United States Patent

Elliott

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[54] **SELF-ALIGNING BAND FOR BEVELING MACHINE**

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[21] Appl. No.: **138,065**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 70,355, Sept. 8, 1970, abandoned.

[52] **U.S. Cl.**.....**266/23 NN,** 266/23 N

[51] **Int. Cl.** **B23k 7/04**

[58] **Field of Search** .....266/23 NN, 23 N, 23 K, 23 F

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[57] **ABSTRACT**

An adjustable band for supporting a dolly carried bevel cutter for movement around a joint of pipe. The band comprises an elongated strip having a pair of parallel side guide edges and a toggle interconnecting the band ends for moving the band in tight engagement with the pipe. Two rows of rollers having wheels mounted on axes extending perpendicular to the pipe axis are carried by the surface of the band and hold the latter in spaced parallelism with the pipe while permitting movement of the band longitudinally of the pipe.

15 Claims, 10 Drawing Figures

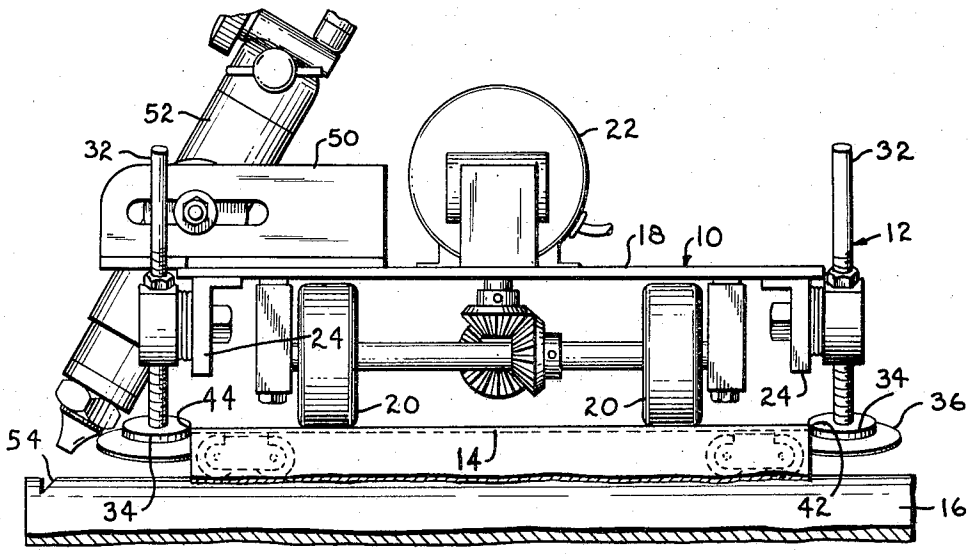


Fig. 1.

