June 2, 1931. W. K. LIGGETT 1,808,237

PORTABLE CONVEYER

Filed March 15, 1922 2 Sheets-Sheet 1

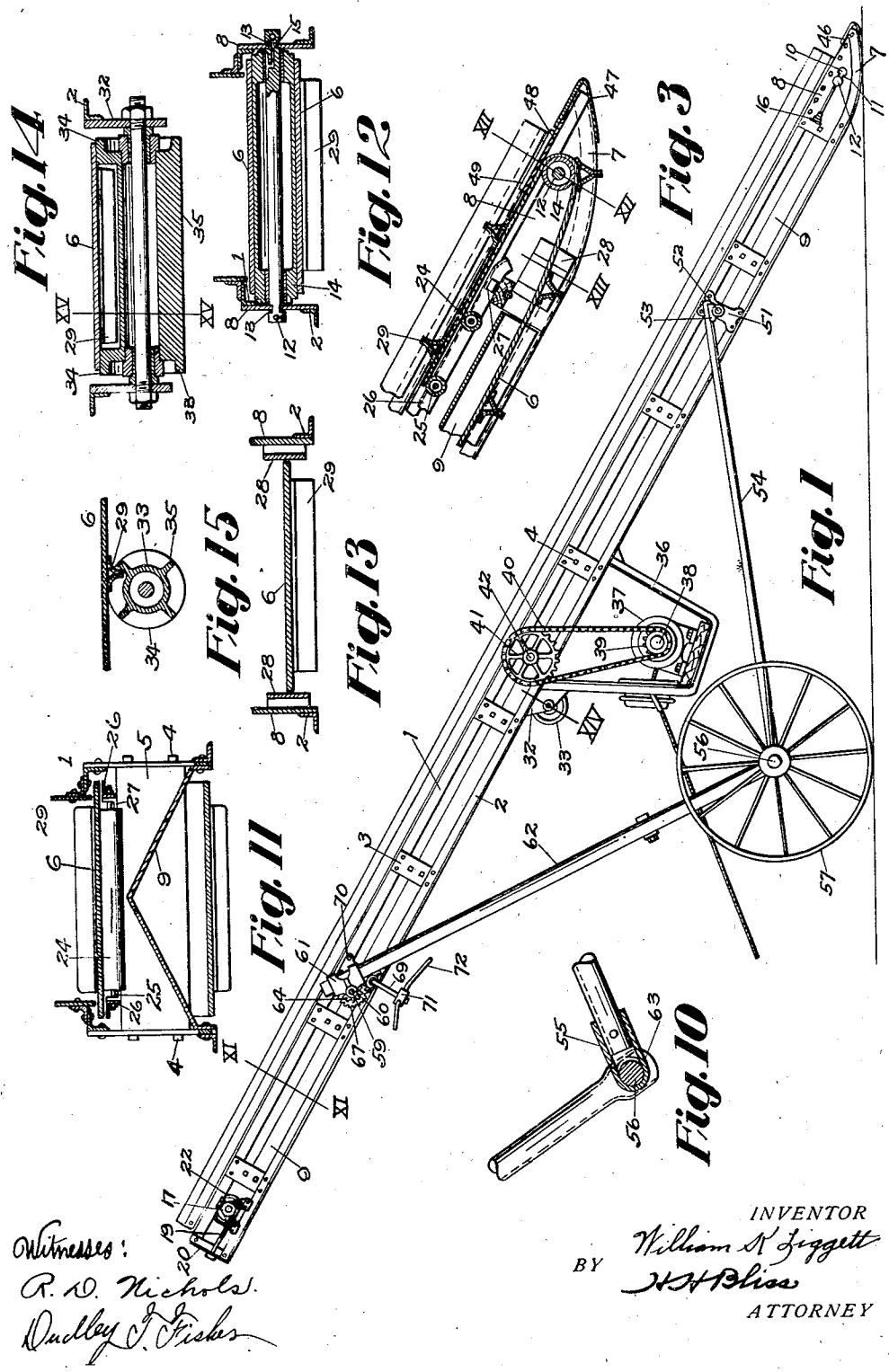

Fig. 14

Fig. 12

Fig. 3

Fig. 15

Fig. 13

Fig. 1

Fig. 11

Fig. 10

Witnesses:
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Filed March 15, 1922 2 Sheets-Sheet 2

