June 6, 1933. C. A. SMITH 1,912,546

GRADING AND ALIGNING DEVICE

Filed May 5, 1932 2 Sheets-Sheet 1

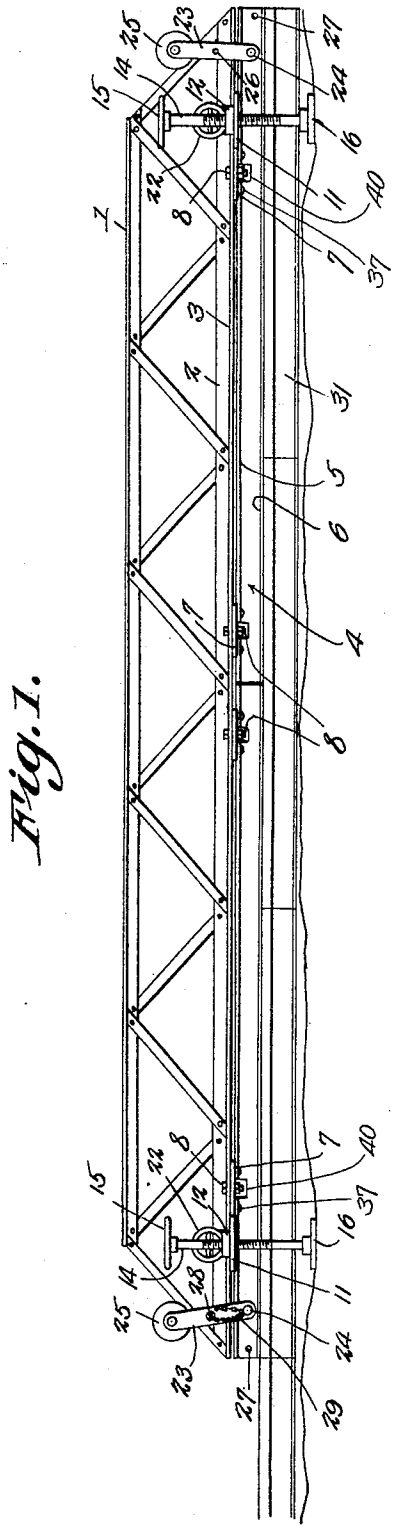


Fig. 1.

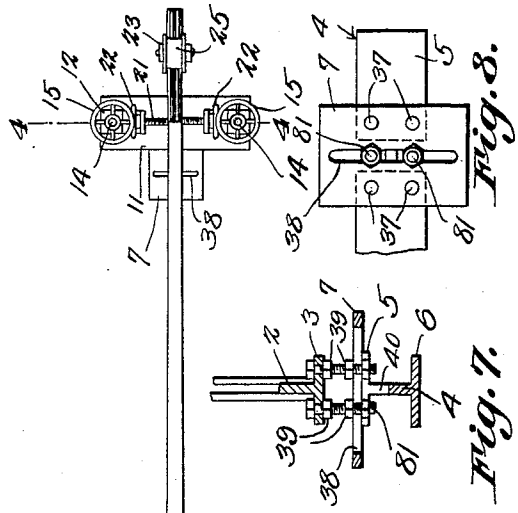


Fig. 8.



Fig. 7.

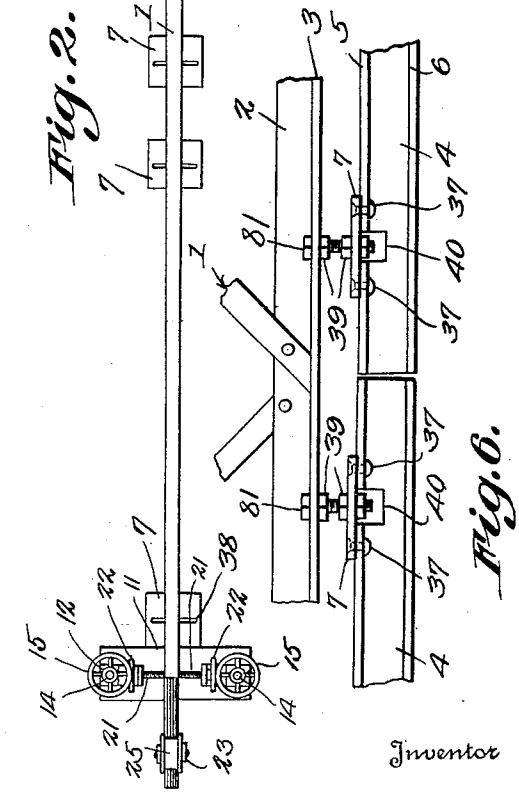


Fig. 2.



