March 6, 1951 F. O. HELTZEL 2,543,966

ROAD SURFACE CHECKING AND GROOVING MACHINE

Filed March 6, 1946 3 Sheets-Sheet 1

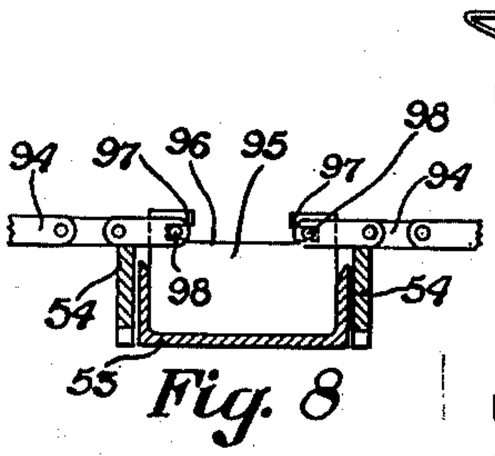


Fig. 8

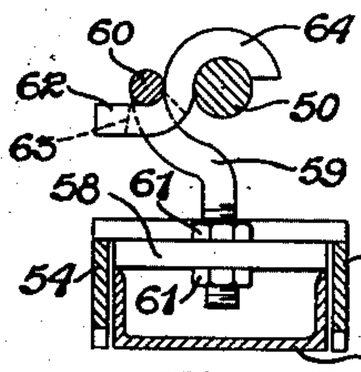


Fig. 7

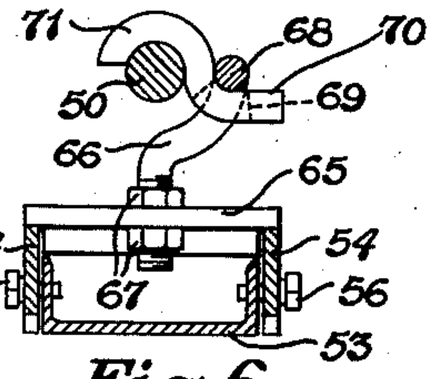


