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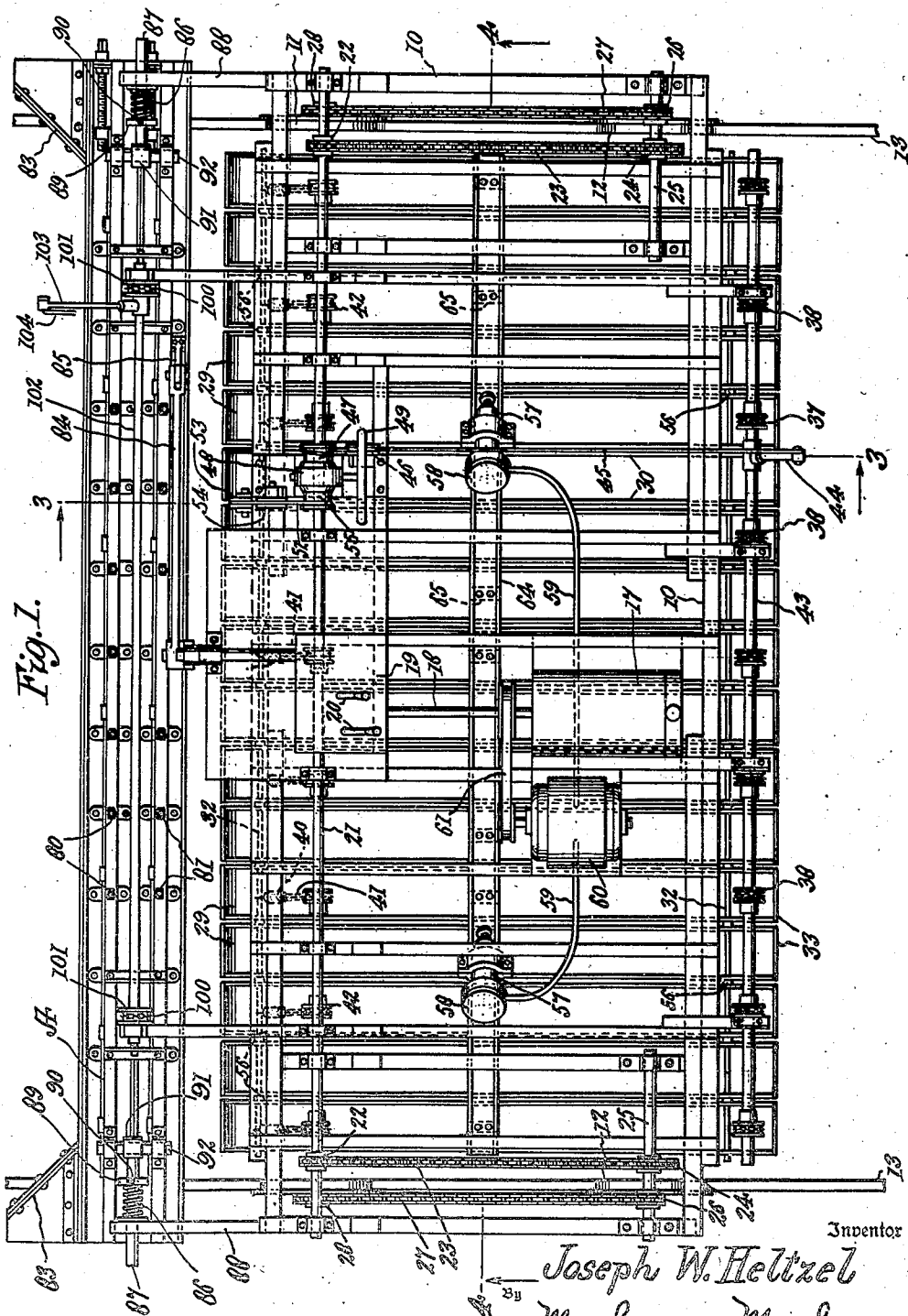
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CONCRETE FLOATING AND BRICK SURFACING MACHINE