Fig. 6.

Inventor

Carl A. Smith

By Crowles.

Attorneys.

June 6, 1933. C. A. SMITH 1,912,546

GRADING AND ALIGNING DEVICE

Filed May 5, 1932 2 Sheets-Sheet 2

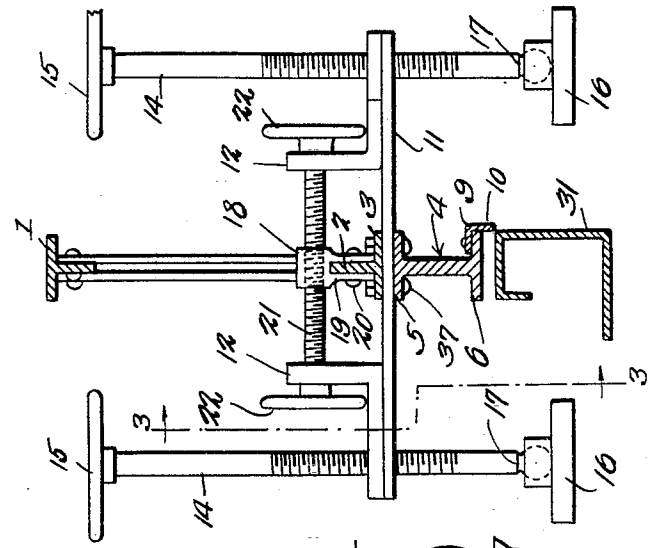


Fig. 4.

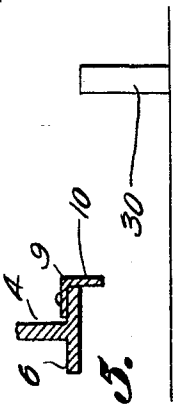


Fig. 5.

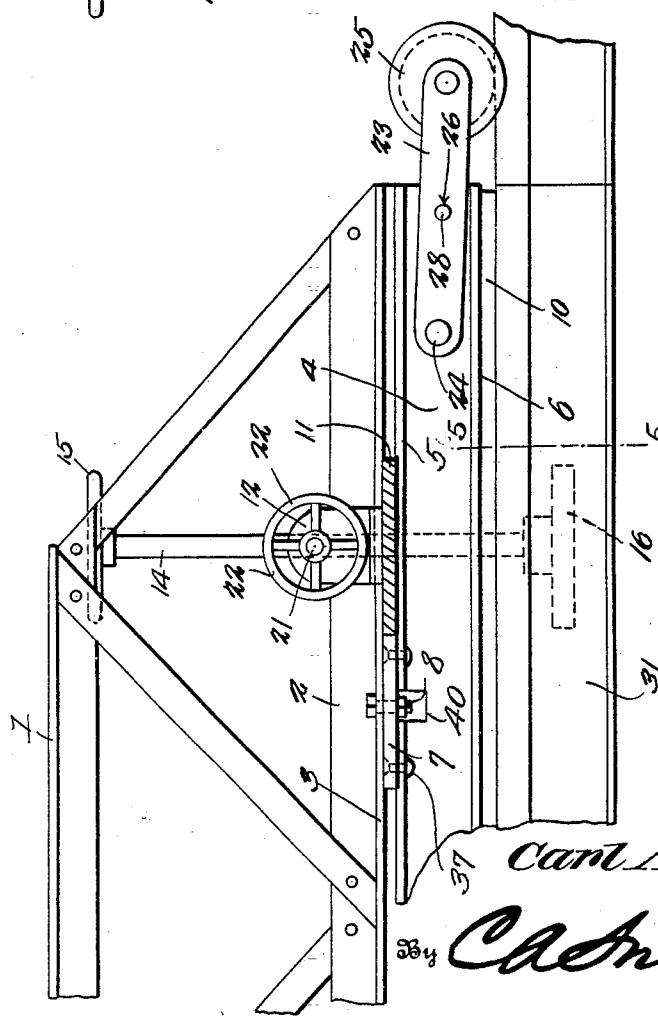


Fig. 3.