Fig. 6

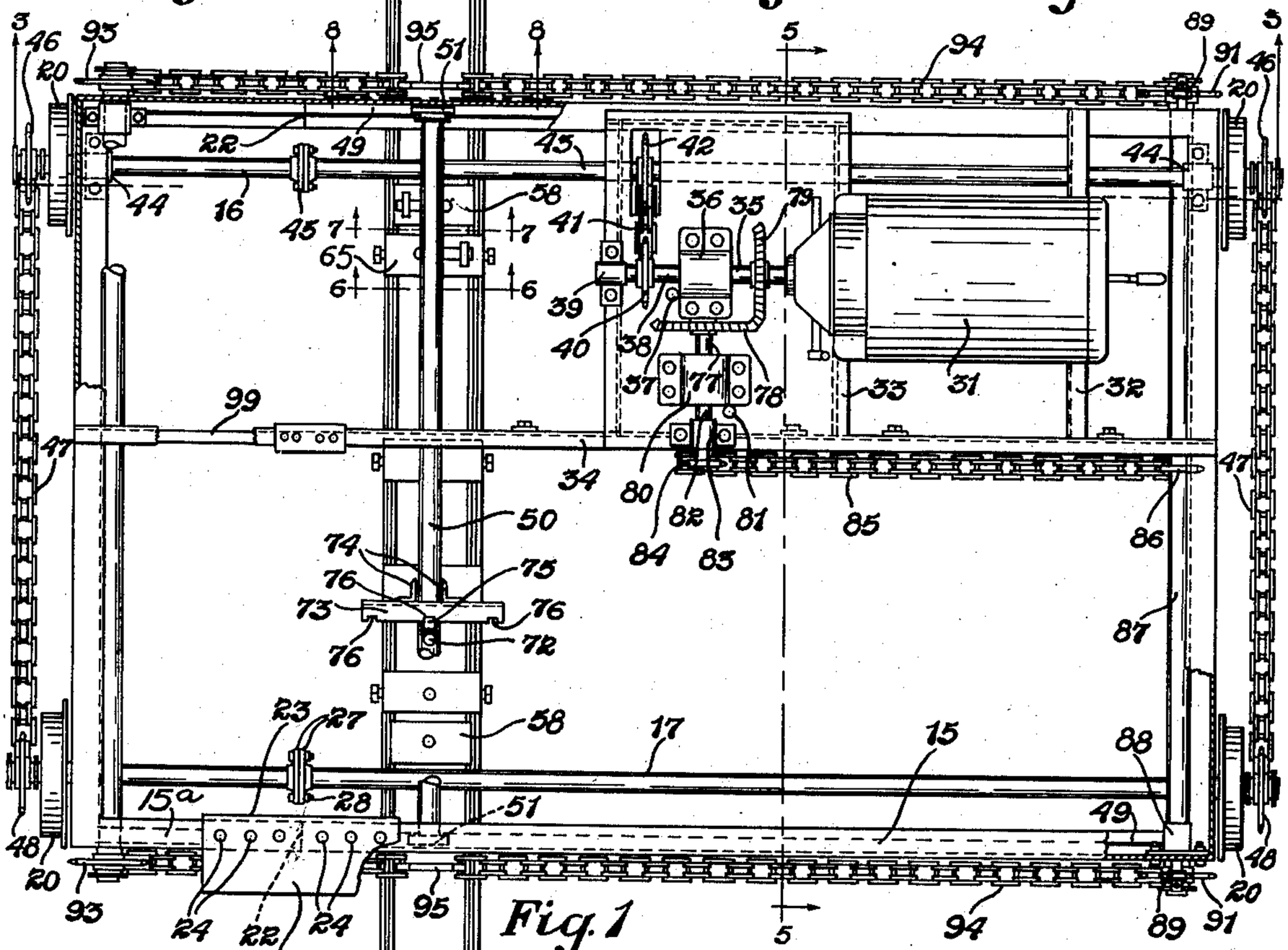


Fig. 1

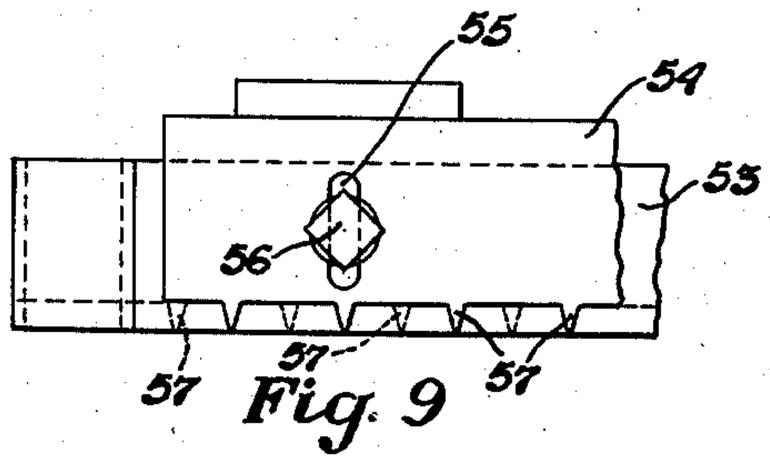
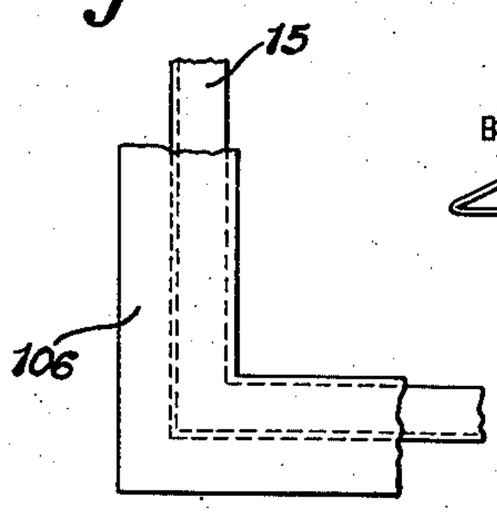


Fig. 9

Fig. 10



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March 6, 1951 F. O. HELTZEL 2,543,966

