

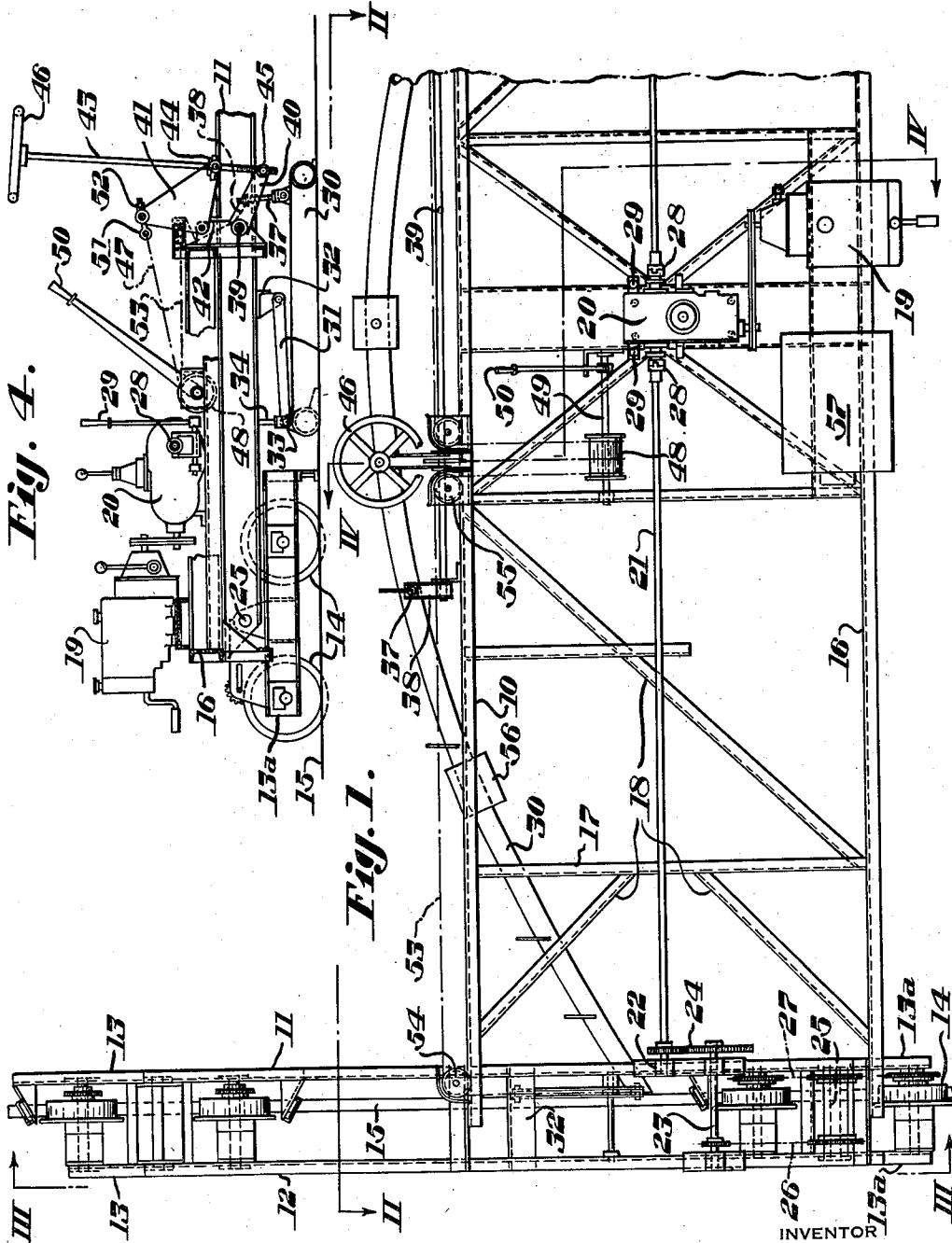
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ROAD-FINISHING MACHINE

2,605,682

Filed Dec. 13, 1946

2 SHEETS--SHEET 1



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2 SHEETS—SHEET 2

Fig. 5. Fig. 6.