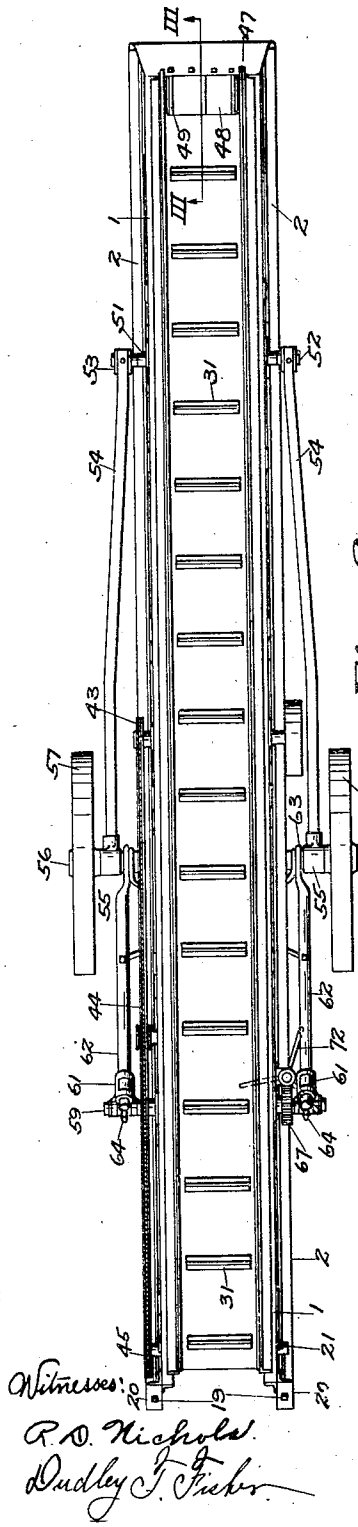

Fig. 2

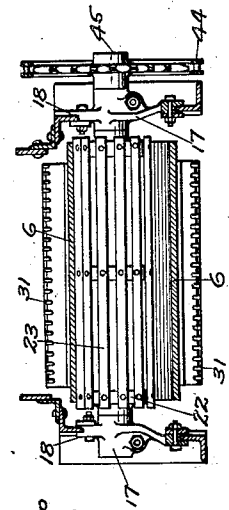

Fig. 5

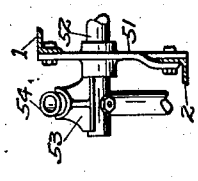

Fig. 9

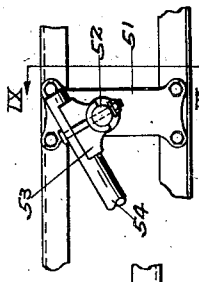

Fig. 8

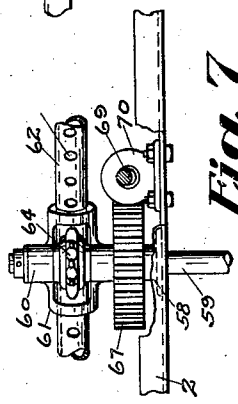

Fig. 7

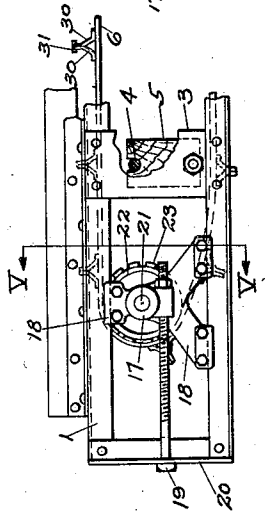

Fig. 4

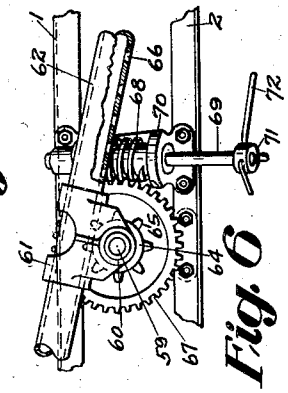

Fig. 6

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Patented June 2, 1931 1,808,237

UNITED STATES PATENT OFFICE

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PORTABLE CONVEYER

Application filed March 15, 1922. Serial No. 543,984.