ROAD SURFACE CHECKING AND GROOVING MACHINE

Filed March 6, 1946 3 Sheets-Sheet 2

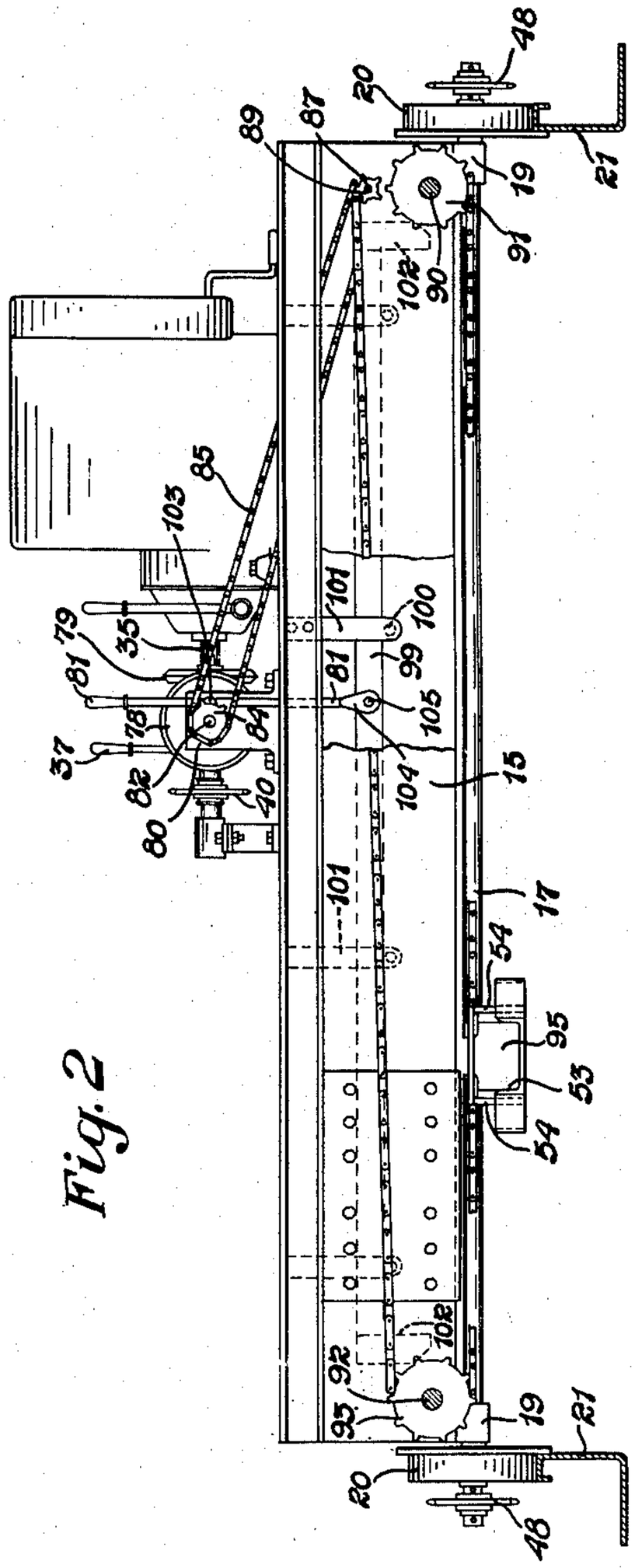

Fig. 2

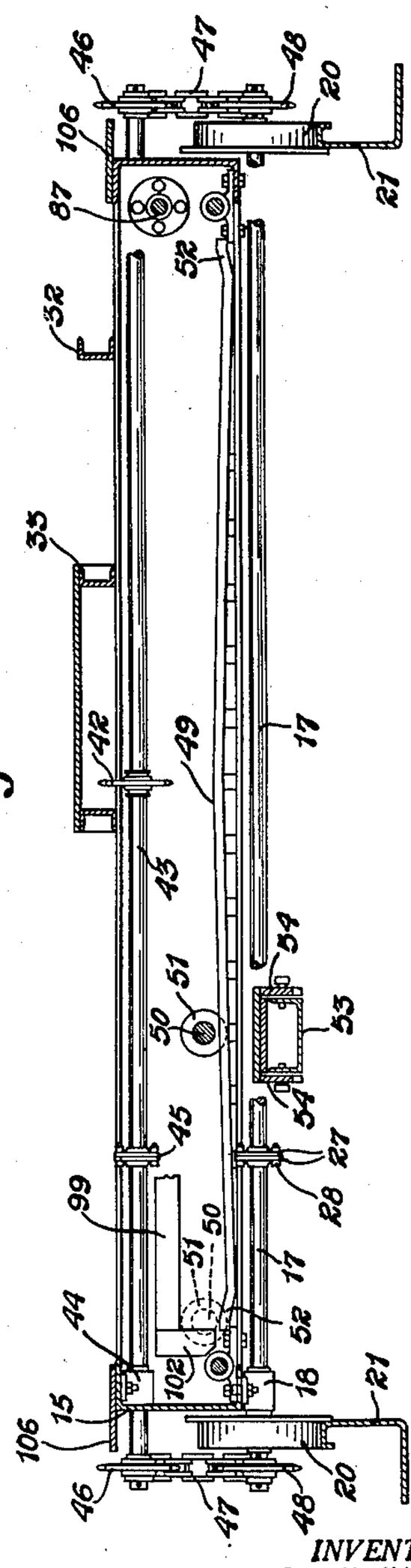

Fig. 3

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March 6, 1951 F. O. HELTZEL 2,543,966

