June 25, 1963 E. MURSCHEL 3,094,819

SANDING MACHINE

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Fig. 1

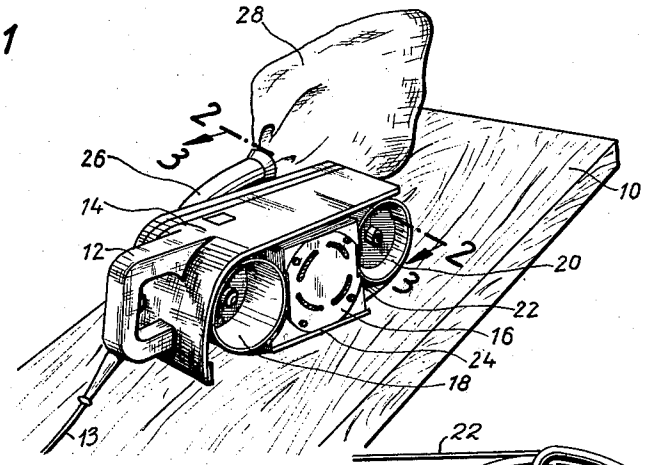



Fig. 9a

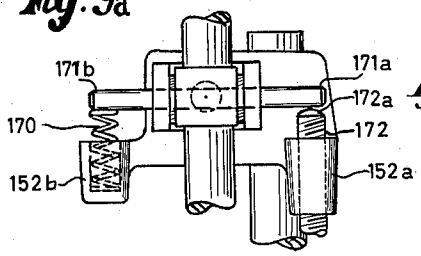



Fig. 5

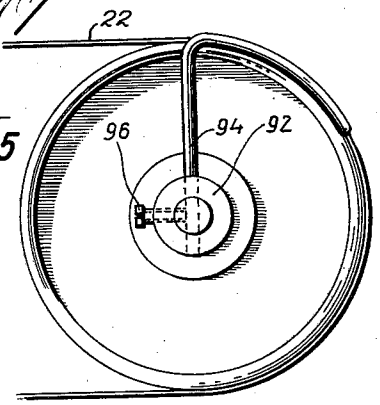



Fig. 7

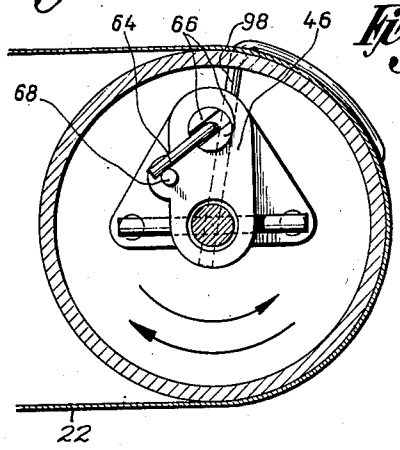
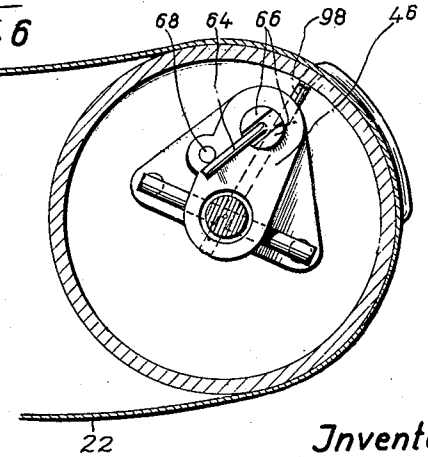



