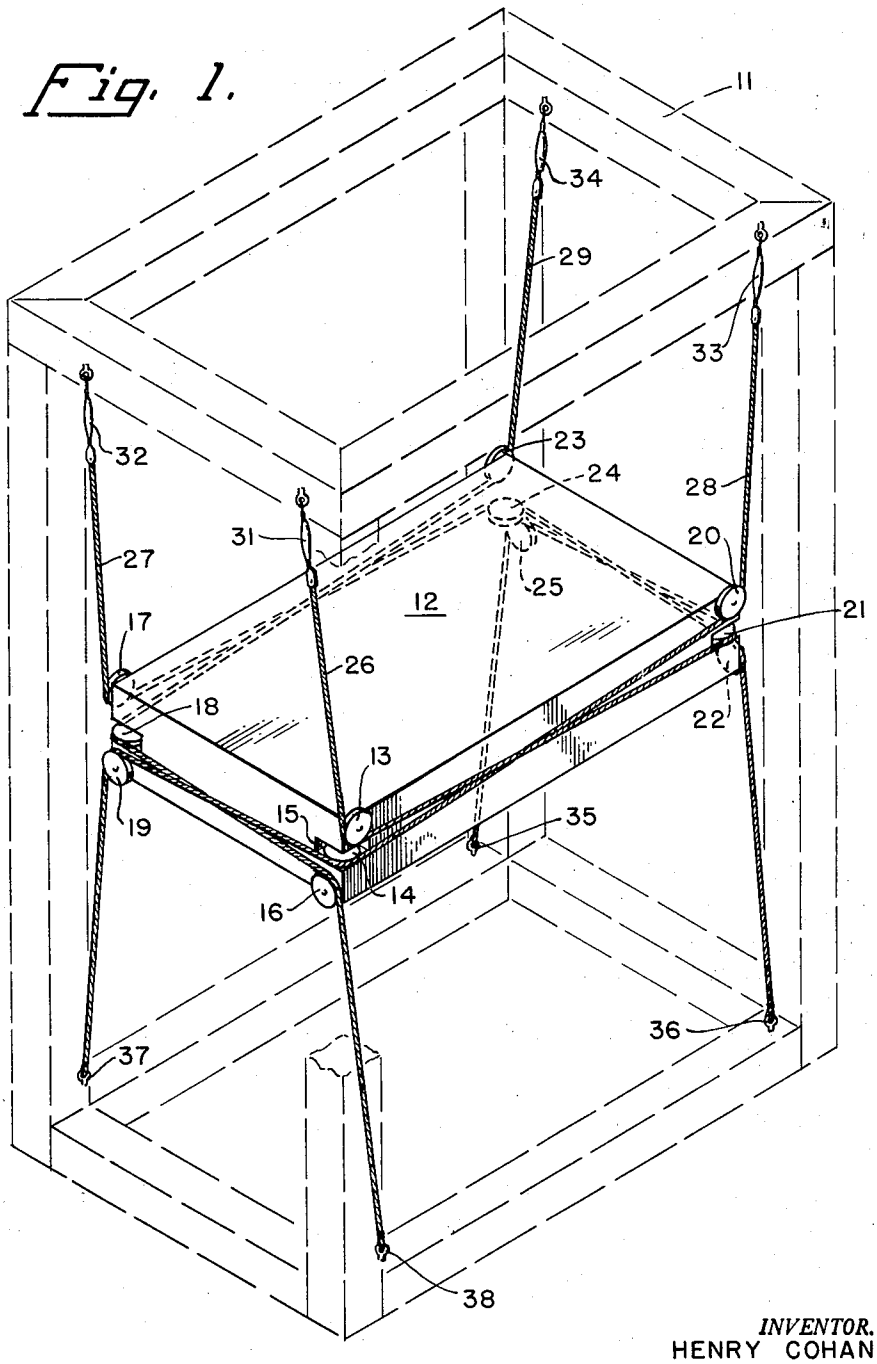
Nov. 25, 1958 H. COHAN 2,861,449

PLATFORM GUIDANCE SYSTEM FOR SHOCK TEST MACHINE

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Fig. 1.