ROAD SURFACE CHECKING AND GROOVING MACHINE

Filed March 6, 1946 3 Sheets-Sheet 3

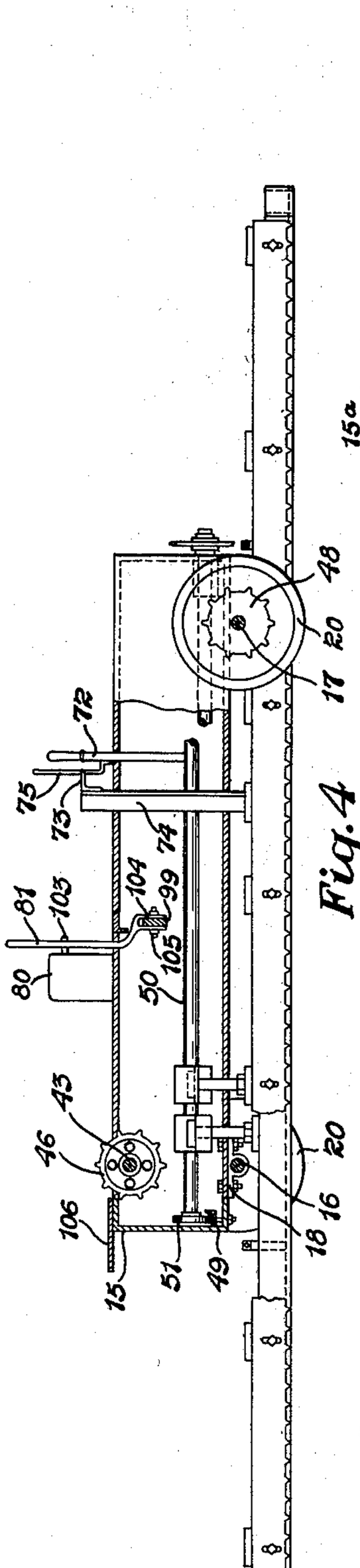

Fig. 4

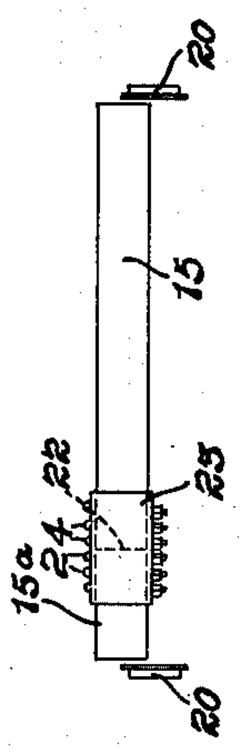

Fig. 11

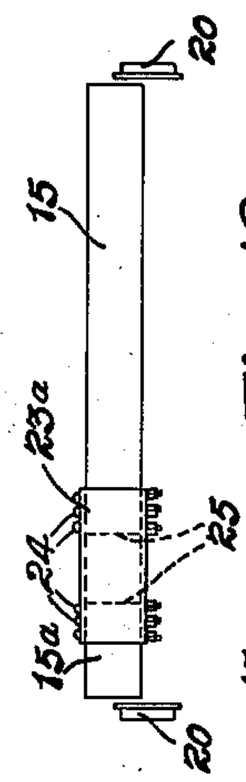

Fig. 12

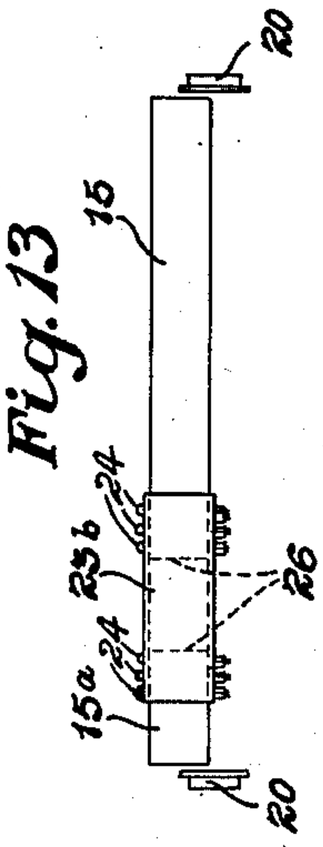

Fig. 13

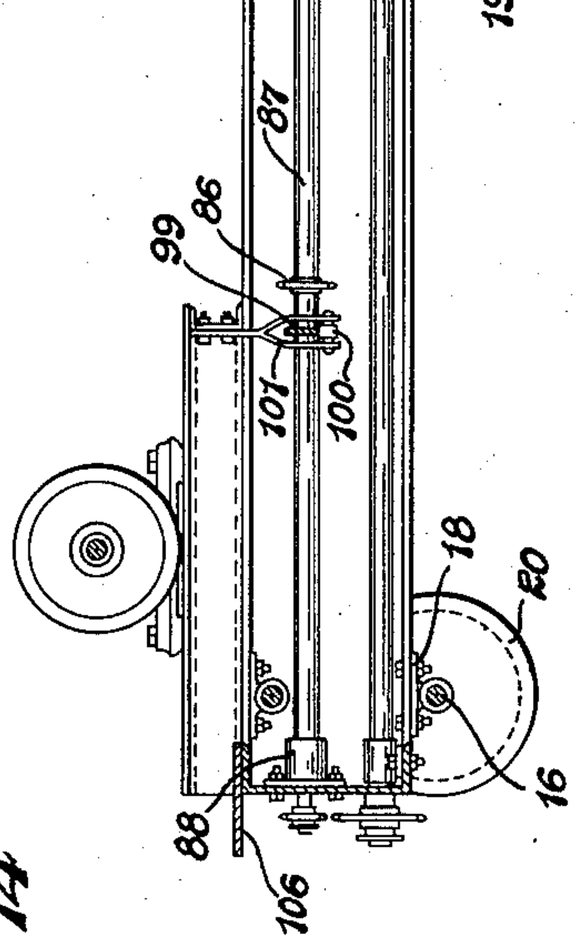

Fig. 5

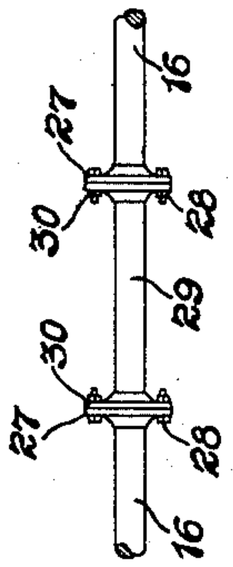

Fig. 14

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UNITED STATES PATENT OFFICE

2,543,966

ROAD SURFACE CHECKING AND GROOVING MACHINE

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Application March 6, 1946, Serial No. 652,445

6 Claims. (Cl. 94—45)

1

The invention relates to apparatus for checking and grooving the surface of a concrete road in the course of construction of the road.

