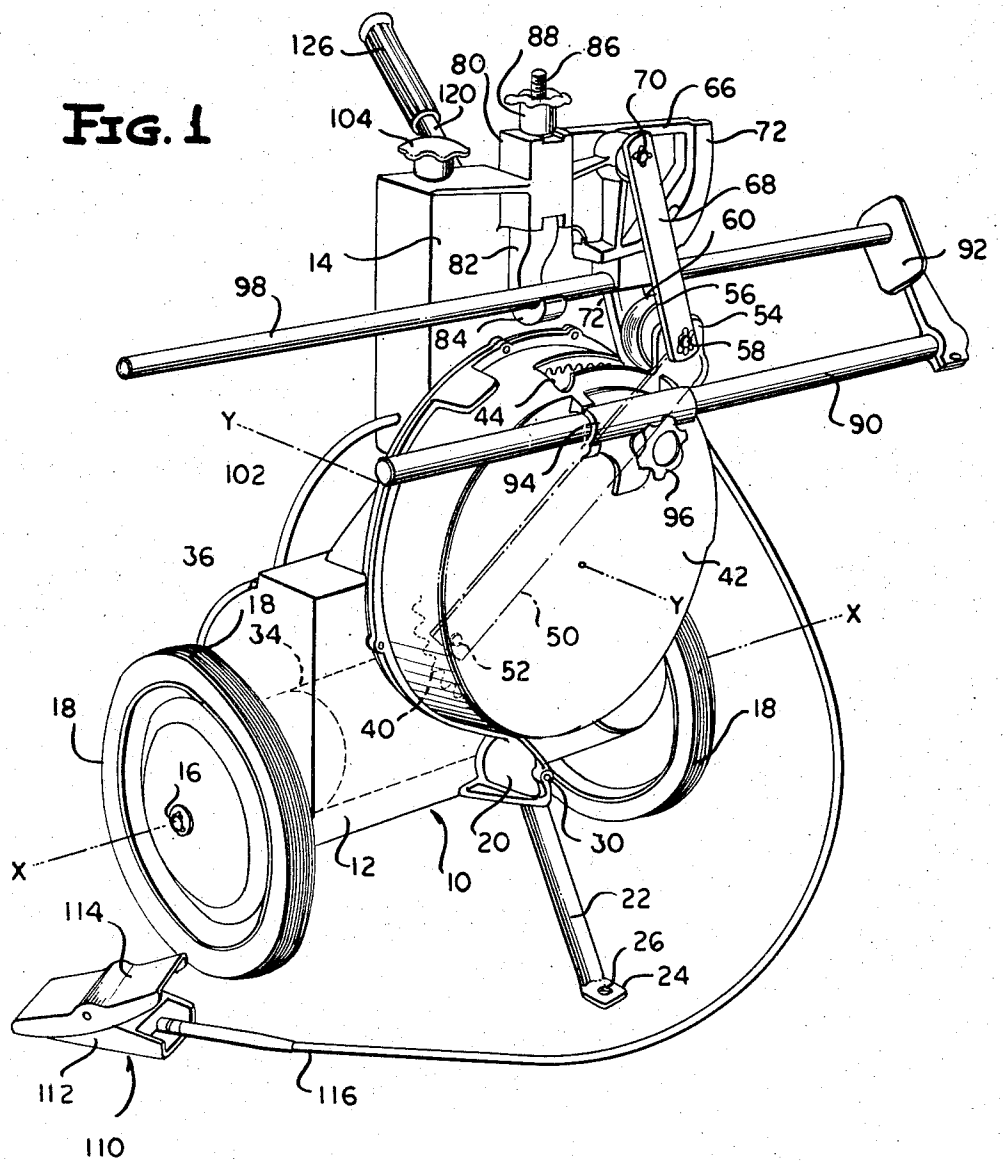
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PORTABLE CONDUIT BENDER