Filed March 23, 1940

3 Sheets-Sheet 1



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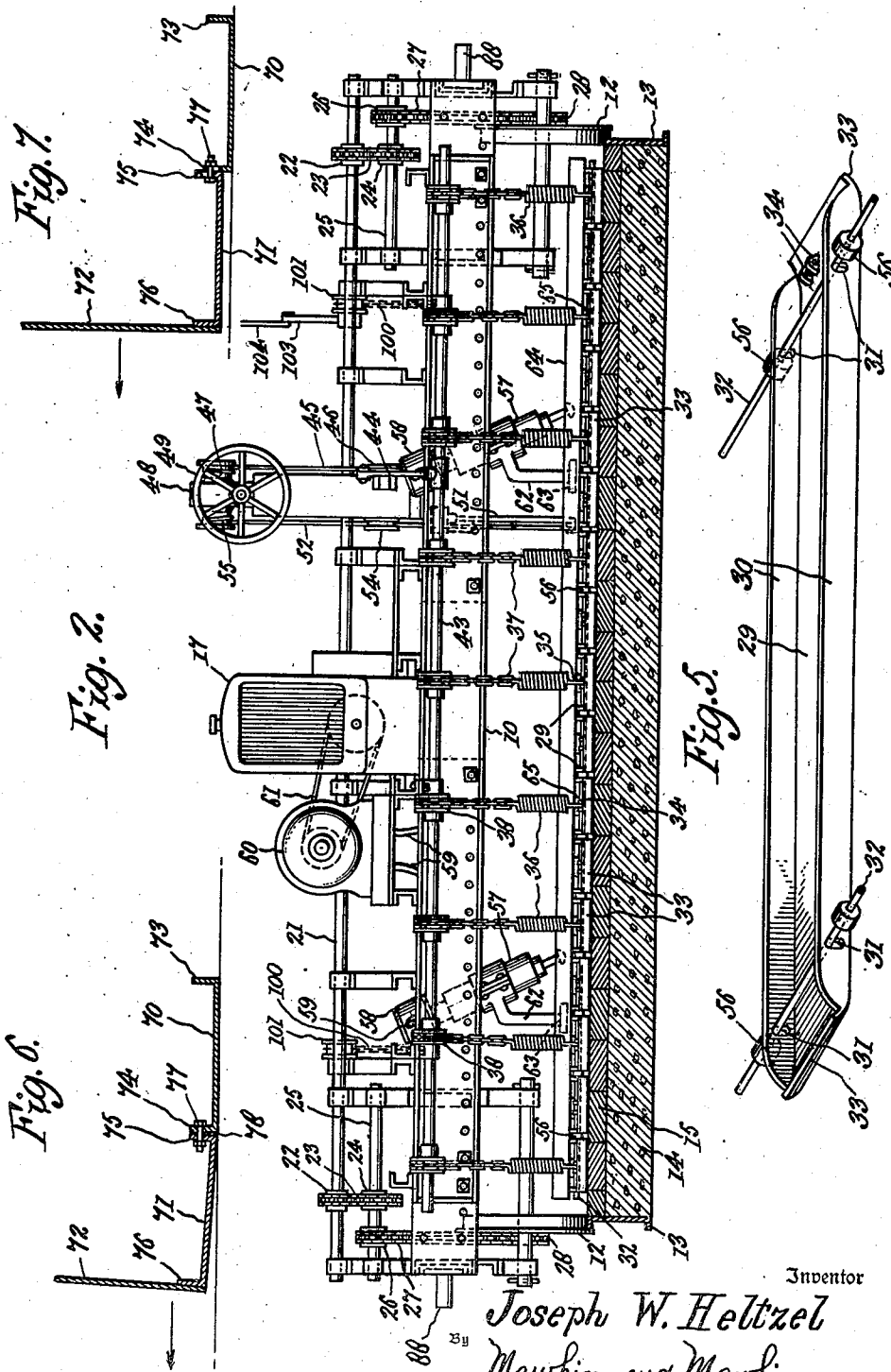
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