May 17, 1949. L. V. GROVER 2,470,615

SANDER

Filed April 4, 1947 3 Sheets-Sheet 1

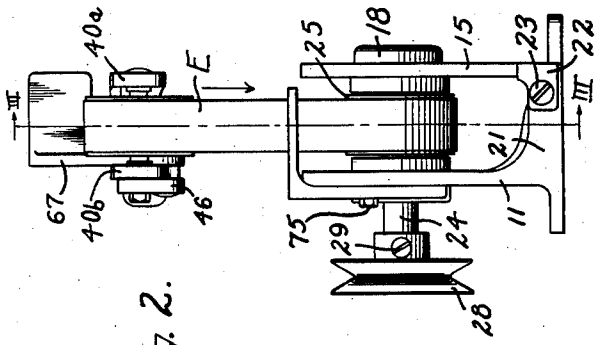

Fig. 2.

Fig. 1.

Inventor

LYNDON V. GROVER.

by The Firm of Charlesworth & Hills Attys.

May 17, 1949. L. V. GROVER 2,470,615

SANDER

Filed April 4, 1947 3 Sheets-Sheet 2

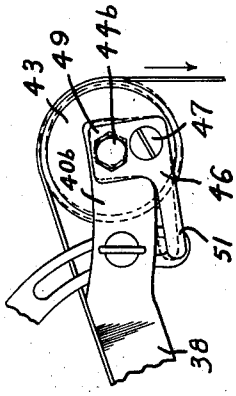

Fig. 5.

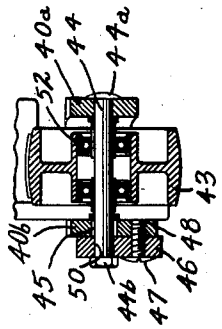

Fig. 4.

Fig. 3.

Inventor
LYNDON V. GROVER.

by The Firm of Charles W. Hills Attys.