The present invention relates to certain new and useful improvements in portable conveyers, and particularly to that class of conveyers which is adapted to the handling of either bulk or package material, and which can be conveniently and expeditiously positioned and adjusted relative to the material which is to be handled.

The especial object of this invention is to provide a conveyer of the class described having improved mechanism whereby the angle of inclination of the conveyer may be conveniently adjusted.

Another object is to provide an improved conveyer element adapted to transport either bulk or package material up relatively steep inclines without slippage.

Another object is to provide improved mountings for the conveyer element adapted to prevent the accretion of sticky material upon the surfaces of the conveyer belt.

These and other objects will appear in the following specification, reference being had to the accompanying drawings, of which

Fig. 1 is a side elevation of the preferred embodiment of my invention.

Fig. 2 is a plan view of the machine illustrated in Fig. 1.

Fig. 3 is a fragmentary sectional view taken along the line III—III of Fig. 2.

Fig. 4 is a fragmentary side elevation on an enlarged scale of the delivery end of the conveyer.

Fig. 5 is a sectional view taken along the line V—V of Fig. 4.

Fig. 6 is a fragmentary side elevation on an enlarged scale of the conveyer adjusting mechanism.

Fig. 7 is a plan view, looking upward, of the devices shown in Fig. 6.

Fig. 8 is a fragmentary side elevation of the connection of the lower end of the conveyer adjusting mechanism with the conveyer frame.

Fig. 9 is a fragmentary sectional view taken along the line IX—IX of Fig. 8.

Fig. 10 is a detail of the axle attachment.

Fig. 11 is a sectional view taken along the line XI—XI of Fig. 1.

Fig. 12 is a sectional view taken along the line XII—XII of Fig. 3.

Fig. 13 is a fragmentary sectional view taken along the line XIII—XIII of Fig. 3.

Fig. 14 is a fragmentary sectional view taken along the line XIV—XIV of Fig. 1.

Fig. 15 is a cross sectional view taken along the line XV—XV of Fig. 14.

Like numerals refer to similar parts in the several figures.

As shown in the drawings my improved portable conveyer comprises a frame made up of two pairs of longitudinally extending angle bars 1 and 2 which are connected together by the upright plates 3 to which they are securely riveted. The side frames thus formed are clamped by the through bolts 4 to the ends of the transversely extending wooden bolsters 5 thus forming a rigid structure in which the endless conveyer belt 6 is mounted. At the forward end of the conveyer frame the angle bars 2 are curved upwardly to form skids 7 adapted to rest upon the ground, and side plates 8 are riveted to the skids 7 and the angle bars 1 to stiffen the forward end of the conveyer frame. The frame is further stiffened by the transverse plates 9 which are riveted along their lateral edges to the angle bars 2, and these plates extend from bolster to bolster to form a shield above the lower strand of the conveyer belt 6. The plates 9 are folded along their longitudinal center line, and incline upwardly from both edges so as to deflect any material falling from the upper strand of the conveyer belt towards the sides of the machine.

Both of the plates 8 are pierced by circular apertures 10 having rearward slot extensions 11 of somewhat less width than the diameter of the apertures 10. A shaft 12 is adapted to be trust through the apertures 10, and is provided with notches 13 so arranged that when in proper position within the apertures 10 said shaft may be moved rearwardly of the conveyer frame, and the edges of the slots 11 will cooperate with

said notches 13 to hold the shaft from both longitudinal and rotary movement. Journaled upon the shaft 12 is a pulley 14 which constitutes the foot wheel of the conveyer, around which travels the conveyer belt 6, and the strain of the belt upon this pulley serves to hold the shaft 12 in its operative position in the slots 11. Suitable passages 15 are formed in the shaft 12 which communciate with the grease cups 16 affording means to apply lubricant to the journal bearing surfaces of the pulley 14.