Under present practice concrete roads are ordinarily constructed by pouring the concrete between metal road forms located longitudinally along the sides of the roadway, or each lane thereof, after which a road finishing machine, which is a very heavy piece of equipment, travels longitudinally of the road, upon the road forms, and is provided with a screed which moves transversely across the newly poured concrete highway with a slight sawing motion to more or less level the surface of the concrete.

The road forms become bent from the weight of the heavy road finishing machine travelling thereover and although they are straightened after using it is not usually possible to straighten them perfectly true. Furthermore the road form joints may become weakened, causing them to sag, or the subgrade on which the forms rest may not be sufficiently firm to support the heavy road finishing machine.

Therefore, when the finishing machine passes over the road forms, any flaws which may exist or develop in the road forms appear on the finished road surface, leaving high spots and depressions in the road surface.

Under present practice it is customary to check the road surface by hand, after the finishing machine has passed over the road. This is usually done by means of a long straight-edge, equipped with a handle, and while this helps to some extent the waves in the road surface are not entirely eliminated. While the concrete is in a semi-plastic state the operation known as "brooming" is carried out, this being accomplished by hand with a steel broom which is slowly drawn across the concrete to roughen the surface.

The object of the present invention is to provide a checking and grooving machine arranged to travel upon the road forms to mechanically smooth out all irregularities left by the road finishing machine and to slightly roughen the finished concrete surface.

Another object of the invention is to provide a machine for mechanically levelling the high spots and filling in the depressions left by the finishing machine while the road surface is still in a plastic state.

A further object is to provide such a machine having a transversely movable checking and grooving screed of greater length than the road forms so as to jump or breach any irregularities in the road forms, particularly at the joints thereof.

A still further object is to provide a machine of this character having removable inserts whereby the machine may be quickly and easily adjusted to accommodate roads or lanes of different widths.

2

It is another object of the invention to provide a novel checking and grooving screed comprising a checking channel and grooving plates or bars vertically adjustable relative to each other.

Still another object is to provide such a checking and grooving screed with means for automatically raising the checking channel and lowering the grooving bars or plates or vice versa.

A further object is to provide an automatic cutout to stop the transverse movement of the checking and grooving screed and at the same time raise it out of contact with the road as it reaches a pre-determined position.

A still further object is to provide means for manually raising the checking and grooving screed from the road surface at any time.

The above objects together with others which will be apparent from the drawings and following description, or which may be later pointed out, may be attained by constructing the improved checking and grooving machine in the manner hereinafter described in detail and illustrated in the accompanying drawings, in which;

Figure 1 is a top plan view of the improved road surface checking and grooving machine with parts broken away and the catwalk removed for the purpose of illustration;

Fig. 2 a side view of the machine with parts broken away;

Fig. 3 a longitudinal sectional view through the machine taken as on the line **3—3**, Fig. 1;

Fig. 4 an end view of the machine with parts broken in section;

Fig. 5 a transverse section through the machine taken as on the line **5—5**, Fig. 1;

Fig. 6 a transverse sectional view through the checking and grooving screed, on an enlarged scale, taken on the line **6—6**, Fig. 1;

Fig. 7 an enlarged, transverse sectional view through the checking and grooving screed taken on the line **7—7**, Fig. 1;

Fig. 8 a transverse sectional view through the checking and grooving screed showing the attachment of the chain thereto, taken on the line **8—8**, Fig. 1;

Fig. 9 a fragmentary elevation of a portion of the checking and grooving screed;

Fig. 10 a fragmentary plan view of one corner portion of the frame of the machine showing the catwalk thereon;

Fig. 11 a small, diagrammatic side elevation of the channel frame with insert piece for adjusting the frame to a narrow width lane or road;

Fig. 12 a similar view showing insert piece for adjusting the length of the frame to accommodate an intermediate width of lane or road;

Fig. 13 a similar view showing insert piece for adjusting the length of the frame to a wide lane or road, and;

Fig. 14 a fragmentary elevation of a portion of one of the axles showing the manner of splicing the same.

The machine is mounted upon a rectangular channel frame, indicated generally at 15, of suitable length to accommodate a lane or roadway and of suitable width to accommodate the mechanism carried thereby.

Axles 16 and 17 are located longitudinally through the frame near opposite ends thereof and are journalled in bearings 18 and 19 respectively fixed upon the under side of the frame, and flanged wheels 20 are fixed upon opposite ends of said axles for traction upon the road forms 21, which may be of usual and well known construction.

The machine illustrated in the drawings is designed for single lane construction but it should be understood that the machine is also adapted for double lane construction, the only difference in the machine being that the frame of the double lane machine is twice the length of the frame of the single lane machine illustrated, all other parts being exactly as illustrated and described.