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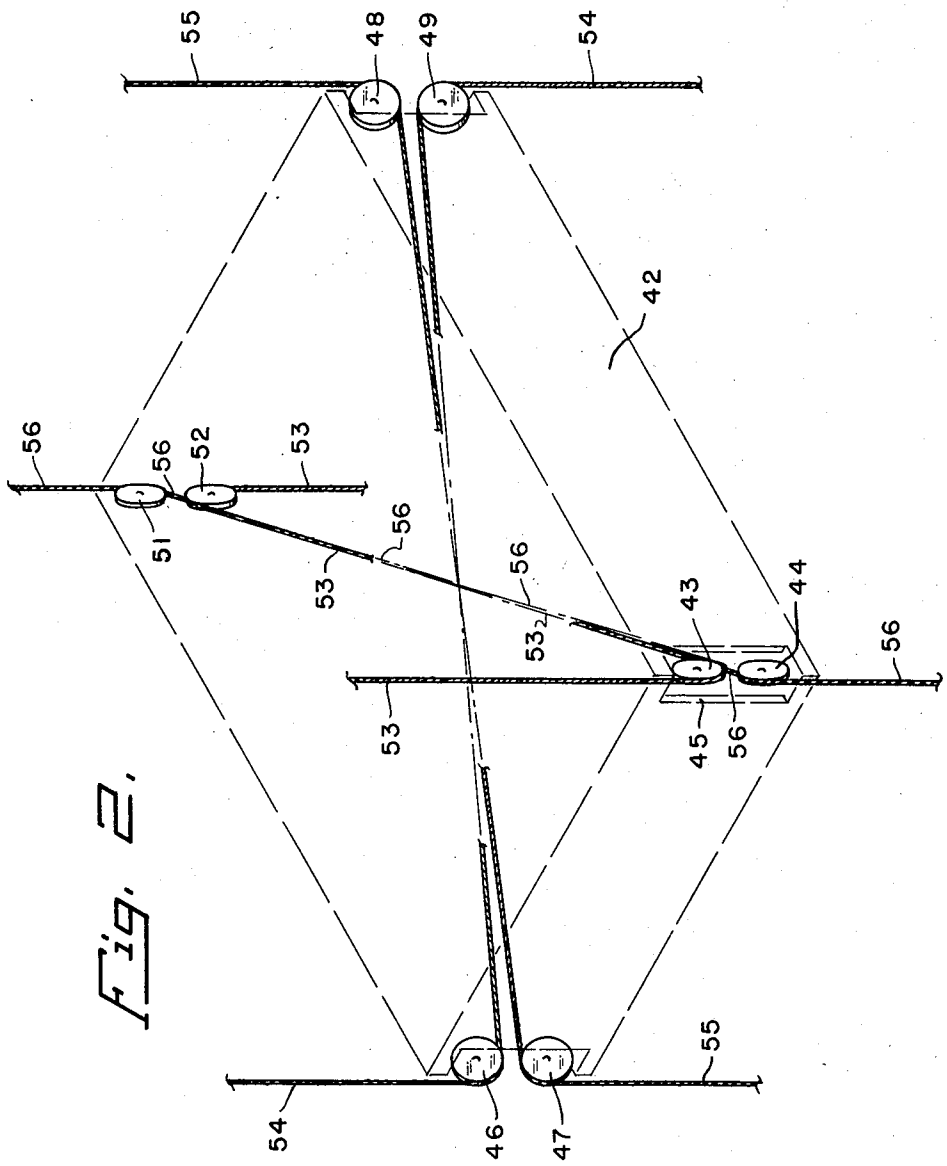


Fig. 2.

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PLATFORM GUIDANCE SYSTEM FOR SHOCK TEST MACHINE

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10 Claims. (Cl. 73—12)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to a cable and pulley system and more particularly to a cable guidance system including a plurality of cables anchored to a framework and trained over a series of pulleys mounted on a platform to allow the platform to fall freely while being constrained to a predetermined path and maintained at a predetermined attitude or inclination to the horizontal.

Structures have been previously designed to permit a platform to fall freely while in a horizontal position but these structures have required the use of rigid vertical guides and ways with sliding or rolling members mounted on the platform and engaging the vertical ways.

These structures were expensive to construct, since they required a heavy, rigid and accurately machined assembly and the friction inherent in the sliders or rollers moving against the ways did not permit a completely free fall which is desirable particularly in such types of devices as shock testing machines. These prior devices could not be readily altered to change the inclination of the platform during fall and were extremely difficult to construct with sufficient accuracy and lack of friction to provide reproducible results in shock tests.

The present invention consists essentially of a rectangular framework having four cables anchored approximately at the four diagonally opposite corners of the top and bottom of the framework. Each of the cables is secured to a turnbuckle at one of the upper corners of the framework and is trained around a pulley on a horizontal axis at the corner immediately below, around a second pulley on a vertical axis at one adjacent corner of the platform, over a third pulley mounted on a horizontal axis at the diagonally opposite corner and down to an anchor at the bottom of the structure at the diagonally opposite corner of the framework. By changing the length of any one or more of the cables by means of the turnbuckles or other similar adjusting means, the attitude or inclination of the platform can be varied so that any side or corner can be made to contact before the others.

One object of the present invention is to provide an improved guidance system for permitting the free fall of a platform for use in certain devices such as shock testing machines.

Another object of the present invention is to provide a cheaper and simpler guidance system to allow a platform to fall freely while held in a horizontal or other predetermined attitude.