Fig. 6




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Fig. 2

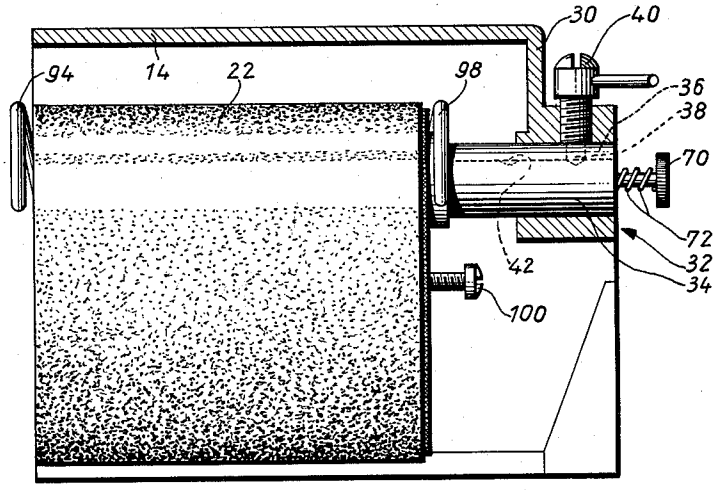



Fig. 8

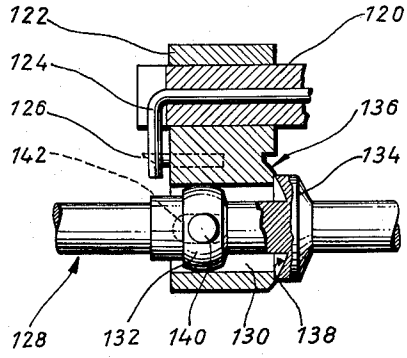
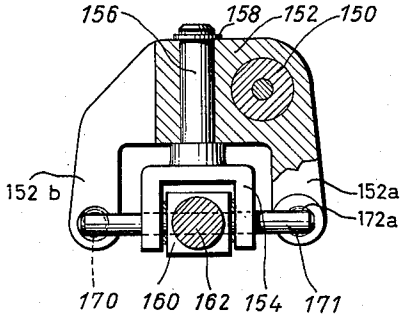



Fig. 9




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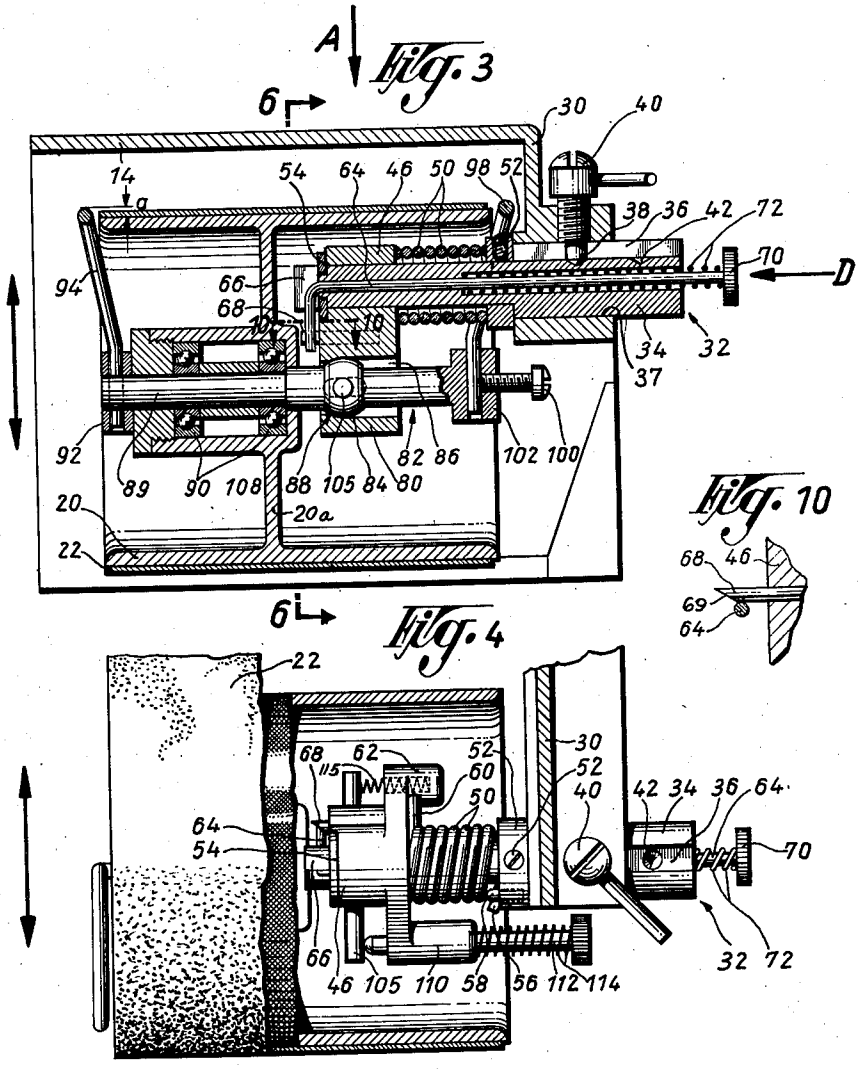
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United States Patent Office 3,094,819 Patented June 25, 1963