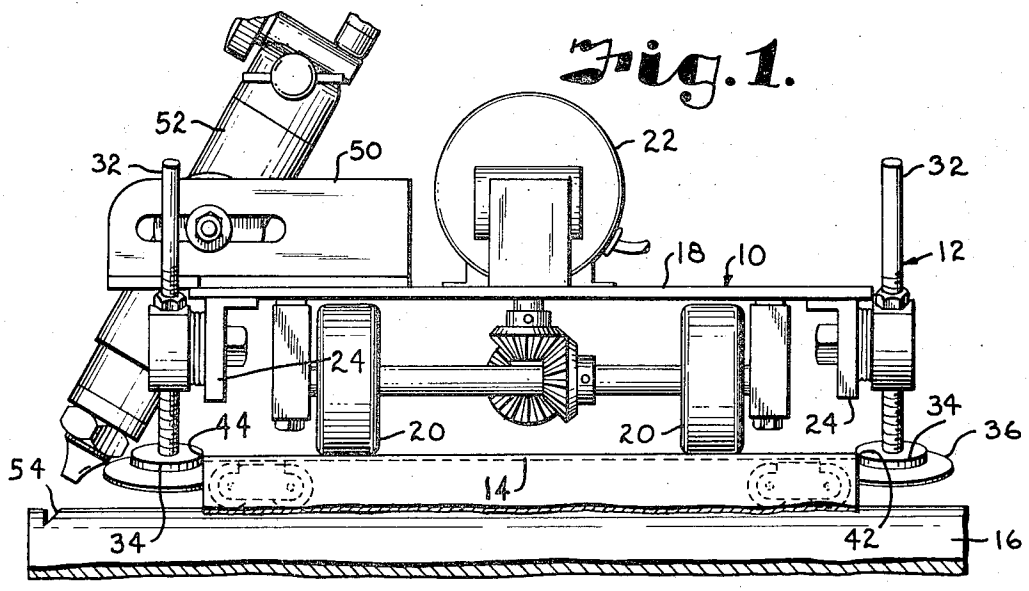


Fig. 2.

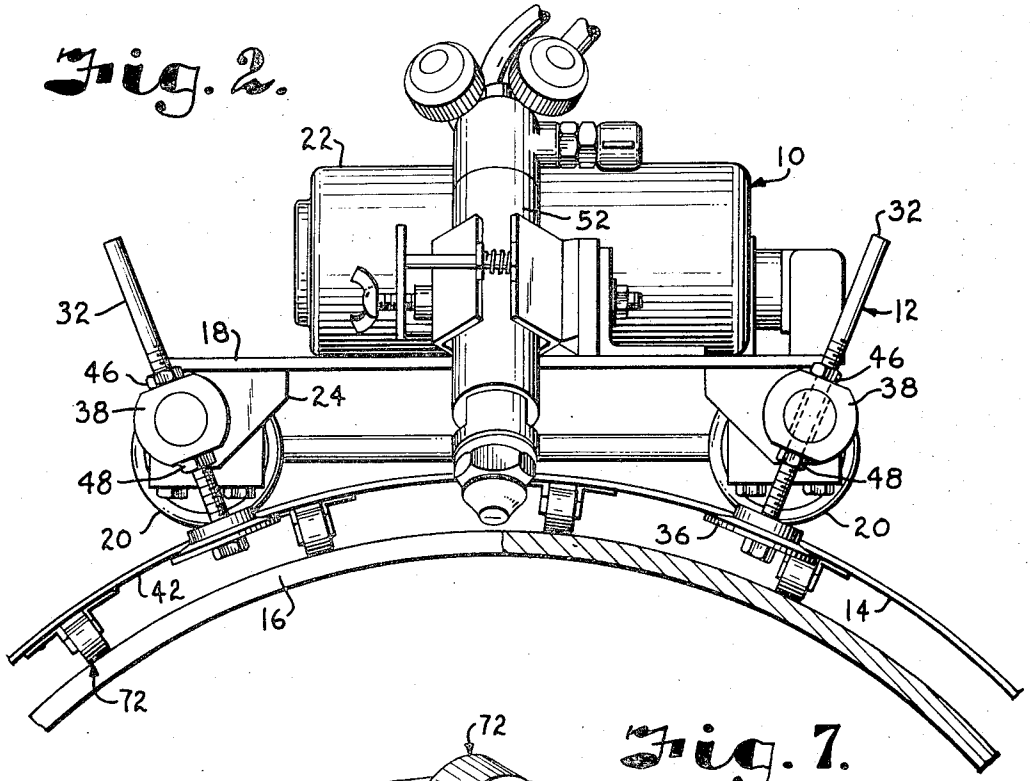
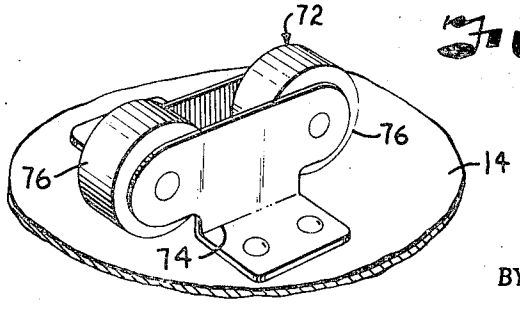


Fig. 7.



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Fig. 3.

