sizes and for guiding material particles of larger sizes inwardly away from the hopper wall and permitting them to freely pass over the inner ends of said means, and means for vibrating the means.

3. In an apparatus for handling material, a hopper having a discharge orifice at its lower end, a plurality of spaced members projecting inwardly and inclined downwardly from the outer part toward the inner part of the mass being discharged from the hopper, for permitting passage of material particles of certain sizes and for guiding material particles of larger sizes inwardly away from the outer part of the mass, and means for vibrating the said members.

ROBERT WILLIAM BAILY.