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FIG. 1



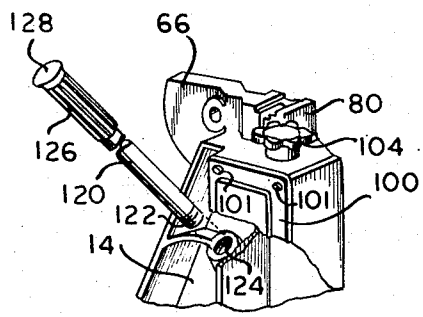


FIG. 2

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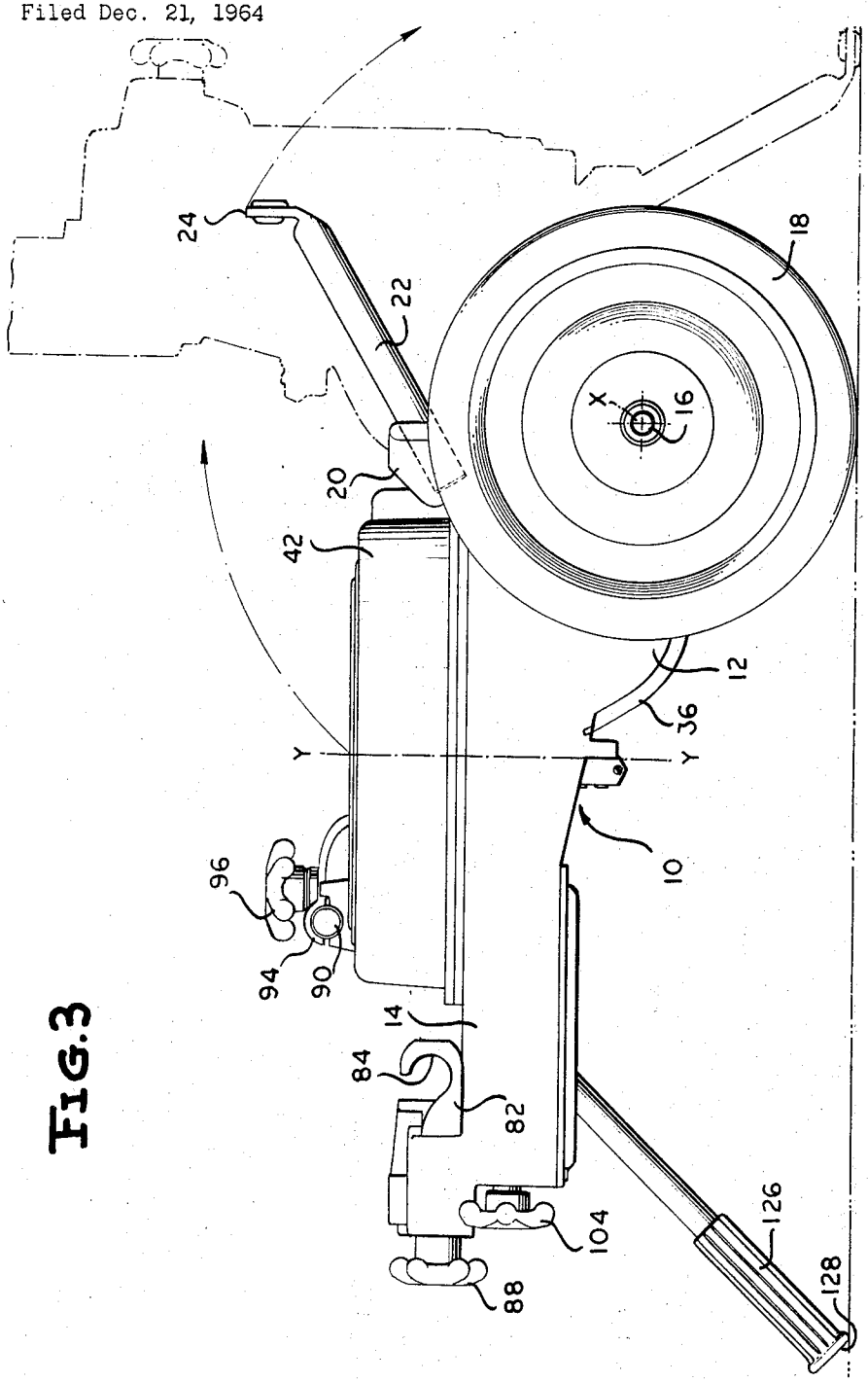


FIG. 3

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PORTABLE CONDUIT BENDER

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7 Claims. (Cl. 72—2)

ABSTRACT OF THE DISCLOSURE

A dolly mounted conduit bender wherein the axle for the wheels of the dolly extends normal to the axis of rotation of the drive wheel of the bending apparatus. The dolly has in addition to its wheels, two support members projecting from the frame in a manner to provide the dolly with two, three-point, support positions, one with the drive wheel axis normal to the support surface and one with the drive wheel axis parallel to the support surface.

The present invention relates to new and novel portable conduit bender apparatus, and more particularly to a portable electrically operated machine for bending metal pipes, rods and the like.

The present invention is an improvement over the portable conduit bender shown in U.S. Patent No. 2,921,-619. As shown in the aforementioned patent, a cast wheeled frame having an adjustable support for a pipe is provided, and the supported pipe is adapted to extend between a fixed integrally formed pipe shaping anvil or shoe means and a movable pipe shaping roller means co-acting with the anvil. The roller is carried around bodily in an arcuate path by lever mechanism which is actuated by suitable driven means in the form of a gear wheel. Automatic means is provided for opening the circuit through a reversible motor whereby the bending operation is stopped, and manually controlled mechanism is also provided for reversing the direction of movement of the pressing device so as to stop the bending operation.