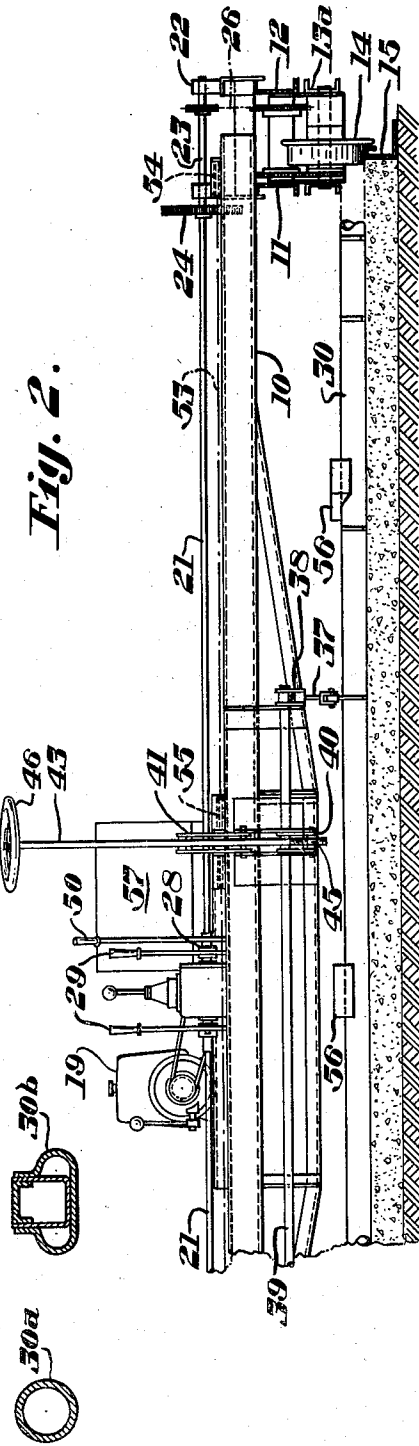
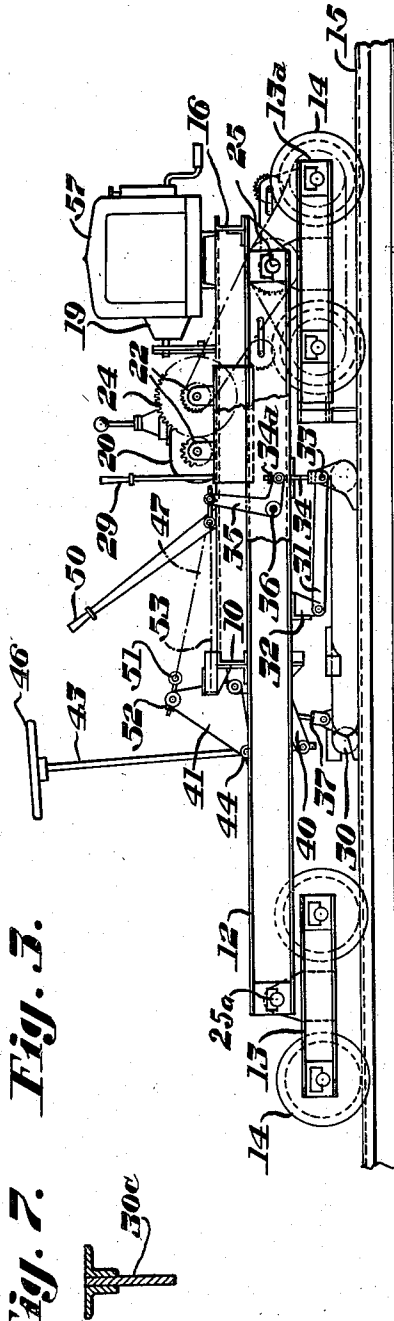


Fig. 7. Fig. 3.



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ROAD-FINISHING MACHINE

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1

This invention relates generally to machines for finishing the surface of a slab of concrete or other plastic material poured between spaced side forms or road rails to form a pavement such as a road.

In finishing road pavements, it is desirable under certain conditions to leave the surface thereof flat. Under other conditions, it may be desired to impart a transverse convexity or crown to the surface for the purpose of drainage and the desired degree of crown may vary considerably. It is often desirable, furthermore, to vary the degree of crown while the machine progresses over the pavement, as around curves, where the desired crown increases uniformly from the apex of the curve to the point of tangency with straight roadway. Provisions have accordingly been made for imparting the desired curvature to the screed or other strike-off member or float of road-finishing machines known heretofore, by elastic deformation thereof. Such members, however, have been quite rigid in construction because they span the full width of the road between rails. It is necessary, therefore, to exert heavy forces on these members in order to impart even a slight curvature thereto.