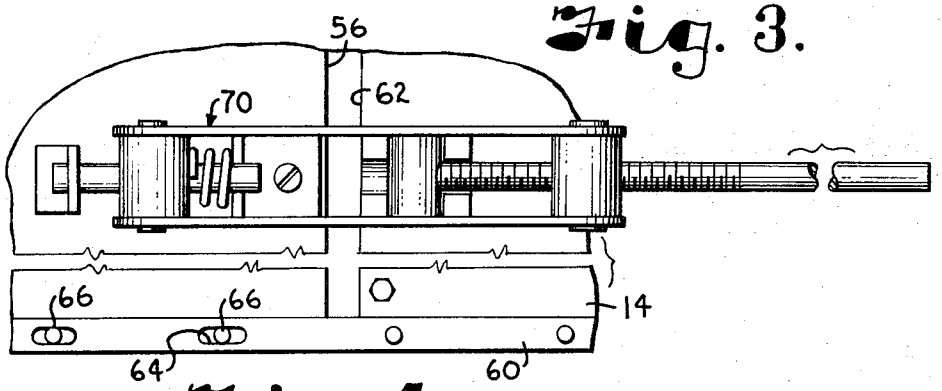


Fig. 4.

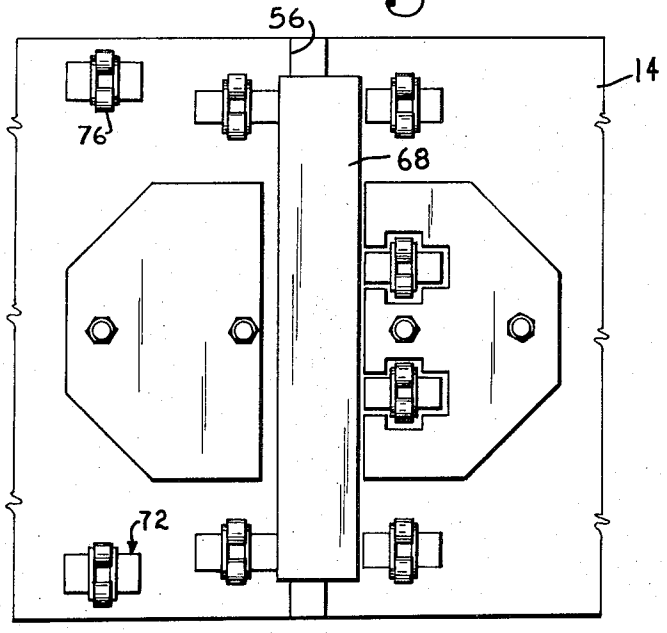


Fig. 5.

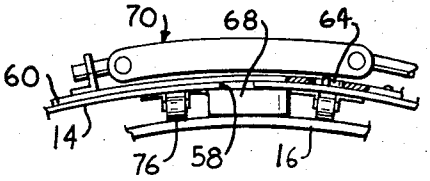
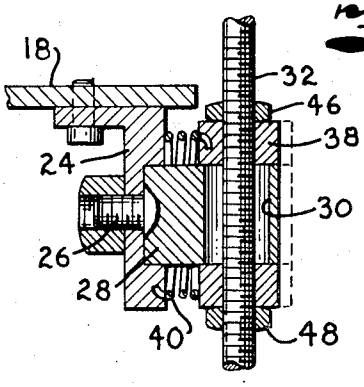


Fig. 6.



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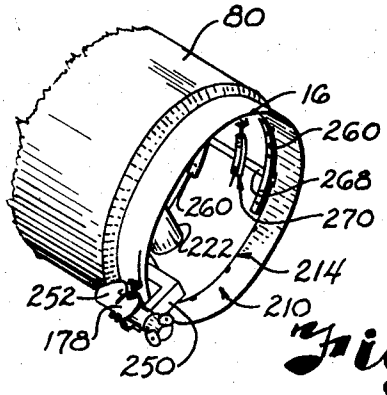


Fig. 9.

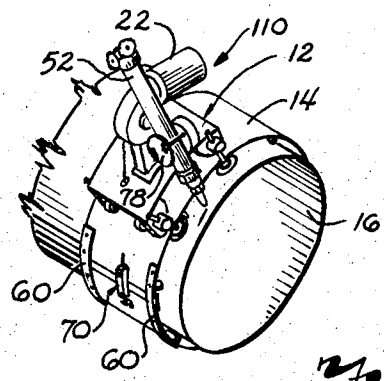


Fig. 8.