The arrangement of the present invention incorporates the same general arrangement as shown in the aforementioned patent, the principal difference of the present invention lying in the particular orientation of the support means in the form of a pair of wheels, and further in the provision of an auxiliary support means to provide a first three point support for the apparatus, and a specially arranged and oriented handle means which cooperates with the wheels to provide a second three point support means.

With the arrangement as shown in the aforementioned patent, the apparatus is normally supported by a pair of wheels which are mounted for rotation about an axis of rotation which extends substantially parallel with the axis of rotation of the gear wheel of the apparatus. The wheels cooperate with the feet **40** provided on the handle bars for affording a four point support for the apparatus when it is disposed in its normal upstanding operative position.

With the arrangement shown in the aforementioned patent, it is necessary to lift up on the rubber cap portions **41** as shown in the patent, to tip the apparatus forwardly about the wheels disposed at the forwardmost portion of the apparatus. It is then necessary to hold the apparatus in the elevated position while wheeling it from place to place. This operation is rather awkward and requires considerable effort on the part of personnel moving the apparatus from place to place.

In the arrangement of the present invention, the handle means is so disposed that a simple downward pressure thereon pivots the supporting leg of the framework off of the ground so that the apparatus can be readily wheeled

from place to place while holding it in one hand. The apparatus accordingly is easier to maneuver and requires less effort to move than the arrangement as shown in the aforementioned patent.

In the patented structure, the apparatus is of such a nature that it can only be operated as a practical matter in an upright position wherein the axis of rotation of the gear wheel thereof is disposed substantially horizontal or parallel with the supporting surface. In certain applications, it is desirable to place the apparatus in such a position that the axis of rotation of the driving means or gear wheel is disposed substantially vertical or perpendicular to a supporting surface. It is not feasible to so position the apparatus as shown in the aforementioned patent since the construction thereof prevents it from being effectively positioned into such a relationship. Firstly, the support means is such that it is extremely difficult to tip the apparatus to one side, and in fact the apparatus is specifically designed to prevent such tipping movement. Secondly, there is no means for providing either a three or four point support which would ensure that the axis of rotation of the gear wheel is truly vertical, but rather it would be canted at an angle to the supporting surface other than the perpendicular relationship.

The arrangement of the present invention provides a unique orientation between the axis of rotation of the gear wheel or driving means and the axis of rotation of the wheel support means. The wheels are mounted for rotation about an axis which extends in a direction which is substantially perpendicular to that of the axis of rotation of the gear wheel. This of course is quite different from the arrangement shown in the aforementioned patent. An auxiliary support means in the form of a leg member is provided which extends obliquely downwardly from the support frame of the apparatus of the present invention and affords in combination with the wheels a first three point support wherein the apparatus is disposed in its normal upright operating position with the axis of rotation of the gear wheel substantially parallel with the supporting surface.

In addition, the handle means of the present invention extends obliquely upwardly from the support frame at the opposite side of the frame from the leg member, and the terminal end of the handle is so oriented that it is adapted to cooperate with the wheels to provide a second three point support arrangement wherein when so supported the axis of rotation of the gear wheel or drive means is disposed substantially vertical or perpendicular to the supporting surface.

In addition, it is quite easy to move the apparatus into either of its three point support positions since the entire frame pivots about the axis of rotation of the wheels whereby the frame can be very readily pivoted from one position to the other with a minimum of effort and the support means including the two wheels, the leg member and the end of the handle provide a very effective and stable three point support for the frame in either position as described above.

An object of the present invention is to provide a new and novel portable conduit bender which is more readily portable and easier to maneuver than prior art structures.

Another object of the invention is the provision of a portable conduit bender incorporating a support arrangement which permits the apparatus to be supported in either of two positions upon a three point support and such that the apparatus is positioned either generally vertically or horizontally so that bending operations can be carried out in either position so as to permit the apparatus to be employed in certain areas where there is restricted space in one direction or another.

Still another object of the invention is to provide a portable conduit bender wherein the support arrangement permits the apparatus to be readily and easily moved into either of the two three point support positions.

A further object of the invention is the provision of a portable conduit bender which is quite simple and inexpensive in construction, and yet which is quite efficient and reliable in operation.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a top perspective view of the portable conduit bender of the present invention;

FIG. 2 is a top perspective view of the upper portion of the apparatus shown in FIG. 1 looking from the opposite side thereof and illustrating the handle means in an exploded position; and

FIG. 3 is a side view of the apparatus shown in FIG. 1 illustrating its other three point support position.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, the portable conduit bender includes a frame indicated generally by reference numeral **10**. This frame may be cast from malleable iron or other suitable metal and may be substantially similar to the frame shown in the aforementioned patent. The frame includes a box-like base portion **12** and an upright extending portion **14**. An axle **16** is connected with the base portion **12** and extends from opposite sides thereof, a pair of wheels **18** being mounted at opposite ends of the axle and held in place by suitable conventional means. Wheels **18** are mounted for rotation about an axis of rotation indicated by line X—X as seen most clearly in FIG. 1 of the drawings.