3,094,819

# SANDING MACHINE

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17 Claims. (Cl. 51—170)

This invention relates in general to sanding machine construction and in particular to a new and useful hand belt sander having improved means for adjusting the tensioning and the run of the belt automatically.

The present invention is an improvement over previous belt sanding machine constructions, particularly in respect to the means for mounting the tensioning roller to permit easy adjustment thereof at a location within the roller. Such means permit adjustment both in outward and inward tensioning directions and in directions along the roller axis. The inventive construction also provides improved means for insuring guidance of the belt from the driving roller over the tensioning roller.

With prior art machines of this type it is essential that there is a large free space between rollers for the adjusting devices. This, for example, applies to machines which are driven by flexible shafts. In a hand belt sander, however, it is desirable that a driving motor be placed between the driving and tensioning rollers and hence there is no space for any adjustment means.

In accordance with the present invention there is provided an improved belt sander construction which includes the housing frame having handle means thereon which supports a central motor and a driving roller at one end thereof and a tensioning roller adjustably mounted at the other end thereof. The tensioning roller is advantageously supported from the housing on an adjustable pin assembly which includes means for biasing the tensioning roller in a direction outwardly to tension an endless sanding belt directed thereover whenever the pin assembly is arranged in this manner. The outward tensioning may be easily removed from the tensioning roller by means of a control pin which is arranged to shift a rocking lever supporting the bearings of the tensioning roller so that a biasing spring no longer acts thereon to force the roller in an outward direction tensioning the sanding belt.

This inventive construction includes a rocking lever construction supporting the shaft of the tensioning roller which permits both the outward and inward movement of the roller for the purpose of tensioning the belt and also permitting the axial adjustment of the shaft for the purposes of displacing the tensioning roller laterally in those instances where it is desirable to adjust the run of the belt, such as for diagonal sanding, for example.

The inventive device permits easy changing of the belt by depressing a control pin to remove the tension acting on a roller through a torsion spring arranged in the pin assembly. The rocking lever carrying the tension roller shaft may then be swung easily backwardly with the roller bearings and the tension roller to permit easy removal of the sanding belt. The improved construction includes means for adjusting the transverse position of the tensioning roller and for biasing the roller bearing shaft in a predetermined direction during the operation thereof. The arrangement permits easy running of the tensioning roller and a slight shifting axially thereof in the event of an unbalancing of forces or overload.

A further feature of the invention includes means for mounting adjustable guide elements on each side of the tensioning roller which include arm portions which extend upwardly and then circumferentially around the lateral periphery of the belt for insuring the true running of the tensioning roller and preventing the lateral displacement of the belt from the roller. In the event of a one-sided load acting on the sanding belt, the belt will run up against one of the guide elements and prevent it from being completely displaced out of alignment. In addition, the running-up pressure is transmitted through the guide elements to the tensioning roller axis which is thereafter rocked or displaced laterally causing the belt to move to the highest plane which is formed by the displacement of the tensioning roller. The guide elements are advantageously constructed as a quarter of the circle guide rod which overlies the circumference of the tensioning roller adjacent each edge.