A further defect common to finishing machines having transverse screeds, floats, strike-off members and the like, is that they do not leave the concrete surface true and level longitudinally of the road. This has resulted partly from the practice of supporting these members directly on the road rails or other supports at each end, or on trucks rolling over such rails, in such a manner that irregularities in the track surface are transmitted bodily to the finishing member. It has therefore been customary to follow such machines with another having a longitudinally disposed finishing member which is oscillated back and forth across the road transversely as the machine moves forward, to iron out any longitudinal unevenness left by the transverse finishing members.

I have invented a novel surfacing member for concrete roadways capable of imparting thereto either a plane surface or a crown of desired convexity, without requiring it to be subjected to any abnormal stress and permitting quick and easy adjustment for various degrees of crown or convexity. In a preferred embodiment, my invention comprises a curved, elongated member of generally bow shape disposed in a substantially horizontal plane, extending across the width of the slab and mounted for movement thereover with the intermediate portion projecting for-

2

wardly. The surfacing member is preferably hinged adjacent its ends to a supporting car traveling on the road rails and the intermediate portion is suspended at the elevation necessary to impart the desired shape to the surface of the slab, i. e., either plane or crowned. The shape imparted to the surface may be changed by merely tilting the member on its hinges. A surfacing member according to my invention may partake of the nature of a screed or similar strike-off member or may serve simply to finish the surface of the slab after the concrete has previously been spread and levelled, or it may serve both as a strike-off and as a finishing member. If used as a finishing member, I prefer to provide means for vibrating the surfacing member either bodily or locally. My surfacing member may be used alone mounted on a suitable car, or in spaced relation with like or different members in a composite finishing machine. With my machine, a single float only need be used, since the float is not materially affected by irregularities in the surface over which the machine rolls such as are usually encountered in practice.

A complete understanding of the invention may be obtained from the following detailed description which refers to the accompanying drawings illustrating the preferred embodiment. For the sake of simplicity I have shown in the drawings a machine embodying my invention provided with one surfacing member only. It will be understood, however, that two surfacing members may be mounted one after the other, with an interval between, one performing the function of a strike-off only, and one adapted for surface vibration, if that be desired. In the drawings,

Figure 1 is a partial plan view of a road-finishing machine embodying my invention;

Figure 2 is a view partly in transverse section along the plane of line II—II of Figure 1 showing parts in elevation;

Figure 3 is a side elevation such as would be seen by looking from the left of Figure 1;

Figure 4 is a longitudinal section taken along the plane of line IV—IV of Figure 1; and

Figures 5, 6 and 7 are sections through several forms of the surfacing member.

Referring in detail to the drawings, the illustrated example of my invention is a road-finishing machine having a main frame 10 extending between spaced side frames 11. The side frames, as shown, include spaced channels or other suitable structural members 12. Wheeled trucks 13 and 13a are pivoted to the side frames

at the forward and rear ends thereof, respectively. The wheels 14 of the trucks are adapted to travel along spaced road rails 15 which constitute the side forms for a slab of concrete or other plastic material poured therebetween.

The main frame 10 comprises suitable transverse channels 16 or other suitable structural shapes secured in any convenient manner to the side frames 11 and longitudinal members 17 with such diagonal braces indicated generally at 18 as may be desired. The main frame 10 and the side frames 11 with their wheeled trucks constitute a car bridging the road slab to be finished and adapted to travel therealong. The wheels are subject to undesirable vertical deflections in this travel, due to such factors as adjacent road rails not being precisely at the same level at a rail joint, encrustation of the forms, or, where on one or both sides of the machine, the wheels roll over previously cast slabs, the upper surface of such slabs is uneven at their edges. I provide a construction by which such local wheel deflections have but slight effect upon the grade which the surfacing member defines in its travel, by the pivotal mounting of the two-wheel trucks 13 and 13a on the ends of the side frames 11, the torsional flexure of the frame 10, and the manner of suspending the finishing member therefrom which will be subsequently described in detail.