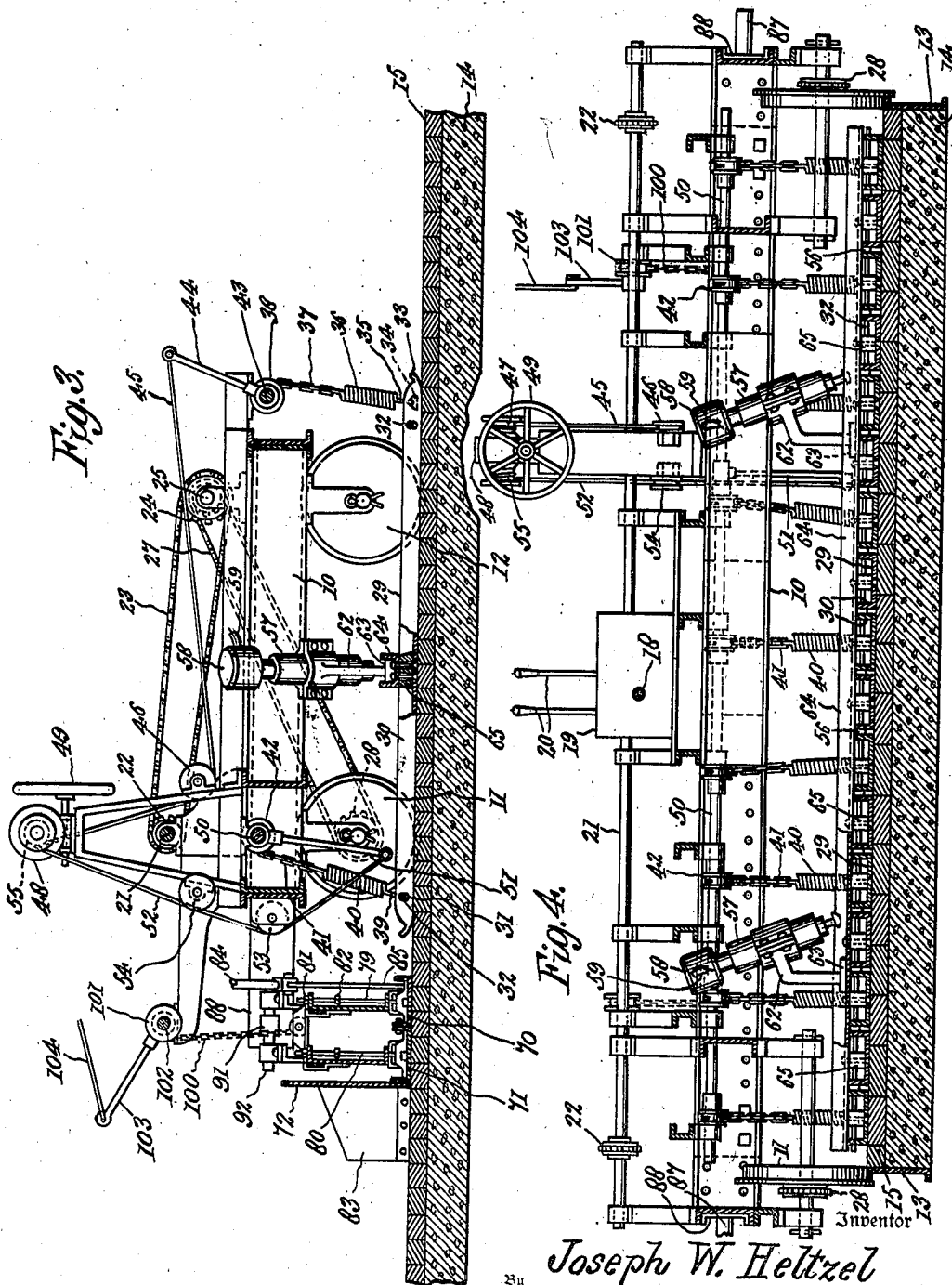
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CONCRETE FLOATING AND BRICK
SURFACING MACHINE