A feature of the invention is that the lateral displacement of the axis of the tensioning roller is permitted by a novel mounting means which includes a rockable bearing formed as a partial ball or ball dish construction. The ball or ball-shaped bearing is advantageously held within a socket formed in a bore in the rocking lever and means are provided to urge the ball bearing which carries the tensioning shaft in a predetermined direction to one side. The construction advantageously includes means for shifting the rocking lever in an axial or transverse direction for the purpose of shifting the tensioning roller for those instances in which it is desirable to run the belt at an angle. A set screw element is provided to set the rocking lever in the adjusted position. The adjustment is advantageously made by shifting a sliding pin element of the pin assembly which carries the rocking lever at the inner end thereof.

Accordingly, it is an object of this invention to provide an improved hand sander construction.

A further object of the invention is to provide a hand sander which includes a housing supporting a central motor and rotatably supporting a driving roller at one end, and including rocker means pivotally supporting the shaft for the tensioning roller, the rocker means being adjustable for tensioning purposes and including means for biasing the rocker means to an outward tensioning position.

A further object of the invention is to provide a hand sander construction including an improved mounting for a tensioning roller which comprises an improved pin assembly supported in the sander housing and carrying a rocking lever at the inner end thereof with means biasing the rocking lever in an outward position to tension a sanding belt trained around the tensioning roller and including a control pin arrangement which may be displaced to effect removal of the action of the biasing means on the roller for the purpose of slackening the sanding belt, such as for removal purposes.

A further object of the invention is to provide an improved hand sander construction which includes adjustable means for supporting the shaft of a tensioning roller to permit axial as well as outward or longitudinal displacement thereof for adjustment purposes.

A further object of the invention is to provide a hand sander including an improved support for a tensioning roller which includes a rocking lever having a bore therein with a ball socket portion adapted to receive a ball bearing portion of the tensioning roller shaft, means being provided to bias the shaft in a lateral direction against the ball socket portion against the rocking lever, said rocking lever being displaceable laterally to permit lateral shifting of the location of said tensioning roller.

A further object of the invention is to provide the sanding device which includes means supporting a shaft of a tensioning roller for axial displacement and guide elements secured to each end of the supporting spindle about which the tensioning roller rotates, said guide elements including portions extending outwardly from the shaft and then circumferentially around each side of said roller at a location to intercept the sanding belt when it moves

off the side of the tensioning roller, the supporting spindle being mounted so that it will be rocked when the guide elements are contacted by the belt and displaced thereby.

A further object of the invention is to provide a hand sander construction which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated and described preferred embodiments of the invention.

In the drawings:

FIG. 1 is a perspective right-hand elevation of a sander constructed in accordance with the invention;

FIG. 2 is a section taken on the line 2—2 of FIG. 1 on an enlarged scale;

FIG. 3 is a section taken on the line 3—3 of FIG. 1 on the same scale as FIG. 2 with the exception it is also extending through the tensioning roller axis;

FIG. 4 is a partial horizontal top plan of the portion of the sander indicated in FIG. 3;

FIG. 5 is a right-hand end elevation of the tensioning roller on a slightly larger scale than FIG. 2;

FIG. 6 is a section taken on the line 6—6 of FIG. 3 indicating the roller in a non-tensioned position;

FIG. 7 is a section similar to FIG. 6 but indicating the roller in a tensioned position;

FIG. 8 is a fragmentary section of another embodiment of rocker lever mounting for the tensioning roller shaft;

FIG. 9 is a longitudinal section of still another embodiment of rocker arm mounting for the tensioning roller shaft;

FIG. 9*a* is a top view of FIG. 9; and

FIG. 10 is an enlarged fragmentary side elevation of the control pin and abutment stop.