Since the width of the lanes of roadways vary, the standard widths being ten feet, eleven feet and twelve feet, the improved checking and grooving machine is preferably made adjustable in length to accommodate lanes of different widths.

For this purpose the channel frame of the machine may be made in two separable sections, comprising the main section 15 and the supplemental section 15*a*, adapted to be butted together as indicated at 22 in Fig. 1 and spliced by inserts 23, each of which is of the same cross sectional shape and construction as the frame and is connected to the frame members as by bolts 24.

In Figs. 11, 12 and 13 is shown diagrammatically the manner in which the frame of the machine may be adjusted to accommodate ten foot, eleven foot and twelve foot lanes respectively. By butting the ends of the frame members 15 and 15*a* together, as indicated at 22 in Figs. 1 and 11, and connecting them by the collar 23, the frame is adjusted for operation upon a ten foot lane.

By separating the ends of the frame members 15 and 15*a* so that they are one foot apart, as indicated at 25 in Fig. 12, and connecting the separated ends of the frame members by a longer collar 23*a*, the frame is adjusted to accommodate an eleven foot lane, and by separating the opposite ends of the frame members 15 and 15*a* a distance of two feet, as indicated at 26 in Fig. 13, and connecting them by a still longer collar 23*b*, the frame is adjusted for use upon a twelve foot lane.

In the same manner, where the machine is built upon a frame of sufficient length to operate upon a two lane road, the two frame members may be spliced with insert pieces of different lengths to accommodate twenty foot roads, twenty-two foot roads and twenty-four foot roads.

Where the machine frame is made adjustable in this manner it will also be necessary to adjust the lengths of the axles. For this purpose each axle is made in two sections having the flanges 27 at their abutting ends connected as by bolts 28.

When the frame is lengthened by separating the opposed ends of the frame members and connecting them with a longer insert piece the sections of each axle will be separated and connected by an insert piece, as indicated at 29 in Fig. 14, the insert piece 29 having flanges 30 at its ends for connection to the flanges 27 of the axle sections by the bolts 28.

For the purpose of driving the machine to cause the flanged wheels 20 to travel upon the road forms 21, a suitable power unit and transmission mechanism may be provided similar to that of an automobile or truck. For this purpose a motor or other prime mover, as indicated generally at 31 is provided, mounted upon suitable cross members 32 and 33, supported at their ends upon the longitudinal channel 34 and the adjacent side of the channel frame 15.

The shaft 35 of the motor is located through a transmission box, indicated generally at 36, and the usual gear shift lever 37 is provided. The shaft 38 driven by the transmission mechanism in the box 36 has its outer end journalled in a bearing 39 mounted upon the cross member or bracket plate 33, and a sprocket wheel 40 is fixed upon the shaft 38 and connected, as by the pin 41, with a sprocket wheel 42 upon a longitudinally disposed shaft 43 journalled through bearings 44 in the upper portion of the channel frame 15 near one side thereof.

The shaft 43 may be spliced, as indicated at 45, to be adjusted for various widths of lanes or roads in the same manner as the axles. A sprocket wheel 46 is fixed upon each end of the shaft 43, these sprocket wheels being connected by chains 47 with the sprocket wheels 48 upon the ends of the axles 17.

An interchangeable surface track 49 is located in the lower portion of each side of the channel frame, these tracks being interchangeable and shaped to provide any desired crown upon the road, by means of fixed graduated supports or the tracks may be flat where no crown is desired.

The transversely disposed normally non-rotating surface track shaft 50 is mounted for longitudinal movement upon the tracks 49 by means of the wheels 51 which are journalled upon opposite ends of the shaft 50 and ride upon the track. The shaft 50 is not rotatable during this movement. As best shown in Fig. 3 each end of each track 49 is raised as indicated at 52 for a purpose to be later described.

The shaft 50 carries the checking and grooving screed suspended therefrom. This screed is primarily formed of two parts comprising the checking channel 53 and the grooving plates or bars 54, which are vertically, slidably movable relative to each other.

For this purpose one of the grooving plates or bars 54 is mounted upon each side of the checking channel 53 and provided with vertical slots 55 through each of which is located a stud or bolt 56 carried by the channel. These studs or bolts are permanently adjusted to allow free relative movement of the checking channel and grooving plates at all times to any desired adjusted position. The lower edge of each grooving bar or plate is provided with a plurality of spaced teeth 57.

For the purpose of suspending the screed from the shaft 50, as best shown in Figs. 6 and 7, transversely disposed plates or bars 58 are fixed to the top of the channel 53 at spaced points and a curved bolt 59, provided with a T-head 60, is connected to each of the bars 58 as by the nuts 61, which insure precision adjustment of the checking channel.

Arms 62 are welded to the non-rotating shaft 50 and provided with apertures 63 which receive the upper end portions of the curved bolts 59,

the T-heads 60 thereof resting upon the arms. There arms 62 are rigidly connected to the non-rotating shaft 50 by means of the arcuate portions 64 located over the top of the shaft and welded or otherwise rigidly connected thereto.

