July 23, 1963 J. K. STEWART 3,098,302

MOUNTING MEANS FOR INFRA-RED TRANSMITTERS AND RECEIVERS

Filed June 30, 1961 2 Sheets-Sheet 1

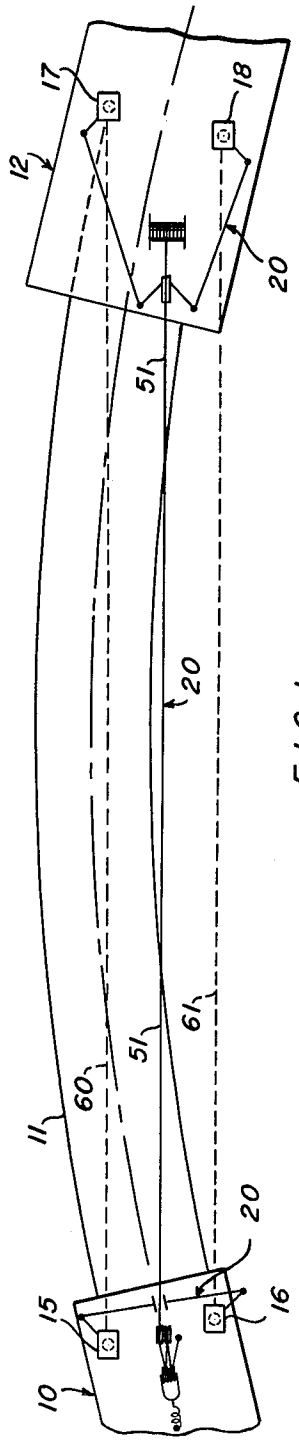


FIG. 1.

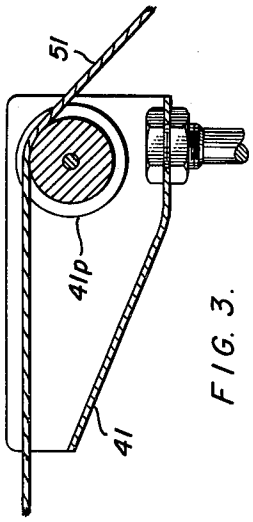


FIG. 3.

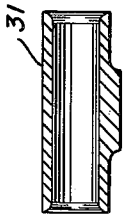


FIG. 2.

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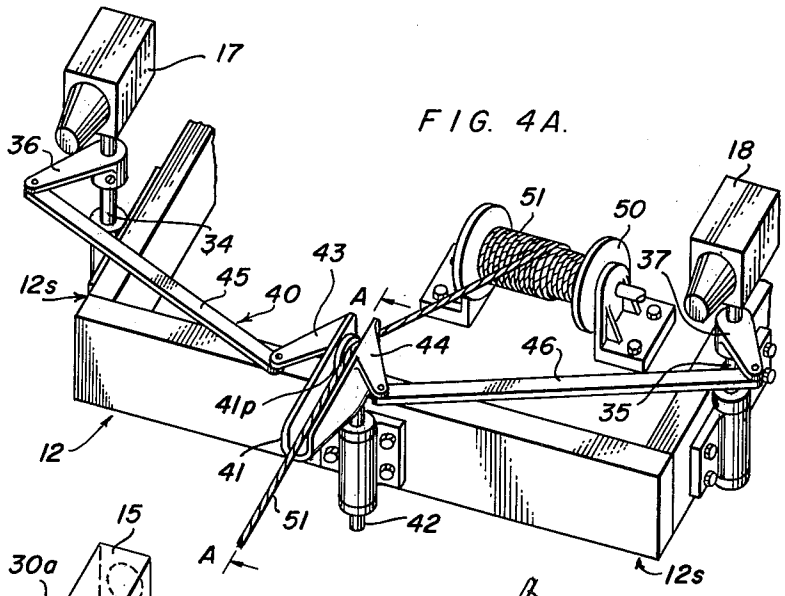


FIG. 4A.