Referring to the drawings in particular, the invention embodied therein includes a hand belt sander indicated in position on a wooden board or plate **10**. The sander includes a machine casing **14** provided with a handle **12** at one end thereof. An electrical outlet cord **13** is provided for connecting a driving motor **16** to an electrical power source. The motor **16** is centrally mounted within the interior of the casing **14** and includes means (not shown) for driving a drive roller **18** mounted at one end thereof. The tensioning roller **20** is rotatably mounted on the opposite end and an endless sanding belt **22** is directed over each of the rollers **18** and **20**. A guide shoe **24** is provided at the lower side of the motor **16** over which the belt runs and the shoe insures the proper positioning of the machine on the workpiece to be worked upon. In order to suck off any wood dust which is accumulated during the sanding, there is provided at the machine casing a suction device **26** having a dust receiving bag **28**.

In accordance with the invention there is provided an improved mounting for the tensioning roller **20** to insure the automatic tensioning compensation or equalization as well as the automatic adjustment of the run of the sanding belt. The adjustable mounting means includes, as best indicated in FIGS. 2 and 3, a carrier pin assembly generally designated **32** arranged at a securing wall **30** of casing **14**. By means of a suitable mounting or bearing (not shown) both the drive motor **16** and the drive roller **18** are secured at the wall **30**. The pin assembly **32** includes an elongated hollow pin piece or member **34** which is slidable in a bore or groove **37** defined in the wall **30**. The pin **34** is prevented from rotating by means of an extension **38** of a set screw member **40** which rides in an axially elongated groove **36** of the pin member **34**. The set screw **40** is threaded in a top portion of a projection of the wall **30** and extends into the groove **36**. The set



screw **40** may be adjusted manually in order to permit the axial sliding of the pin **34**, and notches or detents **42** are advantageously cut out along the groove in order to provide spaced anchoring recesses at which the pin **34** may be anchored by the set screw **40**. A rocker arm or lever arm member **46** is rotatably mounted adjacent the inner end of the pin **34**. The rocker arm member **46** includes an outer end **80** with a bore **86** defining an internal socket ledge portion at the inner end thereof for the purposes of receiving a ball shaped bearing mounting **84** for a bolt shaft or spindle **89** for the tensioning roller **20**.

A torsion spring **50** is twirled around the pin **34** and one of its ends is held in an adjusting ring **52** and its opposite end bears against the lever member **46** by pressing against a securing ring **54** which extends around the pin **34**. The spring exerts a biasing force on the rocking lever member **46** to urge it in an outwardly direction away from the drive roller **18**. This maintains the roller **20** under an outward biasing to tension the sanding belt **22** which is trained to run therearound.

As indicated in FIG. 4, the right-hand end of the spring **50**, designated **56**, bears against an abutment pin **58** which is inserted into the ring **52** while the left-hand end designated **60** bears against a holding piece **62** of the rocker arm member **46** to urge it outwardly with a relatively strong spring force. Due to the action of the torsion spring **50** the tensioning roller is rocked outwardly in accordance with the indication shown in FIG. 7 in a counter-clockwise manner. This insures that the belt **22** will be maintained in tension during the operation of the device.

In accordance with the invention, in order to exchange the belt **22** of the machine in a rapid and easy manner, there is provided a control pin **64**, as indicated in FIG. 3, which extends through the hollow pin **34**. The pin **64** is slidable in the hollow pin **34**. The end of the pin **34** is provided with a forked extension **66** which is angled off and defines a guideway perpendicular to the axis of the pin. The pin **64** extends through the guideway and is biased in position thereon by spring **72**. Rotation of the control pin is impossible when it is located between the forked elements **66**. The spring **72** is coiled around the control pin **70** and abuts against an inner widened portion of the bore of the pin **34** on one end and a control knob **70** on the outer end of the pin **64**. At the inner end of the rocker arm **46** there is provided an abutment pin **68** with an inclined or slanted surface **69**, as indicated in FIG. 10. When the control pin **64** is moved inwardly in the direction of arrow D, the end is snapped over the abutment **68**, as indicated in FIG. 6, so that the tensioning roller may be moved by hand to the untensioned position in which the abutment **68** prevents the torsion spring from tensioning the roller. After the belt is positioned in place, the tensioning may be resumed by merely displacing the control pin **64** in the direction of the arrow D once again to the extent that the pin will be released from the abutment **68** and the rocker will be retensioned by the spring **50**.