May 17, 1949. L. V. GROVER 2,470,615

SANDER

Filed April 4, 1947 3 Sheets-Sheet 3

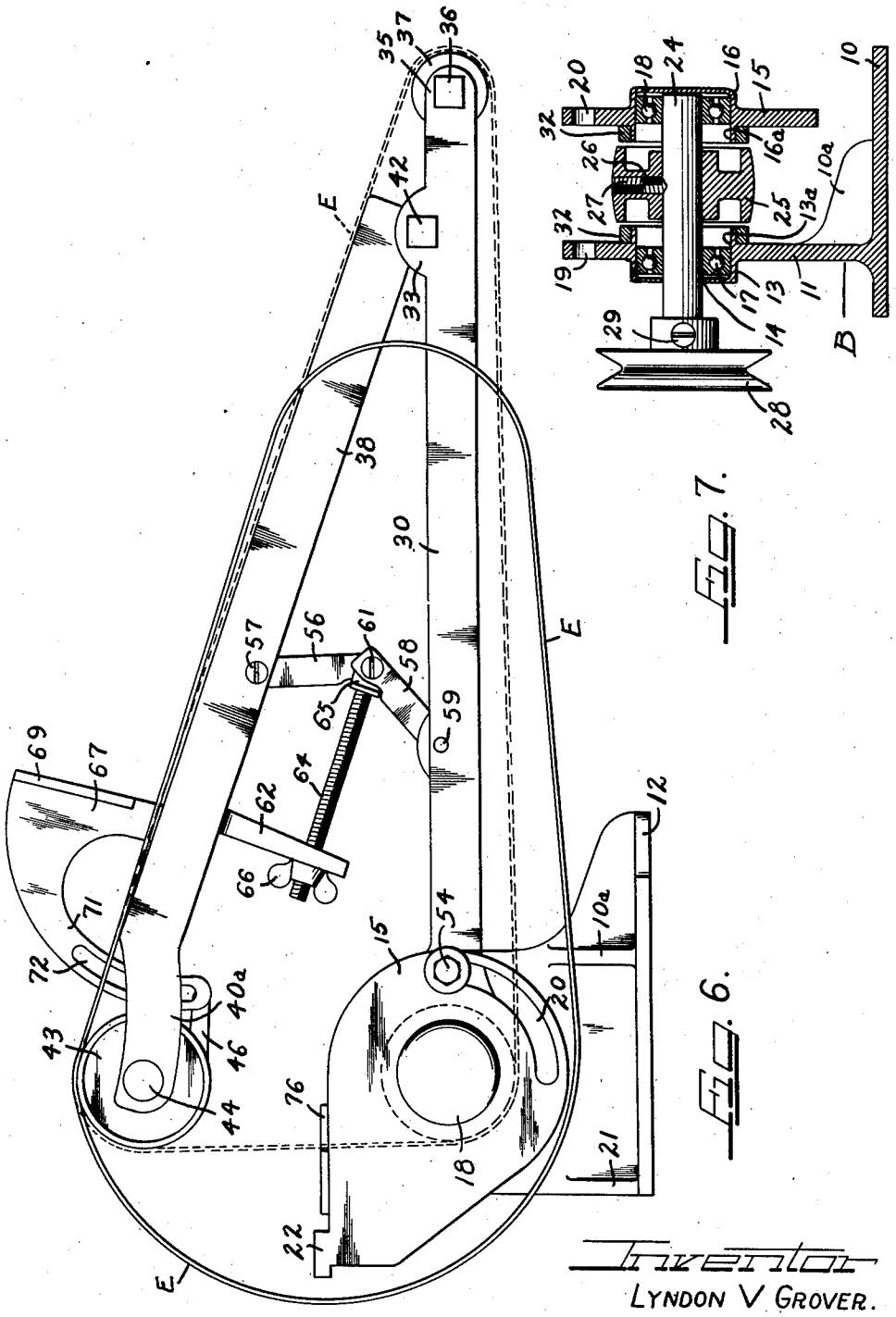

Fig. 7.

Fig. 6.

Inventor
LYNDON V GROVER.

by The Firm of Charlesw Hills Attys.

Patented May 17, 1949

2,470,615

UNITED STATES PATENT OFFICE

2,470,615

SANDER

Lyndon V. Grover, Los Angeles, Calif.

Application April 4, 1947, Serial No. 739,304

5 Claims. (Cl. 51—135)

1

The present invention relates generally to a sander, and more particularly to a bench sander utilizing a narrow abrasive belt which is easily adjusted to several different positions to readily be accommodated to the particular characteristics of workpieces being sanded.

According to the present invention, the sander includes a base member having a relatively small area of contacts with a bench. An endless belt supporting device or structure is pivoted to the base to swing in vertical direction. The belt supporting device or structure includes two long arms pivoted together adjacent similar ends, in V-shape in side elevation. Means are provided for angularly adjusting said arms to vary the distance between the other ends of the same. The other end of one arm is mounted on a pivotal connection between the base and the device while the other end of the other arm is spaced from the said other end of said one arm a distance determined by the relative angular adjustment of the two arms.

A shaft extends through the pivotal connection between the base and the belt supporting device and carries a pulley keyed to it which constitutes the driving pulley for the belt.

A second pulley is journaled in the remote end of said one arm while a third pulley is journaled in the said other end of said other arm.

An endless belt is trained about said pulleys. The construction presents a belt-supporting device or structure which is triangular in side elevation, the distance between the said other ends of said arms is short as compared to the lengths of the arms.

Novel means for angularly adjusting the arms are provided.

It is therefore an object of the present invention to provide a bench sander utilizing an endless belt, and embodying novel belt tension control means.

A further object of the present invention is to provide a bench sander utilizing an endless belt, with novel means for tracking the belt to prevent its displacement from the pulleys.

A further object of the present invention is to provide a sander including a belt-supporting device comprising two arms pivotally connected for scissors like action, together with novel means for angularly adjusting the arms.

Another and yet further object of the present invention is to provide a belt sander of simple construction, adapted for power operation, and having means for quick replacement of a belt in the event it becomes worn out or broken.

2

Another and yet further object of the present invention is to provide a sander including a belt-supporting device triangular in side elevation, and angularly adjustable about a fixed axis to thereby make any of the belt flights available for sanding work pieces.

The invention has for an additional object the provisions in a sander utilizing and endless belt, of a belt supporting device including two relatively long arms pivoted together near similar ends and arranged in elongated triangular relationship so that the apex of the triangular structure may enter inside work pieces for sanding such insides.

An additional object of the present invention is to provide a sander having a long, tapered belt-supporting structure generally triangular in side elevation with one roller at the apex end and two rollers at the base end, which two rollers are laterally spaced, an endless belt trained about said rollers, together with means whereby the belt-supporting structure may be swung about an axis of one of the rollers in a vertical plane to present any of the three flights in convenient position for sanding with the selected flight, together with means for securing the structure in adjusted position.