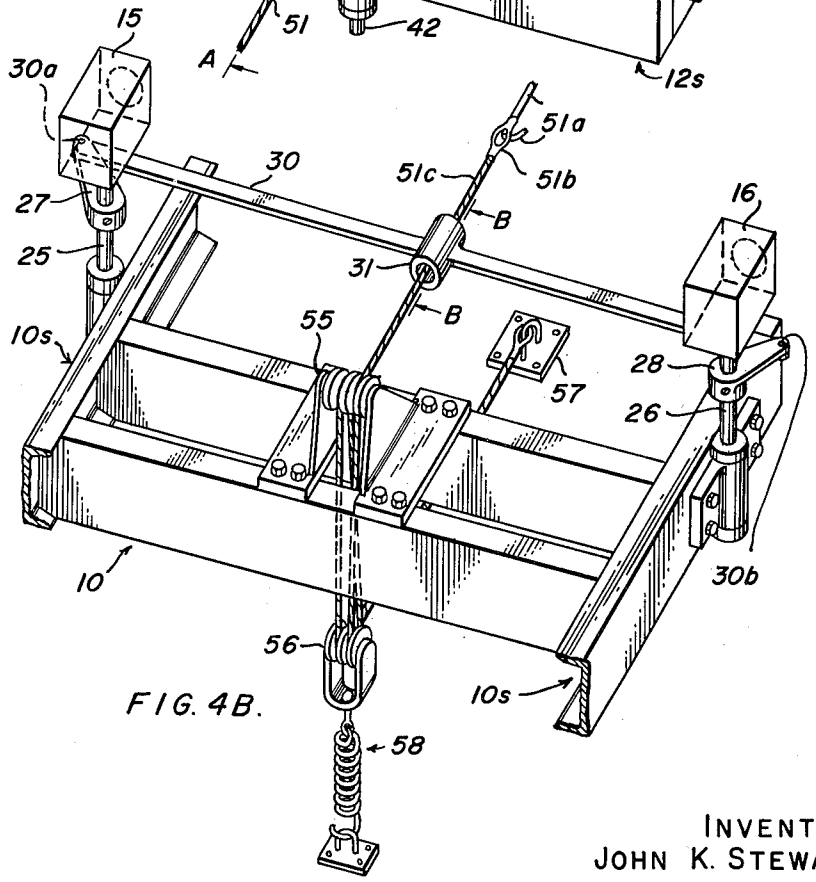


FIG. 4B.

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3,098,302
MOUNTING MEANS FOR INFRA-RED TRANSMITTERS AND RECEIVERS

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7 Claims. (Cl. 33—46)

This invention relates to railroad track surveying devices of the type which use high frequency beam transmitters on a remote carriage, a high frequency beam receiver on a second or base carriage, usually a tamping machine, and a shadow board adjacent the tamping machine to interfere with the transmitted beam. Such a system is described in my Canadian Patent No. 650,557, issued Oct. 16, 1962.

One of the drawbacks of earlier devices has been that when the transmitters on the remote, or first, carriage on the railway track has moved out of alignment with the receiver on the second carriage by reason that the first carriage having entered a curve on the track, the beamed signal from the transmitters has been difficult to obtain. This difficulty maintains throughout the curve, and increased with the sharpness of the curve.

It is an object of the present invention to provide means whereby the transmitters and receivers may be maintained in substantial alignment whilst negotiating normal railroad track curves.

Accordingly, the present invention provides in a railroad track surveying device, a first carriage adapted for movement on a railroad track, high frequency beam transmitter means pivotally mounted on said first carriage; a second carriage adapted for movement on the railroad track and normally spaced from said first carriage; high frequency beam receiver means pivotally mounted on said second carriage and adapted to receive the transmitter beam from said transmitter means; and linkage means between said transmitter means and said receiver means adapted to maintain the transmitter means and the receiver means in substantial alignment with respect to each other.

Preferably, the high frequency beam is an infra-red light beam.

According to a preferred construction a pair of infra-red beam transmitters are pivotally mounted to the first carriage and a pair of infra-red light beam receivers are pivotally mounted to the second carriage.

The following is a description by way of example of one embodiment of the present invention reference being had to the accompanying drawings in which:

FIGURE 1 is a schematic plan view of the device, not a scale, of two carriages on a curve on a railroad track.

FIGURES 2 and 3 are details; and,

FIGURES 4*a* and 4*b* together provide a pictorial representation of the mounting of the present device on a front carriage and its mounting of on a second carriage.

Referring now to the drawings. A first carriage **10** is mounted on rail engaging wheels so that it is capable of movement on a railroad track **11**. The carriage **10** may carry its own prime mover or may be driven by electric motor from a power source on the second carriage **12** which is similarly mounted on rail engaging wheels for movement on track **11**. Under normal surveying conditions the second carriage **12** would be a tamping machine and probably also equipped with jacks and a shadow board would be provided in engagement of the track **11** and in front of, and adjacent to, the carriage **12**.

The first carriage has a pair of infra-red light beam transmitters **15** and **16** pivotally mounted thereon and the carriage **12** has a pair of infra-red light beam receivers **17** and **18** pivotally mounted thereon. These light beam receivers are normally of the photoelectric cell variety. The

connecting linkage generally indicated at **20** extends between the transmitters and receivers and operates to keep them in substantial alignment with respect to each other even when the front carriage **10** has moved into a curve in the track and thus out longitudinal alignment with the carriage **12**.

FIGURES 4*a* and 4*b* illustrate the linkage **20** in detail. The carriage **10** has a structure **10***s* to which the transmitters **15** and **16** are mounted on pivoted pins **25**, **26** substantially above each rail of the track and arranged to project an infra-red light beam back along the track in the general direction of the second car **12**. A pair of crank arms **27**, **28** extend outwardly away from the pivot pins **25**, **26** and are attached to the pivot pins **25**, **26**.