As mentioned previously, the outer end of the rocker member **46** is provided with a bore **86** for the purpose of mounting the roller axis, which is generally designated by the numeral **82**. The ball-shaped recess is formed at the inner end of the bore **86** and provides a ball socket for a partial ball joint dish member or bearing **88** to permit slight rotational adjustment of an axle or supporting spindle **89**, which is carried in the ball joint piece **88**. By this arrangement the run of the belt is automatically controlled, so that the belt will always be flush with the inside of the two rollers. The arrangement permits the rocking movement of the spindle or bolt shaft **89** which rotatably carries the tensioning roller **20**. For this purpose the tensioning roller **20** includes a central web wall **20***a* which carries an elongated barrel portion in which is mounted ball bearings **90**. Ball bearings **90** are advantageously axially spaced to provide a secure supporting

arrangement for the tensioning roller on the bolt member **89**.

In accordance with a feature of the invention, one end of the tensioning roller is held in its position by an adjusting ring **92** which is fitted over the bolt shaft **89** and secured thereto such as by a set screw (not shown). As indicated in FIG. 5, a stirrup member or guide rod **94** extends radially outwardly from the adjusting ring **92** and includes an arcuate or bent portion which extends circumferentially along the side of the tensioning roller and in closely spaced position in respect thereto, such as indicated in FIG. 2. As indicated in FIG. 3, the outer surface of the guide rod **92** extends by an amount *a* beyond the circumference of the tensioning roller. This position can be adjusted by means of the set screw **96** which is arranged in the adjusting ring **92** (FIG. 5).

An additional stirrup member or guide rod **98** is arranged in an extension portion **102** of the bolt shaft **89** at the opposite end and extends radially and then arcuately around a portion of the circumference of the tensioning roller in the manner of the guide rod **94**. A set screw **100** secures the rod in an adjusted position at the selected height above the tensioning roller. Each of the guide rods **94** and **98** provides means for insuring the proper feeding of the sanding belt **22** over the tensioning roller and any tendency for the belt to slide off either end thereof will cause a rocking movement of the bolt shaft **89** and an adjustment of the tensioning roller, so that the belt will tend to be displaced toward a high portion of the roller and an automatic compensation will be made.

As indicated in FIGS. 3 and 4 the ball joint piece **84** is provided with a through bore in which is inserted an adjusting pin **105** which is guided in a slot like recess **108** formed in the outer end of the lever member **46**. Lateral projections of the upper end of the lever member **46** are formed as outwardly extending spindle guide arms **110** and **62**. In the spindle guide arm **110**, as indicated in FIG. 4, there is arranged a threaded spindle **112** which may be threaded into the guide **110** against the force of a compression spring **114** to cause an outer end thereof to bear against the adjusting pin **105**. The spring **115** held in the guide spindle **62** bears against the opposite end of the pin **105** so that the ball piece **84** always bears in the socket **86** under a predetermined biasing force. This permits adjustment of the bolt shaft **89** by rocking movements against the biasing force to accommodate for any unbalancing forces for acting on the sanding belt. The arrangement also permits the guide rod members **94** and **98** to rock the bolt shaft **89** when the belt becomes misaligned on the tensioning roller. If it is desired it is also possible to release the set screw **40** and shift the position of the pin **34** so that the tensioning roller **20** may be positioned on the opposite side of the housing and the belt run at an angle so that the sanding may be made in an excellent and clean manner on angular surfaces.