An additional object of the present invention is to provide a sander of small size which may be quickly and easily adjusted to various positions for sanding various articles and in which novel means are employed for belt-tension adjustment.

The above, other and further objects of the present invention will be apparent from the following description and accompanying drawings.

A form of sander chosen to exemplify the present invention is illustrated on the accompanying drawings, and the views thereof are as follows:

On the drawings:

Figure 1 is a side elevational view of the sander showing in full lines the belt supporting structure in horizontal position and in dotted lines the belt supporting structure in vertical position;

Figure 2 is an end view of the sander looking at the left end of Figure 1;

Figure 3 is a vertical sectional view through the sander with the belt supporting structure in horizontal position and taken in the plane of line III—III of Figure 3;

Figure 4 is a fragmental sectional view taken in the plane of line IV—IV of Figure 3;

Figure 5 is a fragmental elevational view of an end of one of the arms and a roller supported by said ends, taken from the side of the arm opposite to that shown in Figure 1;

Figure 6 is a side elevational view of the sander, with the belt-supporting structure in horizontal position and showing the relationship of the parts when applying a belt to or moving a belt from the belt-supporting structure, the dotted lines representing the belt in working position; and

Figure 7 is a vertical sectional view, with parts in elevation, taken in the plane of line VII—VII of Figure 1.

As shown on the drawings:

Referring to the drawings, the illustrated sander comprises a base, designated generally as B and a belt supporting device or structure designated generally as C.

The base B is illustrated as formed as a casting with a bottom 10, and an integral upstanding side member 11. The side member 11 is formed with a cup 13 the bottom of which cup, shown as vertical in Figure 7, is apertured at 14 centrally of the cup. A bearing plate 15 is formed with a cup 16. A ball bearing 17 is installed in the cup 13 of the side member 11, while a ball bearing 18 is installed in the cup 16 of the bearing support. An arcuate slot 19 is formed in the side member 11, while a corresponding arcuate 20 is formed in the side plate 15.

Reinforcing the side member 11 with respect to the base 10 are webs 10a and 21. The bearing-support 15 has an angular lug 22 disposed to overlap the web 21 when the bearing support is in operative position. A screw 23 connects the lug 22 with the web 21 to hold the bearing support 15 in operative position, which is that shown in full lines in Figure 1.

A shaft 24 is supported by the ball bearings 17 and 18, the shaft entering the aperture 14 in the cup 13 of the side member 11 and abuts the interior of the bottom of the cup 16 of the bearing support 15. A pulley 28, having a V-groove in it is fastened to the projecting end of the shaft by means of a set screw 29.

The pulley 28 is adapted to be connected by a V-belt with a source of power for actuating the sander.

The belt-supporting device or structure as herein illustrated includes two arms pivoted together adjacent similar ends. These arms will herein for convenience be designated the lower arm and the upper arm.

The lower arm 30 is illustrated as formed as a channel with a web 31 and upstanding flanges 32. The flanges 32 have projections 33, adjacent their outer ends, which are apertured to receive a pivot pin.

The lower arm 30 is at its inner end swingably mounted on the base B. To so mount the lower arm 30, the inner ends of its flanges are enlarged and apertured to surround the flange 13a of the cup 13, and the flange 16a of the cup 16 of the bearing support 15, as illustrated in Figure 7. As may be observed in Figure 3 the web 31 of the lower arm 30 is not co-extensive with the flanges, but stops short of the ends of the flanges, and may be apertured as at 31a, to reduce weight. The flanges 32 at the outer end 35 of the lower arm 30 are apertured to receive a pin 36 as a support for a pulley 37. The pin 36 may take the form of a square-headed bolt in which event there will be a nut on the other end of a bolt.

The upper arm 38 is illustrated as formed as a channel member with a web 39 and flanges 40, which flanges depend from the web 9, as shown in Figure 3, that is extend toward the flanges 32 of the lower arm 30. The width of

the upper arm 38 is less than the width of the lower arm 30 by an amount sufficient to enter between the projections 33 of the flanges 32 of the lower member 30, as may be noted in Figures 1, 3 and 6.