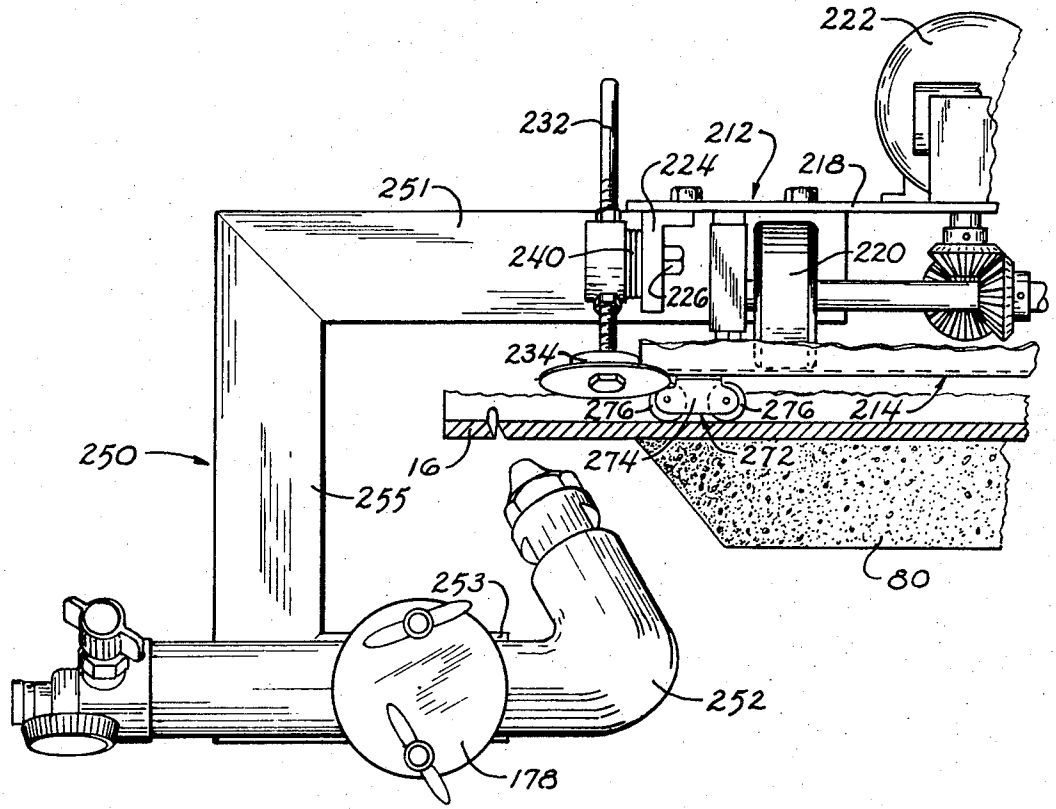


Fig. 10.

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SELF-ALIGNING BAND FOR BEVELING MACHINE

This application is a continuation-in-part of my copending application Ser. No. 70,355 entitled "Self-Aligning Band For Beveling Machine" and filed Sept. 8, 1970, and now abandoned.

This invention pertains to pipe working equipment, and more particularly, to a machine for cutting the required bevel on the ends of joints of pipe.

Elongated joints of pipe are welded in end-to-end relationship to provide an elongated string of pipe for a pipeline or the like. Much of this pipe welding is done by automatic welding machines. It is very important that the abutting ends to be welded have a proper level so that a satisfactory bead is formed in the welding operation.

Although joints of pipe may be fabricated with end bevels, these often are inadvertently damaged when the pipe is handled or transported to the welding site. Sometimes joints are cut prior to welding and sometimes the fabricated bevels are not at the correct angle for the welding operation which interconnects the joints into the pipeline.

Beveling machines have heretofore been used more or less successfully. These have included roller mounted dollies which carry cutting torches or tools mounted at the correct angle for cutting the bevel as the dollies are moved on a path of travel around the pipe. One form of support for the dollies has been a band extending peripherally around the pipe proximal the end of the pipe. The dollies ride on the outer surfaces of the bands and are guided by the side edges of the bands while making the cuts.