Joseph William Heltzel, Warren, Ohio

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11 Claims. (Cl. 94—45)

The present invention relates to improvements in concrete floating and brick surfacing machines, and has for an object certain improvements over my prior Patent No. 1,380,379 granted June 7, 1921.

It is an object of the present invention to provide a concrete floating and brick surfacing plate composed of individual relatively movable sections or elements whereby certain advantages are had in the floating and surfacing operations as hereinafter more fully described.

It is another object of the invention to provide for a flexible and resilient mounting for the floating and surfacing plate to the end that a greater or lesser weight of the plate may be superimposed upon the concrete or the brick surface of the roadway whereby a nice adjustment with respect to weight may be selected, weight having considerable influence in the floating and surfacing operations.

A further object of the invention resides in providing improved means for selectively adjusting the weight factor.

A still further object resides in certain new constructions whereby the members or elements of the plate are flexibly held together in spaced relation for individual movement, and wherein certain novel constructions are provided for the connection of the plate members to the flexible and resilient supporting means.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a top plan view of a machine constructed in accordance with the present invention.

Figure 2 is a rear elevation of the same.

Figure 3 is a vertical transverse section taken on the line 3—3 in Figure 1.

Figure 4 is a vertical longitudinal section taken on the line 4—4 in Figure 1.

Figure 5 is a perspective view of one of the plate members with the connecting rods attached, such connecting rods being broken away.

Figure 6 is a cross section through a modified form of screed, and

Figure 7 is a similar view showing a different arrangement of the screed sections.

Referring more particularly to the drawings, 10 designates the frame of the machine which is mounted upon the front wheels 11 and the

rear wheels 12. These wheels are arranged to ride upon the side forms 13. As usual the side forms retain plastic road material 14 which may or may not be surmounted by the bricks or blocks 15.

At the front of the machine is a screed. The machine is driven by an engine 17 having a drive shaft 18 entering a gear box or transmission and clutch mechanism 19 with external levers 20 for the purpose of connecting and disconnecting the power drive to the front wheels 11. The rear wheels 12 are not necessarily driven.

The drive to the front wheels is through transverse shafts 21 carrying sprockets 22 to which are coupled chains 23. Such chains 23 are also trained over sprockets 24 on shafts 25. The shafts 25 also carry sprockets 26 engaged by chains 27, the lower ends of which are trained over sprockets 28 on the front wheels 11 or on the front wheel shafts.

The machine so constituted and driven, or for that matter any other form of machine, carries a floating and surfacing plate which extends over a great area of the roadway between the forms 13 and beneath the frame 10 of the machine.

This plate is composed of a number of channel members or beams 29, one such member being shown in perspective in Figure 5. The channel members have upstanding flanges 30 which extend along the longitudinal edges of such channel beams. The channel members are of the length of the plate extending from front to rear of the plate but each channel member is only very narrow as compared with the full width of the plate.

A considerable number of these channel members are placed side by side with their flanges 30 substantially parallel in order to form the complete plate. The channel members 29 are locally and relatively movable up and down and to some extent sidewise so that they may conform to the surface of a concrete roadway or may extend up over bricks or blocks in high places. However the plate is a coordinate whole operable as a unit.

To secure these two purposes the flanges 30 are perforated in registry at both the front and back portions of the channel members. The perforations 31 are elongated in a substantially vertical direction. The elongation of the perforations 31 is greater than the diameters of the rods 32 which pass through the same for the purpose of giving the channel members a limited up and down movement relatively to

the rods 32 which are flexible. Therefore due to the flexibility of the rods 32 channel members 29 may have local relative movement which is aided by the elongation of the slots 31.

At the ends of the members 29 the bottom walls are turned upwardly as indicated at 33 to facilitate the longitudinal passage of the members along the road and to permit such members to ride up upon high places of the road to avoid injury both to the material of the road and to the members themselves.

At the rear portions of the members 29, preferably backwardly of the rear rod 32, the members have perforated lugs 34 for receiving the hooks 35 of coil springs 36 shown to best advantage in Figure 3. The coil springs are suspended on chains 37 or other flexible connections wound upon drums 38 carried by the frame 10 in a suitable position. Preferably the arrangement is such that the supporting members 37 including the chains 36 incline upwardly so that, when the machine is reversed in movement, there will be a tendency for the chains 37 to draw the plate along the surface of the roadway.