The outer ends of the flanges 40 are formed with projection 41 which enter between the projections 33 of the flanges of the lower arm 30. A pivot pin 42 passes through registering apertures in the projections 33 and 41 pivotally connecting the arms 30 and 38 adjacent their outer ends. The pivot pin 42 may take the form of a bolt having a square head at one end and a nut applied to the other end to connect the two arms together in working relation.

Referring to Figures 3 and 5, it will be noted that the flanges 40 at the inner end of the upper arm 38 are deflected from the flanges at an obtuse angle and that the web is absent from the deflected end portions of the flanges. A pulley 43 is supported between the end portions of the flanges 40 by a pivot pin 44.

Referring to Figure 4, it will be noted that one of the end flanges is designated as 40a and the other as 40b. The flange 40a is apertured to receive the pin 44 with a snug fit. The end flange 40b is apertured at 45, the diameter of which aperture is greater than the diameter of the pin 44 so that the pin may move within the aperture. The pin may take the form of a round-headed bolt as shown in Figure 4 wherein 44a designates the head and a nut 44b is applied to the other end of the bolt to hold the various parts in operative relationship.

A crank 46 is pivoted on a screw 47 which is threaded into a suitable aperture 48 in the end flange 40b. The crank 46 has an arm 49 apertured at 50 to receive the pin 44, as shown in Figure 4. Another arm 51 is formed as a part of the crank and is disposed at an angle to the arm 49, as illustrated in Figure 5, to constitute a handle to shift the crank. By loosening the screw 47, the crank may be oscillated on the screw as a center, which oscillation shifts the pin 44 within the aperture 45 of the flange 40b to thereby tilt the pin 44. When the pin has been tilted to a desired position, it is secured in that position by tightening the screw 47.

The pin carries the pulley 43, which pulley is supported on ball bearings 52 to reduce friction to a minimum. Thus, when the shaft 44 is tilted as described, the pulley 43 will be correspondingly tilted and thus serve to maintain the tracking of the endless belt which passes around the pulley in operative position and prevents its accidental moving off of one of the pulleys.

For securing the belt-carrying device or structure in desired angular position with respect to the base, in the horizontal position shown in full line in Figure 1, as well as in the vertical position as shown by dotted line in this figure, and in any intermediate position, screws 53 and 54 are provided. Screw 53 is disposed through the arcuate slot 19 in the side member 11 where it is threaded into an aperture 55 in adjacent flange 32 of the lower arm. The screw 54 is disposed extending through the arcuate slot 20 in the bearing support 15 and is threaded into a threaded aperture in the adjacent flange 32 of the lower arm. These screws are loosened to enable swinging of the belt supporting structure or device and tightened to holding structure in desired angular position.

For relatively angularly adjusting the lower and upper arms 30 and 38 respectively, a toggle

mechanism is used. The toggle mechanism illustrated includes a link 56 pivoted at 57 to the flanges 40 of the upper arm 38. A second toggle link 58 is pivoted at 59 to upstanding lugs 60 shown as integral parts of the web 31 of the lower arm 30. A bolt 61 connects the adjacent ends of the links as shown. A post 62 formed integrally with the upper arm 38 extends inwardly thereof towards the lower arm and is provided with an aperture 63. An elongated bolt 64 is provided with a head 65 which is apertured to receive the pin 61, connecting the toggle links. A thumb screw 66 on the bolt 64 contacts the face of the post 62 which is remote from the toggle. As the thumb screw 66 is turned in one direction, the bolt 64 is moved to the left, as viewed in Figure 3, to separate the arms 30 and 38 as is obvious. When the thumb screw is rotated in the opposite direction, the bolt 64 will be moved to the right to draw the arms 30 and 38 toward each other. Manipulation of the toggle, in the manner described, will thus angularly adjust the arms 30 and 38 to tension the endless belt which passes about the pulleys carried by said arms.

E is an endless abrasive belt passing about the pulleys 25, 37 and 43, as shown in Figure 3.

The sander of the present invention is herein illustrated as one arranged to take a belt one inch in width and approximately 44 inches in length. This type of belt is available on the market. The endless belt is on its inside imprinted with an arrow to designate the direction of belt travel when applied to the sander.

Arrows in Figures 1 and 3 designate the direction of travel of the belt.