One disadvantage with conventional bands has been the difficulty or impossibility for adjusting the band position once it is positioned in the general vicinity of the cut. It is, of course, extremely important that the band be precisely aligned prior to cutting the bevel in the pipe. Even slight irregularities in the pipe surface can cause imperfect alignment unless proper compensation is made for the irregularities.

The support bands are usually spaced outwardly from the pipe to accommodate the dolly guide wheels which also hold the dolly onto the band. Heretofore, this spacing has been provided by a plurality of pins which project from the band and engage the pipe surface.

The friction between the pins and the pipe render it almost an impossibility to adjust the support band when on the pipe. Rust or scale on the pipe surface further hamper proper band adjustment as do the pipe irregularities themselves.

Accordingly, it is the primary object of this invention to provide a novel supporting band for a pipe beveling machine of this type, which may be readily adjusted to its desired position even after the band is installed on the pipe.

Still another important object of the invention is to provide a band having novel roller means which insure the proper spacing of the band from the pipe but which assist rather than retard proper band positioning.

Another object of the invention is to provide a plurality of spaced apart rollers between the band and the pipe to permit the band to conform to irregularities in the pipe, yet to assist in the alignment and positioning of the machine prior to the beveling operation.

A further object of the invention is to provide a novel, easily adjustable bevel machine supporting and guiding band which is not prone to inadvertent movement while supporting the beveling machine dolly after the band has been moved to its final, correctly aligned position.

Yet another object of the invention is to provide a highly reliable, easily operated beveling machine support band which may be economically fabricated from readily available materials.

It is also an important object of this invention to provide a support band as described in the foregoing objects which can be disposed on the inner surface of the pipe whereby when the outer surface has previously been coated the coating will not preclude the use of the beveling machine around the pipe periphery.

These and other important objects of the present invention will be further explained or will become readily apparent from the description, claims and drawings.

In the drawings:

FIG. 1 is a fragmentary cross-sectional view longitudinally of the pipe and through a band embodying the principles of this invention, the dolly and bevel cutter appearing in elevation;

FIG. 2 is a fragmentary, end elevational view of a beveling machine embodying the principles of this invention;

FIG. 3 is an enlarged, fragmentary top plan view of the band and toggle;

FIG. 4 is a fragmentary, bottom plan view of the band showing the junction of the band ends;

FIG. 5 is a fragmentary, cross-sectional view through the pipe and band illustrating the toggle contour;

FIG. 6 is an enlarged, detailed vertical cross-sectional view illustrating the spring loaded mounting for one of the dolly guide wheels;

FIG. 7 is an enlarged, fragmentary perspective view of the inner surface of the band showing one of the band supporting rollers;

FIG. 8 is a perspective view on a reduced scale, of a joint of pipe with a support band secured thereto and a modified form of beveling machine traversing the path defined by the band;

FIG. 9 is a perspective view, similar to FIG. 8, of an alternative form of the invention with the support band disposed inside a joint of pipe; and

FIG. 10 is an enlarged cross-sectional view through the pipe and supporting band shown in FIG. 9 illustrating details of construction of the alternative form of the invention.

A machine embodying the principles of this invention is broadly designated in FIGS. 1 and 2 of the drawings by the reference numeral **10** and comprises a mobile dolly **12** and a cylindrical band **14** adapted to encircle a pipe **16**. Dolly **12** includes a frame **18** mounted on four rubber rollers **20**. The rollers **20** are powered by an electric motor **22** carried by frame **18**.

Corner brackets **24** depend from frame **18** and receive the projecting end of a bolt **26** as illustrated more clearly in FIG. **6**. Bolt **26** has a transversely circular, enlarged portion **28** provided with an upright slot **30** adapted to receive a shaft **32** as shown in FIG. **6**. Shaft **32** extends substantially vertically and journals at its lowermost end a disc **34** having an outwardly extending flange **36** (FIG. **1** and **2**).