A still further object of the present invention is to provide a cable guidance system which will permit the free fall of a platform and may be readily adjusted to vary the inclination of the platform during fall.

Still another object of the present invention is to provide a guidance system for a free falling platform which minimizes friction while controlling the path and attitude of the platform during fall.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a pictorial view of one preferred embodiment of the present invention, and

Fig. 2 is a pictorial view illustrating another embodiment constructed in accordance with the present invention.

Referring now to the drawings in detail, the preferred embodiment of the present invention illustrated in Fig. 1 consists of a rectangular framework **11** which may be built from suitable timbers having sufficient strength or from other structural members formed of steel, aluminum or other materials. This framework may be suitably braced where desired and provided with suitable means (not shown) for raising the platform after the fall and a bed of sand or a holder for lead blocks (not shown) to act as a bed for receiving the platform at the end of the fall and providing the desired type and shape of shock waves.

A platform **12** is likewise constructed of wood or other suitable material and may be provided with means for attaching a test speciman on its upper surface and ribs or other forms of projection (not shown) for penetrating the sand bed or lead blocks.

The platform **12** is provided with three pulleys on each corner thereof which may be mounted in several different manners one of which is illustrated wherein one pulley **13** is mounted on a substantially horizontal axis on the long side of the platform near the upper corner, a second pulley **14** is mounted on a vertical axis in a recess **15** formed in the corner of the platform, and a third pulley **16** is mounted on a substantially horizontal axis near the lower corner of the short side of the platform.

Pulleys **17**, **18**, and **19** are similarly mounted in an adjacent corner and pulleys **20**, **21**, and **22** are similarly mounted in the other adjacent corner. Mounted in the far corner of the platform are the pulleys **23**, **24**, and **25**.

The cables **26**, **27**, **28** and **29** are fastened to the upper portion of the framework by means of turnbuckles **31**, **32**, **33** and **34**, with the opposite ends secured to the bottom of the framework by means of eyes **35**, **36**, **37** and **38**.

The cable **26**, as shown in Fig. 1, is trained over the pulleys **13**, **21** and **25** and secured to the eye **35**. The cable **27** is attached to the turnbuckle **32** and is trained over the pulleys **17**, **24**, and **22** and is attached to the eye **36**. Cable **29** passes over pulleys **23**, **18** and **16** and is attached to the eye **38**. Cable **28** passes over pulleys **20**, **14** and **19** and is secured to eye **37**.

By adjustment of the turnbuckles **31**, **32**, **33**, and **34** it will be apparent that the platform **12** may be set in a horizontal plane and will maintain this attitude during its fall to the bottom of the framework. If turnbuckles **32**, and **34** are taken up to shorten the effective length of the cables **27** and **29** the side of the platform mounting pulleys **17** and **23** will be raised relative to the opposite edge. Obviously, by adjustment of the turnbuckles any desired inclination may be obtained.

A modification of the cable guidance system of the present invention is illustrated in Fig. 2 wherein the platform **42** is provided with a pair of pulleys **43** and **44** mounted on a substantially horizontal axis in the recess **45** formed in one corner of the platform **42**. A pair of pulleys **46** and **47** are similarly mounted in one of the adjacent corners and pulleys **48** and **49** are mounted

similarly in the other adjacent corner of the platform **42**. In the far corner a pair of pulleys **51** and **52** are mounted in a similar manner.

The cables **53**, **54**, **55** and **56** may be mounted and attached to a framework in the same manner as the cables **26**, **27**, **28** and **29** illustrated in Fig. 1. Each of the cables is trained around one of the upper pulleys and extends through the interior of the platform **42** and over the diagonally opposite pulley down to the lower fastening means. For example, cable **54** extends over pulley **46** through the platform **42** over pulley **49** and down. Similarly cable **53** extends over pulleys **43** and **52**, cable **55** extends over pulleys **48** and **47**, and cable **56** extends over pulleys **51** and **44**.

It will be apparent that both modifications of the present invention will function in substantially the same manner. The platforms **12** and **42** will each fall in a substantially vertical path within the supporting framework and will maintain the attitude or inclination as determined by the relative lengths of the four cables, thus providing a cable guidance system in three dimensions.

While the framework **11** and the platforms **12** and **42** have been illustrated and described as having a rectangular shape which will be adaptable for most uses, in some cases it may be desirable to use a triangular or other shape of platform with 3 or more cables and with a suitable arrangement of pulleys and anchors. Other conventional means may be used for varying the effective length of the cables, or cables of different lengths may be used for special applications.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A platform guidance system comprising a plurality of cables and a platform adapted to be guided by said cables within a framework, said platform having a plurality of pulleys mounted thereon, each of said cables being adapted to be attached at its opposite ends to the top and bottom of the framework on diametrically opposite sides thereof, said cables being trained over one pulley on one side of said platform and another pulley on a diametrically opposite side of said platform.