At the front end of the plate, the hooks 39 on the bottom of springs 40 engage directly with a rod 32. The upper ends of the springs 40 are suspended from chains 41 wound about drums 42 mounted upon the frame.

Figure 2 shows a rear view of the machine showing that a lesser number of springs 36 than the number of channel beams 29 may be employed. The drums 38 of all these chains are secured upon a lifting shaft 43. This lifting shaft 43 carries an upstanding arm 44 to which is attached a cable 45 running under a guide sheave 46 and wound upon a drum 47 carried by the reducer 48 and driven by the hand wheel 49.

In a similar way the drums 42 of the front chains 41 are all carried by a front lifting shaft 50 rotated by an arm 51 through a cable 52. This cable is guided about the sheaves 53 and 54 and wound upon a drum 55 on the reducer 48 operated by the same hand wheel 49.

The various members of the plate are spaced apart by washers 56 or the like and means is preferably employed to vibrate the plate.

In the instance shown vibrators 57 are employed including electric motors 58 having connections by cables 59 with a generator 60 or other source of power carried by the frame 10 of the machine, and coupled as by the belt drive 61 to the engine 17.

The vibrators 57 are carried upon arms 62 and fixed to bases 63, the bases being in turn affixed to a vibrator beam 64 which extends transversely across the machine in an intermediate position of the plate and intermediate of the channel members 29 of the plate. Such vibrator beam 64 rests upon the flanges 30 of the channel members and imparts vibration through the flanges 30 to the bottom portions 29 of the members and thence to the material of the roadway itself.

Flexible connections 65 are made between the vibrator beam 64 and some or all of the members 29, the connections being flexible so as not to interfere with the local relative movement of one channel member 29 with respect to its mate on either side.

In the use of the device, the machine proceeds along the roadway, riding along the side forms 13 and being pushed or driven by any suitable drive arrangement, for instance the arrangement herein shown and described.

The screed 16 in front of the machine will buck the mass of concrete or plastic material and level it down to the form level, the screed 16 being preferably reciprocated transversely of the roadway in accordance with prevailing practice.

The machine follows the screed action, the plate moving across the surface of the concrete; or if a brick pavement is used across the surface of the bricks.

The plate consisting of the numerous channel members 29 will substantially span the entire surface of the road from side form to side form and will have a substantial longitudinal length, whereby the area of the plate will be relatively great, and its weight proportionately great. The weight of the plate resting upon it will in itself tend to cause the material to slump down whereby the voids and air pockets will be removed and the concrete will be compacted and made more dense. At the same time the surface will be smoothed. In the case of bricks, the bricks will also be smoothed down to a uniform height. The vibratory action superimposed upon the plate will aid the operation both in plastic and brick surfaces. The high brick will be vibrated down to a common level and at the same time the low bricks will be forced upwards.

Concrete mixtures vary a great deal; some are soft and plastic and others are harsh; while still others contain coarse aggregate and fine aggregate; still others contain an excessive amount of coarse aggregate with very little cement and sand. It therefore becomes desirable to vary the weight of the plate while moving the same over plastic concrete of such different compositions. Where the concrete is thin and where the surfacing member is liable to sink into the soft concrete, part of the great weight of the plate may be transferred to and held by the springs 36 and 40.

By turning the hand wheel 49 the cables 45 and 52 may be wound on the drums 47 and 55 thus pulling upon the arms 44 and 51 as seen in Figure 3. One arm 44 extends upwardly while the other arm 51 projects downwardly from its shaft 50. Thus if the cables 45 and 52 are so wound upon their respective drums 47 and 48 that they are wound and unwound simultaneously then when the cables are being wound upon the drums, the shaft 43 will be rotated in a counter-clockwise direction while the front lifting shaft 50 is rotated in a clockwise direction.

However by winding the chains 37 in one direction and the chains 41 in the opposite direction, such chains may be wound upon their shafts 43 and 50 at the same time and unwound therefrom simultaneously when the cables 45 and 52 are slackened.