Each bracket **24** is provided with its upwardly extending shaft **32** and its corresponding disc **34** so that the dolly **12** can be installed on the band **14** as shown in FIGS. **1** and **2** of the drawings. To this end, a hub **38** is secured to each bolt **26** and receives its respective shaft **32** as shown in FIG. **6**. A spring **40** between hub **38** and bracket **24** urges the hub toward its respective bracket so that the discs **34** are drawn into engagement with the longitudinally extending parallel edges **42** and **44** of band **14** respectively. The vertical adjustment of the respective shafts **32** is provided by means of nuts **46** and **48** disposed above and below hub **38** respectively. The tension of the springs **40** holds the dolly onto the band as the dolly traverses its circumscribing path of travel around pipe **16**.

An upwardly extending bracket **50** has mounted thereon a cutting tool **52** in the nature of an acetylene torch or the like. Tool **52** may be disposed at an angle with respect to the end of pipe **16** as shown in FIGS. **1** and **2** of the drawings so that a uniform bevel **54** is cut into the wall of pipe **16** as the dolly is moved around the track provided by band **14**.

Band **14** is constructed in a manner to facilitate accurate alignment of the band with respect to the pipe so that the bevel **54** is precisely located for subsequent welding operations. To this end, band **14** comprises a generally planar elongated strip of material bent into circular configuration for disposition in telescoped relationship around the outer wall of the pipe. One end **56** of band **14** fits into a slot **58** (FIG. **5**) formed between a pair of elongated, curvilinear side straps **60** (only one shown in FIG. **3**) extending from the opposite end **62** of band **14** toward end **56** in overlapping relationship thereto. The side straps **60** are rigidly secured to the outer surface of band **14** at end **62** and have longitudinally extending slots **64** in overlying relationship to end **56** and adapted to receive upwardly extending lugs **66** secured to end **56**. Lugs **66** in slots **64** serve to maintain the side edges of band **14** in precise parallel alignment at the joint of abutment between the ends yet permit relative movement of one end toward the other as the band is adjusted over the pipe.

A block **68** is secured to end **62** and extends beneath the latter in position to receive end **56** of member **14** between block **68** and straps **60**. A toggle mechanism **70** having components secured to end **56** and end **62** respectively is movable from a first overcenter position to an opposite overcenter position to draw the ends **56** and **62** toward each other after the band is precisely positioned longitudinally of the pipe.

While the band **14** must be maintained in outwardly spaced relationship around the wall of the pipe **16**, it is important that the band be shiftable along the pipe to achieve proper alignment of the band prior to final installation of the band into its fixed position. Accordingly, the innermost surface of the band is provided with rollers **72** carried by the band **14** and projecting downwardly therefrom for engagement with the pipe wall. Each roller **72** comprises a bracket **74** attached to the proximal surface of band **14** and a pair of wheels **76** journalled in the bracket and disposed in tandem relationship as shown best in FIG. **7**. It should be noted that the wheels **76** are mounted for rotation about axes extending transversely of the longitudinal pipe axis and the wheels are positioned with respect to each other longitudinally of the pipe.

In the preferred construction, the rollers are disposed in a pair of rows, each row being adjacent the edges **42** and **44** of the band. This construction insures maximum support for the dolly **12** but permits longitudinal alignment of the band prior to final tightening of the band onto the pipe.

The rollers **72** are free to rotate for positioning of the band until toggle **70** is operated to draw ends **56** and **62** into their final positions toward one another. During this time it is relatively easy for workmen to manually move the band longitudinally of the pipe. Once the toggle **70** is moved to its closed position as illustrated in FIG. **5**, the friction resulting from the tension applied by the toggle onto the band prevents longitudinal movement along the pipe so that the dolly can move around the band as motor **22** is operated. It is to be understood that the number of rollers **72** disposed around the band **14** should be sufficient to assure a "gripping action" which will prevent longitudinal shifting of the band once the toggle **70** is moved to its closed position.

While the outer surface of the band **14** must be sufficiently smooth to permit rolling of the dolly over the surface for imparting an accurate bevel to the pipe, there must be sufficient traction between the dolly wheels and the band surface for driving the dolly. In some cases it is desirable to provide a roughened surface to increase the friction between the rollers and the band. A row of integral projections or rivet heads extending from the band **14** and underlying the path of travel of one or more of the power wheels may suffice for this purpose. Further, such a row extending partially around the band in alignment with the path for one wheel may be used in conjunction with a similar row extending the remainder of the portion around the band in alignment with the path of travel of another wheel.