In order to apply an endless belt E to the sander, as illustrated, the screw 23 is removed from the lug 22 of the bearing support 15 and the screw 54 loosened. The bearing support 15 is then swung in clockwise direction from the operative position shown in Figure 1 to the inoperative position shown in Figure 6. The toggle is then manipulated to move the upper arm 38 toward the lower arm 30, a distance sufficient so that the belt E may be applied about the pulleys 43 and 25 and then about the pulley 37. When the belt has been applied as directed, the bearing plate 15 is returned to normal position, which is that shown in Figure 1, and the screw 23 inserted to fasten the bearing support 15 to the web 21 of the base. The toggle mechanism is then manipulated to move the upper arm 38 away from the lower arm 30 a distance sufficient to impose proper tension on the belt E.

Should the belt break or wear out, it may be removed as described and a new one substituted.

Referring to Figure 3, it will be observed that the web 39 of the upper arm 38 serves as a backing or platen underlying the flight of the belt between the rollers or pulleys 37 and 43.

There are two work supports shown in the drawings, one of them, 67, is carried by the upper arm 38 and the second of them, 68, is secured to the base B.

The work support 67 may be formed as a casting or stamping and includes a platform 69 which spans the belt in the flight between the rollers 37 and 43, with its lower margin spaced from the belt, as clearly shown. The work support 67 is pivoted to one of the flanges 40 of the upper arm 38 by a suitable pivot 70 which may be in the form of a screw. The side portion of the work support is preferably formed

with an arcuate arm 71 having an arcuate slot 72 in it. A bolt 73 projects through a suitable aperture in the portion 40b of one of the side flanges of the upper arm 38 and through the slot 72. Inwardly of the arm 71 a nut 74 is threaded onto the bolt 73 to tighten or loosen it with respect to the arm 71. When loosened the work support 67 may be adjusted about the pivot 70, and when tightened holds the work support in an adjusted position with respect to the arm 38. Removal of the pivot pin 70 and the bolt 73 enables removal of the work support 67 from the arm if occasion for so doing should arise.

The work support 68 is removably attached to the base B by means of a screw 75 passing through a suitable aperture in the work support and threaded into the side member 11 of the base, as shown in Figure 3. The table 76 of work support 68 has a horizontal surface adjacent the flight of the belt between the rollers 43 and 25.

When the belt-supporting device or structure is swung from the full line position of Figure 1 to the dotted line position it is, of course, necessary to remove the work support 68 from the base.

When the belt-supporting device or support is in a horizontal position, that is the position shown by full lines of Figure 1, the flight of the belt between the rollers 37—43 or rollers 43—25 may be utilized for sanding purposes. A work piece might be held in contact with the belt overlying the web 39 of the upper arm 38, and resting against the work support 67, for sanding a surface of said work piece.

A work piece might be supported on the table 76 of the work support 68 and sanded by the flight of the belt between the rollers 43 and 25.

When it is desired to utilize the flight of the belt between the rollers 25 and 37, then the belt-supporting device or structure would be moved to substantially vertical positions, as shown by dotted lines in Figure 1.

After the belt E has been applied about the rollers 43, 25 and 37, in the manner heretofore described, and the belt tightened by manipulation of the toggle, the sander is ready for use.

In operating the sander of the present invention, the operator determines what one of the three flights of the belt will be used. With the belt-supporting structure or device in horizontal position, that is the position shown in full length in Figure 1, the operator may use either of two flights of the belt, that is the flight between the pulleys and rollers 37—43 or the flight between the pulleys or rollers 43—25.

When it is desired to sand the inside of work pieces the belt-supporting device or structure may be moved to elevated position, and the piece fitted over the apex of the device or structure whereupon the operator may utilize the flights between the rollers 37—43 or the flight between the rollers 25—37. It is quite apparent that a work piece being sanded on the flight between the rollers 25—37 slight pressure must be used as otherwise there might be the probability of breaking the belt. When sanding against the flight of the belt between the rollers 37—43 greater pressure may be applied as this flight of the belt is for the major portion of its length supported or backed by the web or platen 39 of the upper arm 38.

During the operation of the sander, if per chance the belt loosens, then the tension may be increased by proper manipulation of the toggle.

The tiltable support of the roller or pulley 43 makes it possible to maintain the tracking of the belt evenly over the several rollers or pulleys.