By winding up the chains 37 and 41, the springs 36 and 40 will be distended up to the point where the elongation of the springs is equal to the weight of the plate, and thereafter the plate itself will be lifted. However in the elongation of the coil springs a proportional amount of the weight of the plate is taken up dependent directly upon the amount of such elongation. Therefore the weight superimposed by the plate upon the plastic or brick surface of the road may be very nicely gauged.

As before stated soft concrete will require but little weight. On the other hand, where the concrete is what is called a harsh, dry mix, the full weight of the members 29 composing the plate should be allowed to devolve on the concrete.

Such members will be vibrated violently; for in-

stance about 3500 to 4500 vibrations per minute which causes the same to sink down into the concrete. Substantially all of the weight may be taken off the plate if desired.

A continuous plate would not work well over a brick surface because, when laid, the brick surface is quite uneven and the bricks vary in thickness as much as $\frac{1}{4}$ "; thus, some bricks are comparatively low to others. This condition is aggravated by many of the thicker bricks being laid on high points of the subgrade or road surface. For this reason a continuous plate would ordinarily not be flexible or resilient enough to meet these conditions.

A further desirable point in the multiple members is that in case one of these members goes over a high point in the concrete or a high point in the brick surface, such member receives practically all the vibration; whereas if a continuous plate was used, the vibrations would be spread over the entire area of the plate.

When one of the members 29 rides up from the others it will carry up the vibrator beam 64 which is permitted by the loose connections 65. Thus the vibration is substantially removed from all of the members except the raised member.

The rods 32, being strung through the flanges of the channel members, hold such members together and connect the members and they also form means for lifting the members. These rods may bend to allow of the relative movement of the members.

One or more vibrators may be mounted upon the vibrator beam 64. By running the channel beams 29 longitudinally no sharp edges are presented to the forward or backward movement of the machine.

When the high bricks are vibrated violently, necessarily the material under them is displaced and this material flows under the low bricks forcing such low bricks upwardly inasmuch as the tops of the low bricks do not touch the plate. Therefore the high bricks are moved down and the low bricks are moved up by the vibratory action of the plate.

As an example the members 29 may be 12' wide. The washers 56 holding the members 29 apart may assist in enabling the members to more easily conform to the crown of the road at which time the rods may bend very easily because of the spaced condition of the members and because also of the loose play afforded by the elongated slots 31.

Referring more particularly to Figure 6, 70 designates the rear section of the screed, 71 the front section and 72 the dash board. The arrow indicates the direction in which the screed is moving. The sections 70 and 71 may be flanged as indicated, the flanges of the rear section being represented at 73 and 74 while the flanges of the front section 71 are indicated at 75 and 76. The adjacent flanges 74 and 75 of the two sections are perforated in alinement to receive the bolts or other fastenings 77 by which the two sections 70 and 71 may be secured together. The wedge strip 78 is shown as inserted between the flanges 74 and 75 in order to tip upwardly and forwardly the front section 71.

Concrete as used today is quite dry, and therefore, it is fluffy and contains numerous voids. In order to make the concrete compact, greater volume must enter under the first screed 71, so that by tipping this first screed or first section 71, the screed is thereby arranged so that a greater volume can enter and gradually work

down until such concrete reaches the rear section 70 of the screed, which rear section may be worked in a flat position.

In Figure 3 are shown two rows of crowning bolts 79 and 80 so arranged that the front half 71 of the screed can be raised above the rear half 70. The screed is provided with wearing plates, as usual, which are removable and these wearing plates remain perfectly level on the side forms. The rear part 70 of the screed also remains perfectly level on the side forms. The forward part 71 of the screed can then be raised approximately $\frac{1}{4}$ " high by means of the adjusting nuts 81 and 82. The two screeds are joined together at the wearing plates by bolts. Bolts 77 hold the two parts of the screed together if desired and preferably the holes in the flanges 74 and 75 through which the bolts 77 pass are slotted.

Referring more particularly to Figure 7, the rear section 70 of the screed remains level while the front section 71 is raised a quarter of an inch or more, the slots in the flanges 74 and 75 permitting of this movement.