The crank arms **27**, **28** are connected by a connecting link **30** which is pivoted at **30***a* and **30***b* to the crank arms **27**, **28**. The connecting arm **30** is provided with a centrally located bushing **31**.

The second carriage has a frame **12***s* to which the receivers **17** and **18** are pivotally mounted on similar pivot pins **34**, **35** to which are attached a pair of crank arms **36**, **37** pivotally connected at their outer extremities to connecting link means generally indicated at **40**. The connecting link means comprises the guide channel member **41** mounted on a pivot pin **42** on the frame **12***s*, and extending in the general direction of the first carriage, wing arms **43**, **44** on either side of the guide channel member **41** pivotally connected at their outer extremities to a pair of intermediate links **45**, **46**. The links **45**, **46** pivotally connect the wing arms **43**, **44** and the crank arms **36**, **37**.

A cable reel **50** is mounted on the second carriage **12** and the cable **51** therefrom passes up and over a pulley **41***p* in the guide channel **41**. The cable **51** spans the distance between the first and second carriages and engages a bushing **31** on the connecting link **30**. The cable passes through the bushing and around a series of sheaves **55**, **56** to an anchoring point **57** on the front carriage **10**. The sheaves **55** and **56** are provided with a spring loaded counterbalance means generally indicated at **58**.

In operation when the first carriage enters a curve before the second carriage, or, as in the condition shown in FIGURE 1, when both are in the curve, the cable **51** or other flexible link, tries to keep a straight line between the first and second carriages and as a consequence bears against the side of the bushing **31** and the guide channel **41** to pivot the transmitter and receivers on their pivot pins **25**, **26**, **34**, **35** so that the transmitters and receivers will be in substantial alignment as indicated by the dotted lines **60** and **61** in FIGURE 1.

The cable **51** may, if desired, comprise an electrical energy conductor cable for the greatest part of this span, that is to say, it could be an electrical cable **51***a* to the point **51***b* (FIGURE 4*b*) and thereafter a steel cable **51***c* mechanically connected to the cable **51***a*, the cables **51***a*, **51***c* together form the cable means connecting the two carriages together. The free end of cable **51***a* can, under these circumstances be used to connect an electrical source of energy to a driving motor on the carriage **10**.

However, the first carriage could, if desired, have a self-contained driving unit in which case the cable means **51***a*, **51***c* could be a simple steel cable from beginning to end.

It will be clear that it is not essential to keep the transmitters and receivers in absolute alignment with each other since there is bound to be a certain amount of spread of the transmitter beam and provided that the transmitters and receivers are kept sufficiently in alignment as to be within the spread of this light beam span then the device will function effectively.

What is claimed as my invention is:

1. In a railroad track surveying device, a first carriage adapted for movement in a railroad track, high frequency beam transmitter means pivotally mounted on said first

carriage; a second carriage adapted for movement on the railroad track and normally spaced from said first carriage; high frequency beam receiver means pivotally mounted on said second carriage and adapted to receive the transmitter beam from said transmitter means; and linkage means between said transmitter means and said receiver means adapted to maintain the transmitter means and the receiver means in substantial alignment with respect to each other, said linkage means including a flexible link substantially spanning the distance between the carriages.

2. In a railroad track surveying device, a first carriage adapted for movement on a railroad track, a pair of infrared beam transmitters pivotally mounted on said carriage one substantially above each rail of the track; a second carriage adapted for movement on the railroad track and normally spaced from said first carriage; a pair of infrared light beam receivers pivotally mounted on said second carriage one substantially above the each rail of the track and adapted to receive the transmitted infra-red light from said transmitters; and linkage means between said transmitters and said receivers adapted to maintain the transmitters and receivers in substantial alignment, said linkage means including a flexible link substantially spanning the distance between the carriages.

3. A device as claimed in claim 2 in which the linkage means comprises a crank arm operatively connected to each transmitter; a connecting link operatively connected between the crank arm; a crank arm operatively connected to each receiver, connecting link means between these

crank arms; and a flexible connecting link engaging said connecting link and said connecting link means and spaning the distance therebetween.

4. A device as claimed in claim 3 in which the connecting link means comprises a guide channel substantially centrally located on the said second carriage between the receivers, pivotally connected to said second carriage and extending normally in a direction towards said second carriage; said guide channel being adapted to pass said flexible connecting link; a pair of wing arms on the sides of the guide channel and extending outwardly therefrom; and a pair of intermediate links operatively connecting each wing arm with its associated receiver crank arm.

5. A device as claimed in claim 4 in which the flexible link is a cable means mounted to a reel on the said second carriage and the guide channel includes a pulley to pass said cable.

6. A device as claimed in claim 4 in which the cable means engages the connecting link centrally thereof through a bushing thereon and is anchored to the said first carriage.

7. A device as claimed in claim 6 in which said cable means is connected to a spring counterbalance means on said first carriage.

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