The car is driven by an internal combustion engine 19 mounted thereon through a transmission 20 including speed-change and reversing gears. Cross shafts 21 extend outwardly from both sides of the transmission 20, the outer ends being suitably journaled in bearings 22 on the side frames 11. Each shaft 21 drives a jack shaft 23 through gearing 24. The rear trucks 13a are pivoted to the side frames on drive shafts 25. Chain-and-sprocket drives 26 connect the shafts 23 and 25. The wheels of the trucks 13a have sprockets thereon whereby they are adapted to be driven from shafts 25 by chain-and-sprocket drives 27. If desired the car may be pulled or pushed forward by other means. The shafts 21 may be selectively connected to the transmission 20 by clutches 28 having operating levers 29. All of these features are conventional and well-known in the art of road-finishing machines.

A rigid, elongated bow-shaped surfacing member 30 extends between the side frames 11 and is suspended below them and the main frame 10. The member 30 may be of any desired shape in section, three types being shown in Figures 5, 6 and 7. The circular section 30a, which is the section also shown in Figures 1 through 4, may conveniently be formed from a length of pipe. The member 30 may also be of any other desired shape in section, e. g., flat-bottomed as at 30b or of plate form as at 30c. Drag links 31 are pivoted to cross pieces 32 secured to the side frames 11 and the outer ends of the member 30 are hinged to the rear ends of the drag links 31 on pins 33. The pins 33 pass through clevises on hanger rods 34. The hanger rods are pivoted to bell cranks 35 mounted on shafts 36 journaled in the side frames 11. The hanger rods may be adjusted vertically relative to the bell cranks by means of nuts 34a turned on the upper ends of the rods which are threaded.

The intermediate portions of the member 30 are suspended by links 37 pivoted thereto. These links are also pivoted to cranks 38 on a cross shaft 39 journaled in bearings secured to the forward cross member 16 of the main frame 10. The surfacing member 30 may thus be caused to tilt on

its hinge pins 33 by turning the shaft 39. It will be evident that, when the bottom of the mid-portion of the member is at the same elevation as the bottom of its ends, it will finish the road slab to a plane flat surface. If the intermediate portion of the member 30 is tilted upwardly relative to its end portions, however, the surface of the slab will be shaped to a smooth convex curvature, the degree of convexity depending on the elevation of the bottom of the mid-portion of the member above the bottom of its ends.

The suspension links 34 and 37 are disposed to hang in the frames 11 and 10, respectively, so that the member 30 lies with the center of gravity of its working surface substantially equidistant from the four truck pivots 25 and 25a. The side frames 11, moreover, are preferably of a length between pivots 25 and 25a which is great as compared to the projected length as viewed in side elevation of Figure 3, of the surfacing member 30. Vertical deflections of pins 25 or 25a individually, due to local irregularities in track such as previously mentioned, are only half the deflection of a wheel, and this is reduced one-fourth again (to one-eighth) at the center of gravity of the member 30, so as to reduce its bodily deflections due to surface irregularities to negligible magnitude. Furthermore, the finishing surface defined by member 30 is not unduly warped, this warping being less the longer the end frames are made. The suspension of member 30, therefore, provides not merely a member readily adjusted to grade and crown, but one operating substantially in properly adjusted position regardless of small irregularities, bumps and road rail joints which deflect the wheels from proper level.

For the purpose of turning the shaft 39 through a small angle to adjust the mid-portion of the member 30 to the desired height, I provide the shaft with a crank 40. Bell cranks 41 are pivoted above the crank 40 on brackets 42 secured to the main frame 10. A screw shaft 43 is journaled in a thrust bearing 44 pivoted to the forward end of the bell cranks 41 and is threaded through a nut 45 pivoted to the crank 40. It will thus be apparent that, so long as the bell cranks 41 remain fixed, rotation of the shaft 43 will cause angular movement of the crank 40 to turn the shaft 39 for tilting the surfacing member 30 about its hinge pins. To facilitate this adjustment, the shaft 43 is provided with a hand wheel 46.