Referring more particularly to Figures 1 and 3 the screed is shown as having wings 83. As shown in Figure 1 these wings diverge forwardly and outwardly and in so doing cross the side forms or rails 13. The angular arrangement of the wings performs a new use in preventing the concrete from piling vertically against it and running over the forms 13. Heretofore the wings on all screeds were made vertical and worked laterally with the screed, the concrete piling up against them, so that just as soon as the wing moved outwardly the pile of concrete would fall down, often coming over the side of the forms. With these wings tapered inwardly, the top or rather the pile of concrete is at an angle which prevents it toppling over when the screed wings move away from it.

It is usually the case that concrete flows over the side forms. The idea is to keep the top tapered continually—thus, with the transverse movement of the screed, this is being done continually.

The screed is moved back and forth transversely of the roadway by mechanical power from the engine. The pitman 84 is connected to a fulcrum 85 on the screed and this pitman is driven from a suitable source of power in a well known manner in the art. The pitman is given a rocking motion and it rocks the fulcrum and the screed.

Starter springs 86 are mounted at opposite ends of the screed and are coiled about arbors 87 which play loosely through beams 88 secured to the frame of the machine. The arbor 87 is supported by and attached to the screed which is designated in Figure 1 generally at A. The springs 86 are spirally wound about the arbors 87. The arbors 87 reciprocate transversely of the road along with the screed to which they are attached, but the beams 88 do not participate in this transverse reciprocating motion. Thus the arbors 87 move with respect to the beams 88. Both ends of the screed are equipped identically. When the screed is in the exact center neither of the coil springs 86 is under pressure; however, as soon as the screed passes the center, one or the other of these coil springs 86 will be put under pressure. Such pressure will increase gradually until the screed reaches the end of its stroke, at which point considerable pressure is stored in the spring. The spring may be heavy enough to start the screed in the opposite direction independent of the en-

gine driving means. However, it is not desirable to use a spring strong enough to actually start the return stroke of the screed. The springs 86 are booster springs which help and assist the engine. Screeds of this type are quite heavy, usually weighing a ton and sometimes more, and they reciprocate on an average about seventy strokes per minute. Therefore, when the screed is moved there is considerable thrust on the wheels 11 and 12, and consequently there is a tendency to move the forms 13 or track on which these wheels ride, causing such forms or track to sway to and fro as the screed reciprocates. The supports or beams 88 act as guides for the arbors 87 through which such arbors freely slide in the reciprocating movement of the screed; and these supports or beams 88 also act as stops or abutments for the outer ends of the booster springs 86. The inner ends of the booster springs 86 abut against adjustable collars 89 which are mounted upon the arbors 87 and affixed at any suitable point along the lengths of the arbors 87 as by set screws or the like 90. In this way the pressure of the springs 86 may be regulated. The inner ends of the arbors have eye-bearings 91 pivotally mounted by means of pivot pins 92 secured in appropriate bearings carried by a screed A.

The screed will of coures have a certain up and down movement which might be interfered with by the arbors 87 if it were not for the pivotal connection of the arbors with the screed.

The screed is raised and lowered by means of chains 100 wound upon drums 101 on a shaft 102 which is supported in appropriate bearings on the framework. An arm 103 fixed to said shaft is connected to a cable 104 or other appropriate operating device. The cable may be pulled upon by hand or wound upon a drum operated from the motor of the machine. When the arm 103 is rotated clockwise in Figure 3 the chains 100 are wound on drums 101 and serve to lift the screed. When the cable 104 is slackened the weight of the screed will require it to descend upon the side forms thus unwinding chains 100. Other means may be used for elevating and lowering the screed if desired.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. In a road building machine, a plate having substantial weight and composed of independently movable road-contacting members, each member comprising a narrow elongated strip having upstanding flanges with vertical alined slots and front and rear upturned ends, flexible rods passed through the slots of said members, spacing members on the rods between the first mentioned members, said rods being secured to the outer flanges of the end members, perforated lugs on the bottom walls of said members near the rear portions thereof, springs secured to the rods at the front portions of the members and to the lugs at the rear portions of the members, flexible connections connected to the springs, drums on the machine for said flexible connections, and means for manually controlling the winding and the unwinding of said drums.