2. A platform guidance system comprising a platform adapted to be mounted within a framework encompassing said platform during a free fall, a plurality of pulleys, certain of said pulleys being mounted for rotation on said platform on a substantially horizontal axis, and a plurality of cables each adapted to have one end secured to the upper portion of said framework and the opposite end secured to the lower portion of said framework, each of said cables being trained over one of the pulleys mounted adjacent one side of said platform and over another pulley mounted adjacent another diagonally opposite side of said platform.

3. A platform guidance system comprising a supporting framework, a plurality of cables and a platform adapted to be supported by said cables within said framework said platform having at least two pulleys mounted at each of several positions adjacent the periphery thereof, each of said cables being attached at its opposite ends to the top and bottom of said framework on diametrically opposite sides thereof, said cables being trained over one pulley at one position on said platform and another pulley at a diametrically opposed position on said platform.

4. A platform guidance system comprising a platform, a supporting framework adapted to encompass said platform during a free fall, a plurality of pulleys mounted for rotation adjacent each of four-spaced positions on said platform, at least two of said pulleys being mounted on a substantially horizontal axis, four cables each having one end secured to the upper portion of said framework and the opposite end secured to the lower portion of said framework at a diametrically opposed position, said cables being trained over one of the pulleys mounted at one position on said platform and over another pulley mounted at a diametrically opposed position on said platform, and means for adjusting the length of each of said cables.

5. A platform guidance system comprising a supporting framework, a plurality of cables, a platform adapted to be guided by said cables within said framework, said platform having at least two pulleys mounted adjacent each of the corners thereof, each of said cables being attached at its opposite ends to the top and bottom of said framework on diametrically opposite portions thereof, said cables being trained over one pulley at one corner of said platform and another pulley at a diametrically opposed corner of said platform, and means for adjusting the effective length of each of said cables.

6. A platform guidance system comprising a platform having at least three corners, a framework adapted to encompass said platform during a free fall, a plurality of pulleys mounted for rotation adjacent each of the corners of said platform, at least two of said pulleys being mounted on a substantially horizontal axis, a plurality of cables each having one end secured to the upper portion of said framework and the opposite end secured to the lower portion of said framework at a diagonally opposed position, each of said cables being trained over one of the pulleys mounted at one corner of said platform and over another pulley mounted at a diagonally opposed corner of said platform, and means for adjusting the effective length of each of said cables.

7. A platform guidance system comprising a platform having at least three corners, a supporting framework adapted to encompass said platform during a free fall, said platform having two pulleys mounted on a substantially horizontal axis adjacent each of the corners thereof, said platform having a third pulley mounted on a vertical axis between said two pulleys adjacent each of the corners thereof, and a plurality of cables each secured at one end to the upper portion of said framework and at the opposite end to the lower portion of said framework, each of said cables extending from the upper portion of said framework over the uppermost pulley at one corner of said platform and around the intermediate pulley at an adjacent corner thereof and over the lowermost pulley on another corner of said platform and down to the lower portion of said framework.

8. A platform guidance system comprising a platform having at least three corners, a supporting framework adapted to encompass said platform during a free fall, said platform having two pulleys mounted on a substantially horizontal axis adjacent each of the corners thereof, said platform having a third pulley mounted on a vertical axis between said two pulleys adjacent each of the corners thereof, a plurality of cables each secured at one end to the upper portion of said framework and at the opposite end to the lower portion of said framework, each of said cables extending from the upper portion of said framework over the uppermost pulley at one corner of said platform and around the intermediate pulley at an adjacent corner thereof and over the lowermost pulley on another corner of said platform and down to the lower portion of said framework, and means for adjusting the effective length of each of said cables.

9. A platform guidance system comprising a platform, a supporting framework adapted to encompass said platform during a free fall, said platform having two pulleys mounted on a substantially horizontal axis at each of several positions adjacent the periphery thereof, a plurality of cables each secured at one end to the upper portion of said framework and at the opposite end to

the lower portion of said framework, each of said cables extending from the upper portion of said framework over the uppermost pulley at one position across said platform and over the lowermost pulley at a diametrically opposed position to the lower portion of said framework.

10. A platform guidance system comprising a platform having at least three corners, a supporting framework adapted to encompass said platform during a free fall, said platform having two pulleys mounted on a substantially horizontal axis adjacent each of the corners thereof, a plurality of cables each secured at one end to the upper portion of said framework and at the opposite end to the lower portion of said framework, each of said cables extending from the upper portion of said framework over one of the pulleys at one corner of said

platform across said platform and over one of the pulleys at a diagonally opposed corner of said platform and down to the lower portion of said framework, and means for adjusting the length of said cables.

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