The bell cranks 41 are normally held in their illustrated position by a cable 47 secured to the upper ends thereof and to a drum 48 fixed on a shaft 49 journaled in the main frame 10. The shaft 49 is provided with a hand lever 50 whereby it may be turned through a small angle. The lever limits rotation of the drum 48 in the direction for unwinding the cable 47. The cable is connected to the bell cranks by an eye-bolt 51 having adjusting nuts 52 whereby sufficient tension may be maintained in the cable to hold the bell cranks 41 in the desired angular position. Cables 53 similarly secured to the bell cranks 35 extend around guide pulleys 54 and 55 journaled on the main frame and are secured to the drum 48. It will be understood that, by this construction, the surfacing member 30 may be bodily lifted by pulling back on the lever 50. This raises the member entirely out of contact with the surface of the slab. Thus, after the car has traveled along a limited length of the pavement, the member 30 may be raised and the ma-

chine reversed for a second pass of the member over the slab if desired. When the lever 50 is again thrown forward, the surfacing member 30 descends to the position for which it was previously adjusted, whether horizontal or tilted upwardly at the intermediate or forward portion. That is to say, the bodily lifting of the member to permit a second pass over the slab does not interfere with the angular adjustment of the member or necessitate any change therein. At the same time, the angle between the plane determined by the bottom of the surfacing member and the horizontal may easily be adjusted simply by turning the hand wheel 46.

The means mounting the member 30, i. e., the drag links 31, hanger rods 34 and links 37, have sufficient lost motion therein to permit slight bodily oscillation of the member 30 in a generally longitudinal direction with an amplitude of, say $\frac{1}{8}$ ". To cause such oscillation, I mount vibrators 56 in spaced relation on the member 30. These vibrators may be of any desired type. If electrically operated, they may be energized by a generator 57 driven by the engine 19. Instead of being of the type adapted to cause bodily longitudinal oscillation of the member 30, they may be of the type to create merely local vibration thereof. In either case, passage of the surfacing member over the concrete is facilitated by vibration or oscillation thereof.

It will be apparent from the foregoing that the invention is characterized by numerous advantages over road-finishing machines as known heretofore. In the first place, the bow-shaped surfacing member, while rigid in itself, may be adjusted quickly and easily, by reason of its construction and mounting on the car, to impart either a plane or a crowned surface to the roadway and may be adjusted for the proper degree of crown, all without imparting any substantial stress to the member or its supports. In addition, the member may be raised entirely clear of the pavement slab to permit the machine to back up for a second pass, if desirable. As has already been noted, the machine may be employed simply to impart a finished surface to the concrete which has already been spread and levelled or it may be used to distribute uniformly between the road rails concrete which has simply been dumped therebetween in piles. The bow shape of the member is useful in spreading concrete normally when used in the manner of a screed.

The side frames extend forwardly and rearwardly beyond the intermediate portions and ends, respectively, of the surfacing member. This lends horizontal stability to the surfacing member and tends to eliminate minor variations in the surface of the finished slab. The lost motion in the mountings for the surfacing member permits bodily or local oscillation thereof without imparting vibration to the frame of the car.

Although I have illustrated and described but a preferred embodiment of the invention, it will

be understood that changes in the construction and arrangement of parts may be made without departing from the spirit of the invention or the scope of the appended claims. The terms "road rails" and "side forms" where used in the claims include any equivalent structure providing a lateral wall confining the plastic mass being finished and having a surface over which the car can be rolled, such as the edge of an adjacent previously cast slab, or spaced form walls and track structures separately and independently assembled and supported.

I claim:

1. Slab-finishing apparatus comprising a car adapted to travel along side forms, an elongated rigid bow-shaped member extending between said forms and hinged adjacent its ends to said car, a shaft journaled on the car, a crank on the shaft, a link pivoted to the crank and said member, a bell crank pivoted on the car, a second crank on the shaft, a screw shaft journaled on said bell crank actuating said second crank to adjust said member, and means for lifting said member bodily, whereby said slab may be provided with a planar or crowned contour and said member then lifted if the direction of movement of said car is to be reversed.

2. In a machine having a car adapted to travel along a road surface of concrete or the like to contour the same, in combination, an elongated bow-shaped tubular member hingedly connected to said car so as to substantially extend across said surface, said member defining a plane generally parallel to the plane of movement of said car, means for vertically adjusting the height of the ends of said member, independent means for vertically adjusting the height of the mid-portion of said member, and means for bodily elevating the ends and mid-portion of said member above said surface, whereby a plane or crowned surface may be provided by the relative adjustment of the height of said mid-portion to the height of said ends and the entire member elevated above said surface if the direction of movement of said car is reversed.

LOUIS J. SAROSDY.

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