In FIG. 8 another embodiment of a rocker bearing mount is indicated which includes a rocking lever member **122** rotatably mounted on a pin **120**. As in the previous embodiment the rocker is held in a tensioned position by a torsion spring (not shown). A holding pin **124** permits the tensioning of the lever member **122** by being positioned against one side of an abutment **126** and also permits the untensioning by the shifting beyond the abutment as indicated in the previous embodiment. In this embodiment a cylindrical recess **130** is provided at the outer end of the rocker arm member **122**. The other end of the rocking lever member **122** is provided with a bore **130** for mounting a bearing bolt **128** which carries the tensioning roller (not shown). A partially ball-shaped joint piece **132** is positioned over the bolt shaft **128** and is positioned so that it contacts the walls of the bore **130**. At a distance from the point piece **132** the bearing bolt **128** is provided with an abutment member **134** for the purpose of providing a rigid point which bears against the right-hand end face of the rocker according to FIG. 8. This also insures that in spite of this engagement the bearing bolt **128** can be rocked in each direction. The end portion of the rocker member **122** is provided with a surface **136** which is partially ball-shaped. At this surface the abutment member includes a curved or ball-shaped inner portion **138** which bears over the projection **136**. The bearing bolt is guided by means of a pin **140** which is arranged in the rocking lever member **122** in an elongated slot **142**. By means of an adjusting spindle (not shown, but comparable to the other embodiments), the pin is biased so that the bolt shaft **128** is urged to the left, as indicated in the drawings.

In FIGS. 9 and 9*a* another embodiment of means for mounting the bearing bolt for the tensioning roller is shown. A rocker **152** is rotatable on a bearing pin **150** and it carries a pivotal pin member **156** which is supported in a bore of the rocker member **152** by a projection **158**. The outer end of the pin member is provided with a fork **154** which carries a horizontal pin **171** at its outer ends. The bolt shaft or axis **162** for the tensioning roller is arranged in a bearing piece **160** which is pivotally supported by the pin **171**. The rocker **152** is fitted with two arms **152***a* and **152***b*. In a threaded hole of the former a threaded spindle **172** is threadedly engaged which bears with its forward end **172***a* against the right hand end **170***a* (see FIGS. 9 and 9*a*) of pin **171**, which is held against said forward end **172***a* by means of a biased compression spring **170**, said spring being with one end located in a hole of arm **152***b* and bears with its other end against the left hand end **171***b* (see FIGS. 9 and 9*a*) of pin **171**.

By turning the threaded spindle **172** it is thus possible to change the cross-wise position of pin **171** and thus of the shaft **162** carrying the tensioning roller.

Thus the invention provides an inexpensive sanding device with improved means for adjusting the tensioning roller in a variety of ways. The tensioning roller may be shifted axially and rocked about its axis as well as displaced outwardly for tensioning purposes. Alignment of the belt is always assured by means of the guide rods which correct for any unbalancing forces by shifting the axis of the tensioning roller.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

I claim:

1. A belt sander comprising a casing, a driving motor supported centrally in said casing, a driving roller arranged at one end of said motor to be rotatably supported in said housing at one end of said motor and connected to said motor for rotation thereby, a tensioning roller adjacent the opposite end of said motor, a rocking lever member pivotally mounted on said casing and having a free end extending centrally of said tensioning roller, a tensioning roller shaft, bearing means rotatably supporting said tensioning roller on said shaft, said rocking lever member having rocking bearing means adjustably supporting said tensioning roller shaft within the tensioning roller for rocking adjustable movement, the rocking lever member being pivotal on said housing to permit movement of said tensioning roller outwardly for tensioning purposes.

2. A belt sander according to claim 1, including means to bias said rocking lever member outwardly in a tensioning position.

3. A belt sander according to claim 2, including a tensioning relieving abutment defined on an end of said rocking lever member, a control pin held against rotation in respect to said rocking lever member and being axially displaceable out of the path of said abutment, said tensioning roller with said rocking lever member being displaceable by hand inwardly against said biasing force to permit positioning of said control means on the opposite side of said abutment, said abutment preventing said rock-

ing lever member and said tensioning roller from being biased outwardly beyond a predetermined position.