2. A road-making machine comprising a floating and surfacing device sufficiently wide to span substantially the complete width of the roadway

from side form to side form, said device comprising a plurality of channel members having upstanding flanges, said members being narrow in the direction of width of the roadway and long in the direction of length of the roadway, said members having upturned forward and rear ends and possessing substantial weight for resting individually and collectively as a unitary device upon the material of the roadway, connecting means passed through the flanges of the members, said connecting means being flexible to permit the members to relatively move up over high points, said flanges having substantially vertical slots about said last-named means to permit of the members moving up and down relatively to said means and to one another independently of the flexing action, and spacing means between individual members to increase the flexibility and upward movement of the individual members of the device.

3. In a road-building machine, a device substantially as wide as the roadway and comprising a great number of narrow elongated members having upstanding flanges with pairs of alined approximately vertical slots therein, flexible connecting means passing through said alined pairs of slots for allowing twofold individual adjusting motion of the members with respect to each other, the one a flexible undulating movement derived from the flexibility of said connecting means and the other an up and down movement with respect to said connecting means due to the slots, and spacing means between the members for holding the members slightly apart to facilitate both of the movements above described.

4. A road-making machine comprising a floating and surfacing device of substantially the entire width of the roadway composed of numerous narrow, long channel members situated in close proximity side-by-side across the width of the roadway, flexible means for stringing all of said members together in said closely spaced relation to form the composite unitary device and to enable the individual members to flex with said flexible means when riding over high and low points in the roadway, said members having loose connections in a substantially vertical sense with respect to said flexible stringing means to permit of the automatic vertical individual adjustment of the members independently of one another and independently of said flexing movement, and means for maintaining the members in an individual isolated spaced relation with respect to one another to increase the flexible and vertical individual adjusting movements of the members.

5. In a road-building machine, a device substantially as wide as the roadway and comprising transversely narrow and long individual members, said members possessing individually substantial weight and said device as a composite unitary whole possessing substantial weight and adapted to rest directly on the material of the roadway, flexible means to string the members together into the coordinate plate and permitting of a sinuous flexible movement of the members with the flexing of said means, said members also having a substantially vertical individual movement with respect to said means and in addition to the flexible movement, and spacing means for holding the members transversely apart to give freedom to the flexing and vertical movements of individual members.

6. A road-building machine according to claim

5, with means to adjust the degree of weight of the device imposed on the roadway.

7. A road-building machine according to claim 5, with a carriage supported for movement along the side forms, and means on the carriage to adjust the degree of weight of the device imposed in the roadway.

8. A road-building machine according to claim 5 with a carriage movable along the side forms, spring means connected to the device and to the carriage, and means on the carriage to exert a lifting movement on the device through the spring means to initially elongate said spring means resulting in diminishing the degree of the weight of the device on the roadway in proportion to the amount of the elongation.

9. A road-making machine according to claim 2, further comprising springs having their lower ends connected to said members, a carriage and means on said carriage connected to the upper ends of the springs for exerting lifting action thereon to elongate the springs and to this extent relieving the roadway of the weight of said device.

10. A road-building machine according to claim 3, with a beam extending transversely across and supported upon the flanges of all of said mem-

bers, means for flexibly connecting said beam to said device to avoid interfering with the flexible and up and down movement of the individual members, and means for subjecting said beam to vibration.

11. In a road-building machine, a large heavy device of substantial area both transversely and longitudinally of the roadway and comprising individual transversely narrow and long members associated together to constitute said device, means for integrating the members into the unitary device, said means being flexible to allow transverse sinuous movement of the members, said members having substantially vertical loose play with respect to said last-named means for permitting the members in addition to the sinuous flexing movement to lift and lower with respect to said means, spaced means for isolating the members transversely to give freedom of sinuous and lifting and lowering individual movements, a member extending across and resting upon said individual members of said device and flexibly secured thereto so as not to interfere with the previously described movements of said individual members, and means for communicating vibration to said last-named member.

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