A plurality of cross bars or plates 65 are welded or otherwise fixed to the upper edges of the grooving plates and a curved bolt 66, similar to the bolts 59 but reversely disposed is connected to each cross bar 66 as by the nuts 67, which insure precision adjustment of the grooving plates. A T-head 68 is formed upon each of the curved bolts 66 and each bolt is located through an aperture 69 in an arm 70 similar to the arms 62 but oppositely disposed. Each of these arms has an arcuate portion 71 located over the top of the shaft 50 and welded or otherwise rigidly secured thereto.

With this construction it will be seen that as the shaft 50 is rotated clockwise, as viewed in Figs. 6 and 7, the checking channel 53 will be raised and the grooving plates 54 will be lowered, while rotation of the shaft 50 in the opposite direction will lower the checking channel and raise the grooving plates.

An operating lever 72 is fixed upon the shaft 50 and arranged to be held in vertical position as shown in Figs. 1 and 4, or in position to be tilted either to the right or to the left and held in such positions by means of the notched quadrant 73 mounted upon the vertical angle irons 74 supported upon the screed and the pawl 75 carried by the lever for engagement in the notches 76 thereof.

Thus the arms 62, rigidly fixed to the non-rotating shaft, form a single unit therewith which is tilted to the desired position by the operating lever 72 and held in such position by the quadrant 73.

Thus when the lever 72 is in vertical position, as shown in Figs. 1 and 4, the lower edges of the checking channel and grooving plates will be substantially flush as shown in Figs. 6 and 7, and by tilting the lever to either side, the shaft 50 will be rocked thereby and the checking channel and grooving plates will be moved relative to each other, as above described and held in adjusted position by engagement of the pawl upon the lever in the proper notch 76 of the quadrant, locking the parts in this position until manually released.

For the purpose of moving the screed transversely across the road, drive mechanism is provided including a shaft 77 having a bevel gear 78 thereon meshing with a bevel gear 79 upon the motor shaft 35.

The shaft 77 extends into a transmission box 80 controlled by a cutout gear lever 81, the shaft 82 from said transmission box being journalled in a bearing 83 and having a sprocket 84 fixed thereon and connected by the chain 85 with the sprocket 86 upon a shaft 87 extending transversely through the frame near one end thereof and journalled in bearings 88. A sprocket wheel 89 is fixed upon each end of the shaft 87.

A shaft 90 is journalled transversely through the channel frame just below the shaft 87 and has a sprocket wheel 91 fixed upon each end thereof, and a similar shaft 92 is journalled transversely through the other end portion of the channel frame and has a similar sprocket wheel 93 mounted upon each end thereof.

Endless chains 94 are located around each set of sprocket wheels 89, 91 and 93 at each side of the machine. These chains are connected to the

screed, preferably in the manner best shown in Fig. 8 by welding or otherwise fixing a plate 95 in the checking channel 53 the plate extending above the top of the channel and being centrally cut out as at 96 and notched as at 97 on each side of the cutout portion to connect the ends of the chain 94 thereto as by receiving the end pins 98 of the chain in said notches.

Thus as the chains 94 are moved in either direction they will carry the screed therewith transversely across the roadway. In this connection it is pointed out that the screed is preferably made of a greater length than the road forms so as to eliminate all irregularities which would ordinarily occur at the road form joints. In practice the road forms are ordinarily ten feet long and for such road forms the screed is preferably twelve feet long.

In order to provide an automatic cutout to stop the movement of the screed in either direction as it reaches a point adjacent to either end of the channel frame, a cutout bar 99 is longitudinally slidably suspended through the central portion of the machine as by rollers 100 mounted in the yoke 101.

This cutout bar 99 has depending lugs 102 at each end arranged to be engaged by the shaft 50 as it is moved to positions at each end of the frame. The cutout gear lever 81 which controls the operation of the screed through the transmission box 80 is pivoted as at 103 upon said transmission box and the lower end of said lever is forked as at 104 and pivotally connected to the cutout bar 99 as shown at 105.

Thus when the shaft 50 engages either of the lugs 102 the cutout bar 99 will be pulled longitudinally swinging the cutout gear lever 81 into neutral position thus automatically cutting off the power to the chains 94 and stopping the movement of the screed.

As shown in broken lines at the left side of Fig. 3, it will be seen that as the shaft 50 engages either of the lugs 102 of the cutout bar, the wheels 51 upon said shaft will have ridden up upon the adjacent high point 52 of the surface tracks 49, raising the screed out of contact with the road so that the machine may travel longitudinally along the road with the screed held up out of contact with the road into position for the next operation. When motion of the screed is arrested, either manually at any point on the track, or automatically at the end of the track, motion of the screed is resumed by operating the lever 81.

For the purpose of providing means for workmen to walk around upon the frame of the machine, a catwalk 106 may be welded or otherwise attached to the top of the channel frame. This catwalk is removed in Fig. 1 for the purpose of illustration. Each of the inserts, by means of which the frame sections are spliced together, is provided with a catwalk section 106*a*.

When lengthening the frame an insert section of proper length is required in the cutout bar 99 and corresponding lengths must be inserted in the chains 94 also.