4. A belt sander according to claim 1, wherein said means adjustably supporting said bolt shaft includes a bore defined in said rocking lever member with an internal ball socket ledge portion, and a ball joint piece carried around said bolt shaft positioned in said bore and rotatably displaceable on said ball socket ledge portion, and means to bias said bolt shaft in a direction urging said ball joint piece into engagement with the ball ledge portion of said lever member bore.

5. A belt sander according to claim 4, wherein said means urging said bolt shaft into engagement with the ball-shaped ledge portion of said lever member bore includes first and second arms projecting on each side of said lever member, a bolt member extending through said ball joint piece on each side thereof in alignment with the arms of said lever member, spring means extending from one of said arms against said bolt piece and an adjustable pin member bearing against the opposite of said arms.

6. A belt sander according to claim 1, including a pin slidably mounted in said housing, said lever member being rotatably carried on said pin.

7. A belt sander comprising a housing, a driving motor secured to said housing, a driving roller connected to said motor for rotation thereby, a tensioning roller, a rocking lever member, axially movable means rotatably supporting said rocking lever member within said tensioning roller, a tensioning roller bolt shaft, said tensioning roller being rotatable on said bolt shaft, and means defined adjacent the free end of said rocking lever member rockingly supporting said bolt shaft.

8. A belt sander according to claim 7, wherein said means defined on said rocking lever member includes a bore having a ledge portion formed as a curved socket portion, a ball socket piece within said bore having curved portions in sliding engagement with the socket portion of said rocking lever member bore, said ball socket piece being connected to said bolt shaft.

9. A belt sander according to claim 8, including a pin extending through said ball socket piece, said bolt shaft having an elongated slot through which said pin extends.

10. A belt sander according to claim 9, including means for biasing said pin in a direction urging said ball socket piece into engagement with the curved portion of said rocking lever member bore.

11. A belt sander according to claim 7, wherein said means rotatably supporting said rocking lever member within said tension roller includes a pin slidably mounted in said housing, and set screw means for fixing said pin in a slidably adjusted position in said housing.

12. A rocking lever member according to claim 7, including a guide rod member affixed to at least one end of said bolt shaft, including a portion extending in a curve around a portion of the circumference of said tension roller forming a guide for an endless sanding belt positioned over said driving roller and said tension roller.



13. A belt sander comprising a housing including a side bearing support wall portion, a driving motor secured to said housing, a driving roller connected to said motor for rotation thereby, a tensioning roller, a pin slidably but non-rotatably mounted in said housing, a rocking lever member rotatable on said pin, spring means urging said rocking lever member to rotate in a direction away from said driving roller, a tension roller bolt shaft, said tension roller being rotatable on said bolt shaft, and means defined adjacent the free end of said rocking lever member and on said bolt shaft rockingly supporting said bolt shaft on said lever member.

14. A belt sander according to claim 13, including a control pin slidable in said pin and having a portion bent at the inner end thereof at right angles to said pin, guide means on the exterior of said pin at an angle to the axis thereof, the control pin being held by said guide means against rotation relative to said pin but being displaceable out of said guide means, an abutment defined on said control lever member and preventing said spring means from moving said rocking lever member fully outwardly when said control pin is positioned on one side thereof, said control pin being displaceable out of said guide means to permit positioning thereof on the opposite side of said abutment and to permit said spring means to urge said rocking lever with said tensioning roller fully outwardly in a belt tensioning position.

15. A belt sander according to claim 13, including a guide rod connected to said bolt shaft adjacent at least one end thereof, and including a curved portion extending around a portion of the circumference of said tension roller, said guide rod being adjustable to permit the outer curved end thereof to be located at a preselected height outwardly from the periphery of said tension roller.

16. A belt sander according to claim 13, wherein said means defined on said bolt shaft and said lever member includes ball and socket joint means supporting said shaft in said lever member.

17. A belt sander according to claim 16, including a pin extending through said ball and socket joint means, and means biasing said pin in a direction toward engagement of the ball and socket joint means.

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