Inventor
Carl A. Smith
By C. A. Snow & Co.
Attorneys.

Patented June 6, 1933 1,912,546

# UNITED STATES PATENT OFFICE

CARL A. SMITH, OF DEFIANCE, OHIO

## GRADING AND ALIGNING DEVICE

Application filed May 5, 1932. Serial No. 609,521.

This invention aims to provide a simple means whereby the forms used for defining the longitudinal edges of a concrete highway may be brought into alignment, and into grade, to correspond with the alignment and grade established by the engineer's stakes, novel means being supplied whereby the device may be moved readily from one place of use to another.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:

Fig. 1 shows in side elevation, a device constructed in accordance with the invention;

Fig. 2 is a top plan;

Fig. 3 is a vertical section on the line 3—3 of Fig. 4, on an enlarged scale, and wherein most parts appear in elevation;

Fig. 4 is a transverse section, taken approximately on the line 4—4 of Fig. 2, with many parts in elevation;

Fig. 5 is a fragmental, diagrammatic transverse section, on the line 5—5 of Fig. 3, and illustrating one step in the practical application of the device;

Fig. 6 is a fragmental side elevation illustrating the means whereby a vertical and a horizontal adjustment of the grade and alignment members is brought about;

Fig. 7 is a cross section of the structure depicted in Fig. 6;

Fig. 8 is a top plan of a portion of the structure shown in Fig. 7.

The device forming the subject matter of this application comprises a frame, including a stiffener or body 1, which may be a light truss, the bottom part of the truss including a vertical flange 2 and a horizontal flange 3.

Below the stiffener or truss 1 are disposed grade and alignment members 4, which may be light I-beams, each including an upper horizontal flange 5, and a lower horizontal flange 6. Bracket plates 7 are secured at 37 to the flanges 5 of the I-beams 4, near to the ends of the beams, and have transverse slots 38.

Securing elements 8, such as bolts, are mounted in the flange 3 of the stiffener 1 and are received in the slots 38 of the bracket plates 7, the securing elements connecting the I-beams 4 with the stiffener 1. If the operator prefers, he can use the bolts 81 of Figs. 6, 7 and 8, the same being provided with spacing nuts 39, which, cooperating with the bracket plates 7 and the flange 3 of the stiffener, make possible a vertical adjustment of the I-beams 4 with respect to the stiffener 1, such an adjustment being desirable, for instance, when there is a change of grade, within the length of the piece of road spanned by the device forming the subject matter of this application. In the event that there is a horizontal transition in the road, within the length of the device, a horizontal adjustment of the I-beams 4 may be brought about by shifting the securing devices 81 in the slots 38 of the bracket plates 7, the webs of the beams 4 having openings 40 for the accommodation of the lower ends of the securing devices. An angle member 9 is secured to the lower flange of each part 4, and has a flange 10, which depends below the flange 6 of the member 4. The lower surface of the flange 6 constitutes a substantially horizontal grading surface, and the inner surface of the flange 10 constitutes a substantially vertical aligning surface.

Supports 11, such as plates or bars, are located between the flange 3 of the truss 1 and the flanges 5 of the members 4. Bearings 12, for instance angle brackets, are secured to the supports 11 and are located on opposite sides of the truss 1, near to the ends of the grade and alignment member 4.

Grading devices 14, preferably screws, are provided, and are threaded into the horizontal parts of the bearings 12 and into the end portions of the supports 11. The grad-

ing screws 14 are disposed on opposite sides of the truss 1 and on opposite sides of the grade and alignment member 4. The screws 14 may carry hand wheels 15 at their upper ends, for the convenient manipulation of the screws. Feet 16 are connected by ball and socket joints 17 with the lower ends of the screws 14.

Nuts 18 are provided, as shown in Fig. 4, and carry depending forks 19, straddled on the flange 2 of the truss 1, and connected thereto by securing elements 20. Operating members 21, which may be screws, are threaded into the nuts 18 for longitudinal adjustment, and are horizontally disposed, in parallel relation to the supports 11. The screws 21 can turn in the vertical parts of the bearing brackets 12, but are not threaded into those parts. The screws 21 may be turned by means of hand wheels 22 at their outer ends, the hubs of the hand wheels cooperating with the vertical parts of the bearings 12, to hold the screws in place for rotation in the brackets 12, but against longitudinal movement therein.