I claim:

1. A road surface checking and grooving machine comprising a frame, wheels upon the frame for mounting the machine to travel longitudinally over a road, a checking and grooving screed upon the under side of the frame for contact with the surface of the road, said screed comprising a rigid checking channel and toothed grooving plates, a rocker shaft journalled in the frame,

oppositely disposed arms on the rocker shaft, means pivotally suspending the checking channel on one of said arms, means pivotally suspending the grooving plates on the other arm, means for rocking the shaft for simultaneously moving the checking channel and the grooving plates vertically in opposite directions throughout their entire length, and means for moving the screed transversely relative to the frame.

2. A road surface checking and grooving machine comprising a frame, wheels upon the frame for mounting the machine to travel longitudinally over a road, road surface tracks mounted in the frame transversely of the road, a normally non-rotatable rocker shaft provided with surface track wheels mounted upon said tracks, a checking and grooving screed suspended from said shaft, said screed comprising a checking channel pivotally connected to one side of the rocker shaft and toothed grooving plates pivotally connected to the other side of the rocker shaft, means for rotating the rocker shaft in either direction to selectively move the checking channel and the grooving plates relative to each other, endless chain means for moving the screed transversely relative to the frame whereby said surface track wheels travel upon said tracks and move said shaft in unison with the screed, driving means for the endless chain, a clutch between the driving means and the endless chain, a slidable cut out bar operated by the movement of said shaft, a clutch lever operatively connected to said cut out bar for stopping the movement of the endless chain means when the screed reaches a predetermined position near each side of the machine.

3. A road surface checking and grooving machine comprising a frame, wheels upon the frame for mounting the machine to travel longitudinally over a road, road surface tracks mounted in the frame transversely of the road, a normally non-rotatable rocker shaft provided with surface track wheels mounted upon said tracks, a checking and grooving screed suspended from said shaft, said screed comprising a checking channel and toothed grooving plates, means for rocking said shaft to move the checking channel and grooving plates vertically in opposite directions, endless chain means for moving the screed transversely relative to the frame whereby said surface track wheels travel upon said tracks and move said shaft in unison with the screed, a slidable cut out bar operated by the movement of said shaft, a clutch lever operatively connected to the cut out bar for stopping the movement of the endless chain means when the screed reaches a predetermined position near each side of the machine.

4. A road surface checking and grooving machine comprising a frame, wheels upon the frame for mounting the machine to travel longitudinally over a road, road surface tracks mounted in the frame transversely of the road, a normally non-rotatable rocker shaft provided with surface track wheels mounted upon said tracks, a checking and grooving screed suspended from said shaft, said screed comprising a checking channel pivotally suspended from one side of the rocker shaft and toothed grooving plates pivotally suspended from the other side of the rocker shaft, means for rotating the rocker shaft in either direction to selectively move the checking channel and the grooving plates relative to each other, endless chain means for moving the screed transversely relative to the frame whereby said surface track wheels travel upon said tracks and move said shaft in unison with the screed, power means for operating the endless chain means, a cutoff lever controlling the power means, a cutoff bar pivotally connected to the cutoff lever and lugs upon the cutoff bar for engagement with said shaft for stopping the movement of the endless chain means when the screed reaches a predetermined position near each side of the machine.

5. A road surface machine comprising a frame, wheels upon the frame for mounting the machine to travel longitudinally over a road, road surface tracks mounted in the frame transversely of the road, a normally non-rotatable rocker shaft provided with surface track wheels mounted upon said tracks, two series of oppositely disposed rocker arms fixed upon said shaft, a screed comprising a channel suspended from one series of rocker arms and plates on opposite sides of the channel suspended from the other series of rocker arms, means for rocking the shaft to cause relative vertical movement between the channel and plates and means for moving the screed transversely relative to the frame whereby the surface track wheels travel upon said tracks and move the shaft in unison with the screed, drive means for the screed moving means, a clutch between the drive means and the screed moving means, a slidable cut out bar operated by the movement of the shaft, a clutch lever operatively connected to said cut out bar for stopping the movement of the screed when it reaches a predetermined position near each end of the machine.

6. A road surface machine comprising a frame, wheels upon the frame for mounting the machine to travel longitudinally over a road, road surface tracks mounted in the frame transversely of the road, a normally non-rotatable rocker shaft provided with surface track wheels mounted upon said tracks, two series of oppositely disposed rocker arms fixed upon said shaft, a screed comprising a channel suspended from one series of rocker arms and plates on opposite sides of the channel suspended from the other series of rocker arms, means for rocking the shaft to cause relative vertical movement between the channel and plates and means for moving the screed transversely relative to the frame whereby the surface track wheels travel upon said tracks and move the shaft in unison with the screed, the ends of the surface track being raised, drive means for the screed moving means, a clutch between the drive means and the screed moving means, a slidable cut out bar operated by the movement of the shaft, a clutch lever operatively connected to said cut out bar for stopping the movement of the screed when it is raised out of contact with the road surface as said surface track wheels ride up onto the raised end of the tracks.

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