The belt engaging surfaces of the roller are crowned slightly to prevent any tendency of the belt to run off of any of the rollers while in use, and also for effecting better driving relation between the belt and pulleys.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A sander including two arms pivoted together adjacent similar ends, means connecting said arms to relatively adjust them with scissors-like action, pulleys on said arms, an endless belt trained about said pulleys, and means carried by one of said arms underlying said belt to provide a backing surface for the belt, said adjusting means including two toggle links connected together at similar ends and at their other ends pivotally connected respectively to said arms, a bolt connected at one end to the pivotal connection of said links to each other, a support as a part of one arm receiving said bolt and means threaded on said bolt and bearing against said support to effect movement of the pivotal connection of said links towards and away from said support to thereby vary the angular adjustment of said arms.

2. A sander including two arms of substantially equal length pivoted together adjacent similar ends, means connecting said arms to relatively adjust them with scissors-like action, pulleys on said arms, work supporting means carried by said arms, and an endless belt trained about said pulleys, said adjusting means controlling the tension of said belt, said adjusting means including two toggle links connected together at similar ends and at their other ends pivotally connected respectively to said arms, a bolt connected at one end to the pivotal connection of said links to each other, a support as a part of one arm receiving said bolt and means threaded on said bolt and bearing against said support to effect movement of the pivotal connection of said links towards and away from said support to thereby vary the angular adjustment of said arms.

3. A supporting structure for an endless belt comprising two arms of substantially equal length pivoted together adjacent similar ends, three pulleys on said arms for receiving an endless belt, an endless belt trained about said pulleys, means for angularly adjusting said arms to tension the belt, a base supporting said device, and means for driving one of said pulleys to move the belt, one of said arms underlying said endless belt to provide a work support said adjusting means including two links connected together at similar ends and at their other ends pivotally connected respectively to said arms, a bolt connected at one end of the pivotal connection of said links to each other, and a support as a part of one arm receiving said bolt and a wing nut threaded on said bolt and bearing against said support whereby as the nut is rotated it will move the pivotal connection of said links relative to said support to thereby vary the angular adjustment of said arms.

4. In a sander, a supporting device for an endless belt comprising two arms of substantially equal length pivoted together adjacent similar ends and movable towards and away from each other with scissors-like action, pulleys on said arms, an endless belt trained about said pulleys, and means for angularly adjusting said arms including two links connected together at similar ends and at their other ends pivotally connected respectively to said arms, a bolt connected at one end of the pivotal connection of said links to each other, a support as a part of one arm receiving said bolt and a nut threaded on said bolt and bearing against said support whereby as the nut is rotated it will move the pivotal connection of said links toward and away from said support to thereby vary the angular adjustment of said arms and the tension of said belt.

5. A sander including a base, an endless belt carrying device pivotally connected to said base and including two arms pivoted together about an axis remote from the pivotal connection of said device to said base, means connecting said arms to effect scissors-like action of the same, pulleys on said arms, a driving pulley mounted on said pivotal connection of the device to the base, means for driving said last mentioned pulley, and an endless abrasive belt trained about said pulley, said arms, pulleys and belt cooperating to define three separate belt flights, said connecting means including two links connected together at similar ends and having their other ends pivotally connected respectively to said arms, a bolt connected at one end to the pivotal connection of said links to each other, and a pivot as a part of one arm receiving said bolt and a nut threaded on said bolt and bearing against said pivot, whereby movement of the pivotal connection of said links relative to said support is effected by rotation of said nut to thereby control the tension of the belt with respect to the pulleys, said arms, pulleys and connecting means being pivotable about said shaft through an arc of approximately 90°, so that each one of said belt flights may be employed in a horizontal, vertical or intermediate position.

LYNDON V. GROVER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
266,257	Hanson et al.	Oct. 17, 1882
398,497	Currier	Feb. 26, 1889
462,185	Wilson et al.	Oct. 27, 1891
681,636	Furber	Aug. 27, 1901
747,699	Gough	Dec. 22, 1903
894,851	Oakley	Aug. 4, 1908
1,042,354	Kroeze	Oct. 22, 1912
1,049,214	Drury	Dec. 31, 1912
1,191,045	Verwer	July 11, 1916
1,356,338	Clarke	Oct. 19, 1920
1,589,196	McCarty	June 15, 1926
1,621,931	Johnson	Mar. 22, 1927
1,635,399	Fischer	July 12, 1927
1,701,814	Maddox	Feb. 12, 1929
1,749,898	Ward	Mar. 11, 1930
2,282,658	Kneisley	May 12, 1942

FOREIGN PATENTS

Number	Country	Date
616,303	Germany	July 25, 1935