At the rearward end of the conveyer frame there are mounted two journal bearings 17 each of which is provided with wings 18 having grooves along their edges adapted to engage and slide upon the edges of the angle bars 1 and 2. Bolts 19 rotatable in suitable apertures of the end angle bars 20 of the conveyer frame, and screw threaded into bosses on the bearing castings 17, afford the means to move the bearings 17 longitudinally of the conveyer frame to tension the conveyer belt 6 in the manner common in conveyer practice. Journaled in the bearings 17 is the head shaft 21 to which are attached the circular flanges 22. To the peripheries of these flanges 22 are attached the spaced apart slats 23 which constitute the bearing face of the head pulley which drives the conveyer belt 6.

When a conveyer such as is above described is used to handle bulk material, it is found that it is not practicable to so thoroughly protect the lower strand of the belt that none of the material may find its way thereto. When the material is sufficiently sticky to adhere to the face of the belt, the pressure of the pulleys over which the belt passes tends to form accretions upon the inner surface of the belt which materially interferes with its satisfactory operation. The tendency to slip over the surface of the driving pulley, which is characteristic of all belts, causes the slats 23 to scrape all such material from the belt, forcing it through the slots between the slats 23 and effectively preventing the formation of such accretions.

The upper run of the conveyer belt is further supported by a plurality of spaced apart idler rollers 24 having spindles 25 journaled in apertures of the longitudinally extending angle bars 26. The bars 26 are supported upon and fastened to the wooden bolsters 5 by angle clips 27. Guide plates 28 are secured to the inner surfaces of the side plates 8 and these are so disposed that they engage the edges of the conveyer belt 6 to insure its traveling centrally of the conveyer frame.

In order that the conveyer may operate at inclinations steeper than the angle of repose of the material upon the belt, it is the common practice to attach, at spaced intervals along the belt, transverse cleats formed of strips of either wood or metal, which are secured to the belt by a single row of rivets disposed along the longitudinal center line of each cleat. When the belt is bent around the relatively small pulleys which are made necessary by the limited space available in such machines, the fine material works under the edges of the cleats, and this material is compressed when the belt passes on to the straight run. This accumulated material under the edges of the cleats puts a very undesirable strain upon the cleat attaching rivets which in time tears the cleats loose from the belt.

To obviate this difficulty I have provided improved cleats 29 formed of two relatively narrow strips 30 of flexible material, such as rubber belting or the like, placed face to face and joined along one of the longitudinal edges by laces 31 or similar suitable fastenings. The opposite edges of the strips 30 are then separated, like a letter A, and these edges are attached to the belt 6 by suitable rivets placed as close to the edges of the strips as is conveniently possible. These strips 30 brace each other to form a cleat of sufficient rigidity to prevent the slippage of material longitudinally of the belt, while being sufficiently flexible to conform to the curvature of the pulleys and thereby prevent the admission of fine material beneath the edges of the cleats.

Journaled in bearings 32 attached to the angle bars 2 is an idler roller 33 arranged to support the lower strand of the conveyer belt 6 midway its length. This idler comprises the discs 34 which are so spaced that they engage the edges of the belt outside the ends of the cleats 29, and the longitudinally extending flanges 35 which are connected with the discs 34 and are of the same radial height. These flanges 35 form pockets in the idler which are of sufficient length and depth to receive the cleats 29, and they contact with the belt to produce vibrations therein which dislodge any fragments of material adhering to its surface.