In FIG. **8**, the pipe **16** is shown in perspective with an alternative form of beveling machine, designated generally by the numeral **110**, shown disposed at the end of the pipe. The beveling machine **110** is generally similar to the machine **10** described above, in that it comprises a mobile dolly **12** and a cylindrical band **14** adapted to encircle the pipe **16**. In the machine **110** however, the cutting tool **52** is mounted by a turret head **78**. The turret head **78** provides somewhat more maneuverability of the cutting tool **52** and greater accuracy in aligning the tool for cutting the proper bevel **54**.

Referring now to FIG. **9**, another alternative form of the invention is shown disposed within the end of a joint of pipe **16** and designated generally by the numeral **210**. The beveling machine **210** comprises a mobile dolly **212**, partially visible in FIG. **10**, and a cylindrical band **214** adapted to be disposed adjacent the inner surface of the pipe **16**. The dolly **212** includes a frame **218** mounted on four rubber rollers **220** (one of which is visible in FIG. **10**). The rollers **220** are powered by an electric motor **222**.

As with the machine **10** above described, a plurality of corner brackets **224** depend from the frame **218** and each bracket receives a bolt **226** for mounting an upright shaft **232**. Each shaft **232** in turn mounts a disc **234** which engages an edge of the cylindrical band **214**. A spring **240** around the bolt **226** and between the bracket **224** and the shaft **232** assures tight engagement of the disc **234** with the band **214**.

A U-shaped bracket **250** has a first leg **251** which is approximately twice the length of a second leg **253** and is secured to the frame **218** by appropriate means. A bight portion **255** of the bracket **250** extends outwardly away from the inner surface of the pipe **16** and a cutting tool **252** is mounted on the leg **253** by a turret assembly **178**.

The band **214** is constructed in a manner analogous to that described above for the band **14** except that the band **214** is adapted to be disposed in engagement with the interior surface of the pipe **16**. Thus, the band **214** comprises a generally planar elongated strip having parallel longitudinally extending edges and being bent into a circular configuration conforming to the configuration of the wall of the pipe **16**. A pair of elongated, curvilinear side straps **260** which are secured to one end of the band **214**, an underlying block **268** also secured to one end of the band, and a toggle mechanism **270** serve to couple the two ends of the band together and assure tight engagement of the band with the pipe **16**. The outer surface of the band **214** is provided with rollers **272** which are carried by the band and project therefrom for engagement with the wall of the pipe **16**. Each roller **272** comprises a bracket **274** attached to the proximal surface of the band **214** and a pair of wheels **276** journalled in the bracket and disposed in tandem relationship one to the other. As with the wheels **76** of the embodiment described above, the wheels **276** are mounted for rotation about axes extending transversely of the longitudinal pipe axis.

Although only a single pair of rollers **276** are visible in FIG. **10**, it is to be understood that the rollers **276** would be disposed in parallel rows adjacent the longitudinally extending edges of the band **214** in a manner similar to that described above for the rollers **76** and the band **14**.

The toggle mechanism **270** is similar to the toggle **70** above described with components joined to each end of the band **214**. The toggle **270**, however, is designed to spread the ends of the band **214** away from each other as the lever arm of the toggle is moved from one over-center position to an opposite position. With the toggle **270** in a position so as not to exert any force on the band **214**, the rollers **272** are free to rotate for positioning the band **214** into a desired position. Once the toggle **270** is moved to a position to spread the band **214** the friction resulting from the tension applied by the toggle to the band prevents longitudinal movement along the pipe **16** so that the dolly **212** can move around the band as the motor **222** is operated.

The beveling machine **210** is particularly useful where the outside surface of the pipe **16** is obstructed as for example when this surface is covered by a layer of coating **80**. Although there is not sufficient room between the end of the pipe **16** and the beginning of the coating **80** to permit a band such as **14** to be positioned in telescoped relationship around the pipe, the band **214** can be positioned on the inside of the pipe with the cutting tool **252** still disposed on the outside for forming the bevel **54** as a result of the disposition of the mounting bracket **250**.