Radius arms 23 are pivoted at 24 to the outer end portions of the grade and alignment members 4, for vertical swinging movement, and, when in use, as shown in Fig. 3, project outwardly beyond the ends of the members 4. In the outer ends of the radius arms 23, grooved wheels 25 are journaled. The radius arms 23 and the wheels 25 constitute vertically adjustable trucks on the outer ends of the grade and alignment members 4. Intermediate their ends, the radius arms 23 have openings 26 adapted to be brought into registration with openings 27 in the members 4, and when the openings 26 and 27 are in registration, they are adapted to receive latch pins 28, which are removable, the latch pins being connected by flexible elements 29, if desired, to the radius arms 23.

The device is mounted in place as shown in Fig. 1, with the feet 16 of the grading devices 14 on the ground or other surface provided. The grading screws 14 are manipulated by the hand wheels 15, to raise and lower the supports 11 and parts associated therewith, to wit, the truss 1 and the grade and alignment members 4. The truss 1 and the grade and alignment members 4 are moved horizontally by the screws 21 and the hand wheels 22. These vertical and horizontal adjustments are continued until comparison with the offset engineer's stakes 30 shows that further adjustments are unnecessary.

The operator then is assured that the members 4 are positioned properly, both for grade and for alignment, as determined by the engineer's stakes 30. The road forms 31 are raised, in any suitable way, until they fit in the angle formed by the parts 10 and 6 of Fig. 5. The contractor then knows that the road forms 31 are placed properly both for grade and for alignment.

During the setting of the road forms 31, the radius arms 23 are swung upwardly into the position of Fig. 1, the latch pins 28 being mounted in the openings 26 of the radius arms, and extending across the upper edge of the flange 2 of the truss 1, to hold the radius arms and the wheels 25 in the position shown in Fig. 1. When, however, it is desired to move the structure along from one pair of engineer's stakes to another, the radius arms 23 are swung down into the position of Fig. 3, the latch pins 28 are inserted into the openings 26 of the radius arms, and into the openings 27 of the grade and alignment members 4, and said members are raised enough so that, when the grooved wheels 25 are engaged with the road forms 31, the entire structure can be wheeled ahead, in a way which will be understood readily when Fig. 3 of the drawings is examined.

The vertical adjustment between the members 4 and the truss 1, for changes of grade, and the horizontal between the parts 4 and 1, for lateral curves or changes in azimuth, are accomplished by the screws 81, the nuts 39, and the bracket plate slots 38 of Figs. 8, 7 and 6.

Having thus described the invention, what is claimed is:—

1. A device for setting road forms to adjustment, from engineer's stakes, comprising a frame including a grade and alignment member, supports disposed transversely of the frame, and whereon the frame is slidable, longitudinally of the supports and transversely of the frame, means carried by the supports for sliding the frame longitudinally of the supports and transversely of the frame, to secure adjustment of said member with respect to the engineer's stakes, and vertically-operating ground-engaging grading devices carried by the supports, on opposite sides of the frame, and constituting means for adjusting said member to the grade established by the engineer's stakes.

2. A device of the class described, constructed as set forth in claim 1, and further characterized by the fact that the frame is provided with a substantially horizontal grading surface on its lower edge, and with a substantiallly vertically alignment surface cooperating with the grading surface.

3. A device of the class described, constructed as set forth in claim 1, and further characterized by the fact that said means carried by the supports comprises a screw threaded into the frame, means on the supports for holding the screw for rotation, but against longitudinal movement, and means for rotating the screw.

4. A device of the class described, constructed as set forth in claim 1, and further characterized by the fact that the grading de-

vices are screws threaded into the supports and provided at their lower ends with swivelled feet.

5. A device for setting road forms to adjustment, from engineer's stakes, comprising a frame including a body and a grade and alignment member disposed below the body, means for connecting the grade and alignment member to the body for vertical adjustment and for horizontal adjustment, with respect to the body, supports disposed transversely of the frame, and whereon the frame is slidable, transversely of the length of the frame, means carried by the supports for sliding the frame as aforesaid, to secure adjustment of the grade and alignment member with respect to the engineer's stakes, and vertically-operating ground-engaging grading devices carried by the supports, on opposite sides of the frame, and constituting means for adjusting the grade and alignment member to the grade established by the engineer's stakes.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

CARL A. SMITH.