Depending from the conveyer frame near its center of gravity, is a supporting frame 36 in which is mounted the motor by which the belt 6 is actuated. This motor may be of any preferred type suitable to the conditions under which the machine is operated. For purposes of illustration I have shown an electric motor 37 to the armature shaft 38 of which is fixed a sprocket wheel 39. The sprocket wheel 39 is connected by an endless chain 40 wtih a sprocket wheel 41 attached to the counter shaft 42 which extends transversely through the conveyer frame and is journaled in suitable bearings attached thereto. To the opposite end of the counter shaft 42 is fixed a sprocket wheel 43 which is connected by the endless chain

44 with the sprocket wheel 45 attached to the projecting end of the head shaft 21 to transmit power from the motor 37 to actuate the conveyer belt 6.

At the forward end of the conveyer frame there is provided a shovel nose 46 adapted to be thrust into a pile of material lying upon the ground in front of the machine to facilitate loading said material onto the conveyer. This shovel nose is formed of a steel plate 47 folded on itself and riveted to the skids 7 and the angle bars 1. In order that the cleats 29 may freely pass around the foot wheel 14 the plate 47 terminates at a considerable distance from said foot wheel, and the gap between the shovel nose and the foot wheel is bridged by the flexible apron 48, made of rubber belting or the like, which is attached along the rearward edge of the plate 47 and is adapted to contact with the belt 6 and be lifted by the cleats 29. Stiffening strips 49 are attached to the rearward portion of the apron 48 to counteract its tendency to curl due to the repeated lifting.

Attached to the conveyer frame near its forward end are journal bearings 51 in which is mounted a shaft 52 extending transversely through the conveyer frame. Journaled upon the projecting ends of the shaft 52 are bearing sleeves 53 which are attached to the forward ends of the strut bars 54. The strut bars 54 are preferably of tubular form and have bearing sleeves 55 attached to their rearward ends which engage the axle 56. On the axle 56 are mounted the ground engaging wheels 57 adapted to support the machine for transportation. Journal bearings 58 are attached to the conveyer frame near its rearward end, and in these bearings is journaled a second transverse shaft 59 upon the projecting ends of which are journaled the bearing castings 60. On these bearing castings 60 are formed transversely extending sleeve bearings 61 in which are longitudinally slidable the tubular strut bars 62. At the lower ends of the strut bars 62 are formed eyes 63 which engage the axle 56 adjacent the bearing sleeves 55. Fixed to the transverse shaft 59 are two star wheels 64, the rays 65 of which engage the spaced apertures 66 formed in the strut bars 62, and constituting pinions and racks for the longitudinal movement of the strut bars 62 relative to the bearing sleeves 61. A worm wheel 67 is attached to the shaft 59 and this worm wheel is engaged by a worm 68 fixed to the upper end of a substantially vertical shaft 69 supported in suitable bearings 70 fixed to the conveyer frame. To the lower end of the shaft 69 is secured a hub 71 from which radiates the operating levers 72 convenient to the hand of the operator and affording means for the rotation of the star wheels 64 and the consequent vertical adjustment of the conveyer relative to the axle 56. As the worm 68 is of the non-overhauling type it serves not only to adjust the conveyer relative to the axle but to lock these parts in the preferred position of angular adjustment.

I claim:—

1. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of transverse cleats attached at spaced intervals to the belt, each cleat being made of yielding material having one longitudinal edge secured to the belt and the other longitudinal edge extending outwardly from the belt.

2. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of a power actuated head shaft journaled in suitable bearings at one end of the frame, concentric discs attached to the shaft, and spaced apart longitudinally extending slats attached to the periphery of the discs and engaging the belt as and for the purpose set forth.

3. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of transverse cleats attached at spaced intervals to the belt each cleat comprising a fold of flexible material attached at two of its longitudinal edges to the belt as and for the purpose set forth.

4. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, transverse cleats attached at spaced intervals to the belt each cleat comprising two relatively narrow oppositely and transversely curved strips of flexible material joined at their adjacent edges and attached to the belt along their separated edges as and for the purpose set forth.

5. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, transverse cleats attached at spaced intervals to the belt each cleat comprising two relatively narrow oppositely and transversely curved strips of flexible material laced together along their adjacent edges and attached to the belt along their separated edges as and for the purpose set forth.

6. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of an idler roller adapted to support the lower strand of the belt and having ribs adapted to contact with the belt to produce vibrations therein as and for the purpose set forth.

7. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of an idler roller adapted to support the lower strand of the belt and comprising two discs adapted

to engage the face of the belt adjacent its edges, and flanges extending between the discs and adapted to contact with and vibrate the belt as and for the purpose set forth.

8. In a machine of the class described, the combination with an elongated self-contained conveyer, of an axle positioned beneath the conveyer substantially midway its length and connected thereto by forwardly extending rods pivotally connected to the conveyer frame, strut bars pivotally connected to the axle and longitudinally slidable in bearings attached to the conveyer frame near its rearward end, and means to move the strut bars in the bearings as and for the purpose set forth.

9. In a machine of the class described, the combination with an elongated self-contained conveyer, of an axle positioned beneath the conveyer substantially midway its length and connected thereto by forwardly extending rods pivotally connected to the conveyer frame, strut bars pivotally connected to the axle and longitudinally slidable in bearings attached to the conveyer frame near its rearward end, racks formed on the strut bars, pinions on the conveyer frame, and means to rotate the pinions to move the strut bars in the bearings as and for the purpose set forth.

10. In a machine of the class described, the combination with an elongated self-contained conveyer, of an axle positioned beneath the conveyer substantially midway its length and connected thereto by forwardly extending rods pivotally connected to the conveyer frame, strut bars pivotally connected to the axle and longitudinally slidable in bearings attached to the conveyer frame near its rearward end, racks formed on the strut bars, pinions on the conveyer frame, and self locking means to rotate the pinions to move the bars in the bearings and to hold them against such movement as and for the purpose set forth.

11. In a machine of the class described, the combination with an elongated self-contained conveyer, of an axle positioned beneath the conveyer substantially midway its length and connected thereto by forwardly extending rods pivotally connected to the conveyer frame, strut bars pivotally connected to the axle and longitudinally slidable in bearings attached to the conveyer frame near its rearward end, racks formed on the strut bars, pinions carried by a shaft supported in the conveyer frame, a worm wheel attached to the shaft, a worm adapted to engage the worm wheel, and means to rotate the worm to cause the rotation of the pinions and the movement of the strut bars in the bearings as and for the purpose set forth.

12. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of transverse cleats attached at spaced intervals to the belt, each cleat being made of resilient yielding material and having one edge secured to the belt and the other longitudinal edge extending outwardly therefrom.

13. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of transverse cleats attached at spaced intervals to the belt, each cleat comprising a pair of yielding strips attached to said belt and arranged to converge outwardly of the belt.

14. In a machine of the class described, the combination with an elongated frame and an endless belt mounted therein, of means adapted to support the lower strand of the belt and including means to vibrate the same for the purpose set forth.

15. In a machine of the class described, the combination with an elongated conveyer frame, of an axle positioned beneath the conveyer frame substantially midway its length, a forwardly extending support connecting said axle with the forward end of said frame, and a rearwardly extending support pivotally connected to said axle and slidably and adjustably connected to the rear end of said frame, and said forwardly and rearwardly extended supports being connected to opposite ends of said frame at substantially equal distances from the ends thereof at all times.

16. In a machine of the class described, the combination of a conveyer frame, an axle positioned beneath the same and connected thereto by forwardly extending members pivotally connected to said conveyer frame, a strut bar pivotally connected to said axle and slidably connected to said frame, and means for releasably retaining said sliding connection in any of its positions.

17. In a machine of the class described, the combination with an elongated conveyer frame, of an axle positioned beneath the frame substantially midway its length, struts extending in opposite directions from said axle, one of said struts being pivotally connected to said frame, the other strut having a pivotal and sliding connection with said frame, and said pivotal connections of said struts with the frame being arranged at substantially equal distances from opposite ends thereof at all times regardless of the inclination of the frame and struts.

In testimony whereof, I affix my signature.

WILLIAM K. LIGGETT.