Although the invention has been described with specific reference to a type of beveling machine, it will be appreciated that the novel aligning band may be utilized with other type working machines employing tools other than a bevel cutter disposed on a movable dolly.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. For use with a pipe working machine having a movable dolly and a tool mounted on the dolly for movement therewith around the pipe, a support for the dolly comprising:

an elongated band having a surface to support the dolly and a pair of parallel side edges, the dolly being provided with means engaging said edges for guiding the dolly during movement over said surface;

means interconnecting the ends of said band to hold the latter in substantially cylindrical configuration and in spaced relationship to a joint of pipe with said edges concentric with the axis of the pipe; and

roller means carried by the surface of the band and projecting therefrom for engagement with the pipe to support the band in spaced parallelism from the surface of the pipe,

said roller means being operable to permit shifting movement of the band longitudinally of the pipe when the band is held in said cylindrical configuration, whereby to facilitate accurate alignment of the band with respect to the pipe irrespective of irregularities in the surface of the pipe.

2. The invention of claim **1**, wherein said roller means includes a plurality of spaced apart rollers secured to the band.

3. The invention of claim **2**, wherein said rollers are disposed in a row extending parallel to said edges.

4. The invention of claim **3**, wherein said rollers are disposed in a pair of rows spaced apart longitudinally of the pipe, each of said rows being parallel to said edges.

5. The invention of claim **2**, wherein each roller includes a bracket secured to said band, and a wheel for each bracket respectively, each wheel being mounted to its corresponding bracket for rolling movement about an axis perpendicular to the longitudinal axis of the pipe.

6. The invention of claim **5**, wherein is included a pair of wheels for each bracket respectively, the wheels of each pair thereof being spaced apart longitudinally of the pipe.

7. The invention of claim **4**, wherein each row of rollers is disposed in relatively close proximity to a corresponding edge of the band.

8. The invention of claim **1**, wherein said interconnecting means includes a toggle, one element of the toggle being pivotally coupled with one end of the band and the other element of the toggle being coupled with the other end of the band, whereby said toggle may be operated to move the band tightly into engagement with the pipe.

9. The invention of claim **8**, wherein said band is disposed around the outer surface of said pipe and said toggle is adapted to be operated to draw the band tightly around the pipe.

10. The invention of claim **8**, wherein said band is disposed around the inner surface of said pipe and said toggle is adapted to be operated to move the band outwardly into engagement with said pipe.

11. The invention of claim **8**, wherein said toggle includes adjustable structure to permit selective adjustment of the force exerted on the band.

12. The invention of claim **8**, wherein said toggle is on the surface of the band proximal the dolly, and

wherein said toggle is bent to conform to the general contour of the band when the latter is installed on said pipe, whereby to permit relatively unobstructed movement of the dolly around the surface of the band.

13. The invention of claim 1, wherein said roller means is carried by the inner surface of said band for supporting the band in spaced relationship to the outer surface of the pipe.

14. The invention of claim 1, wherein said roller means is carried by the outer surface of said band for supporting the band in spaced relationship to the inner surface of the pipe.

15. Apparatus for beveling a metal pipe comprising:

an elongated band conforming in configuration to the configuration of the pipe and presenting a supporting surface with spaced, parallel side edges;

means interconnecting the ends of said band to hold the latter in substantially cylindrical configuration and in spaced relationship to a joint of pipe with said edges concentric with the axis of the pipe;

roller means carried by the surface of the band and projecting therefrom for engagement with the pipe to support the band in spaced parallelism from the surface of the pipe,

said roller means being operable to permit shifting movement of the band longitudinally of the pipe when the band is held in cylindrical configuration whereby to facilitate accurate alignment of the band with respect to the pipe irrespective of irregularities in the surface of the pipe;

a movable dolly mounted on said band,

said dolly being provided with means engaging said edges for guiding the dolly during movement over said surface and around said band; and

a bevel cutter mounted on the dolly for movement therewith.

* * * * *