Base portion **12** is provided with a fitting **20** which is adapted to receive one end portion of an auxiliary support means or leg member **22**. The opposite support end **24** of leg member **22** is adapted to rest upon a suitable supporting surface, and is provided with a hole **26** therethrough for receiving a suitable attaching means if it is desired to secure this leg member to the supported surface. A set screw **30** is threaded within a suitable hole provided in fitting **20** for securing the upper end of leg member **22** within a receiving opening in fitting **20**.

It will be noted as seen in FIG. 1 that the two wheels **18** and the support end portion **24** of leg member **22** provide a three point support for the apparatus, and when the apparatus is so supported, it is disposed in an upright position as shown with the axis X—X disposed substantially parallel with the supporting surface. This position represents the normal operating position of the conduit bender, and the three point support is such as to provide a very stable arrangement.

A reversible electric motor **34** is supported within the base portion **12** of the frame, and a motor cover **36** is secured to the frame to provide access to the motor when removed. A gear box (not shown) containing suitable reduction gearing is supported within the base portion **12** of the frame alongside motor **34**, the gear box including an output gear pinion which drives a gear wheel **40**. This driving arrangement is substantially identical with that shown in the aforementioned patent. Gear wheel **40** is supported for rotation about an axis of rotation indicated by line Y—Y in FIG. 1, and it will be noted that this axis of rotation extends in a direction which is substantially perpendicular to that of axis X—X previously described.

Gear wheel **40** is protected by a gear cover **42** secured to the frame, gear cover **42** having a cutout portion **44** for a purpose hereinafter explained.

A straight lever **50** extends across the gear wheel **40** and is pivotally connected with the gear wheel by a pivot pin indicated by reference numeral **52**. The other end of the lever extends through the cutout portion **44** formed in the gear cover and is formed with an enlarged laterally offset yoke **54**, U-shaped in cross section, formed integrally therewith and extending over and closely spaced from the teeth of the gear wheel. A roller **56** is disposed in the yoke between its side walls and is rotatably supported on a stub shaft **58** supported between the walls of the yoke, the roller having a groove **60** formed in the outer periphery thereof which is substantially semi-circular in cross sectional configuration. This structural arrangement is substantially identical with that disclosed in the aforementioned patent.

An anvil portion **66** in the form of a segment of a circular plate is cast at the upper portion of the frame, and a pair of supporting levers **68**, one on each side of the anvil portion, are provided, each lever **68** having one end pivotally fastened to the anvil by means of a pivot pin **70**, and having the opposite end thereof pivotally connected with a protruding end of the stub shaft **58**. With this arrangement, it is apparent that the roller member **56** is supported by the lever means including portions **50** and **68** such that the roller means is adapted to move in an arcuate path upon rotation of the gear wheel **40**.

Shoe means **72** is supported by anvil portion **66**, the shoe means being provided with an arcuate groove in the outer surface thereof which may also be of semi-circular cross sectional configuration, the groove provided in the shoe means being disposed in alignment with the groove in the roller means such that the roller means and the shoe means can cooperate during operation of the apparatus to confine a conduit therebetween and to bend the conduit into the desired configuration.

The rear end of the anvil portion **66** joins with a vertically disposed hollow bearing block portion **80** formed at the uppermost part of the upwardly extending portion **14** of the frame. The block has a square-shaped opening therein and a pipe supporting member **82** includes a square portion which fits within the square-shaped opening within the bearing block **80** to prevent relative rotation between these components. The pipe supporting member **82** has a curved lower portion **84** providing a substantially semi-circular seat which is adapted to support a suitable conduit therewithin. The upper portion of pipe or conduit supporting member **82** comprises an externally screw-threaded shank portion **86** of reduced dimension. A nut member **88** includes an elongated cylindrical body portion which has a threaded hole therein for receiving shank **86** and a handle portion at the upper part thereof. Upon rotation of nut member **88**, the pipe or conduit supporting member **82** is moved up or down in order to adjust the seat thereof relative to the grooves provided in the roller and shoe means. It will be noted that the seat provided in the lower end of the pipe supporting member is disposed in the same plane as the grooves provided in the shoe means and the roller means.

Length gage means is provided and includes an elongated tubular member **90** having a flat stop pad **92** secured at one end thereof. Tubular member **90** is received within a stop clamp **94** having an inner surface of complementary configuration to the tubular member, the tubular member also being received within arcuate portions formed on the outer surface of the gear cover **42**. A stop clamp knob **96** is threaded into a suitable threaded hole provided in the gear cover for urging the stop clamp tightly against member **90** to hold it in a desired operative adjusted position.

A conduit to be bent is indicated by reference numeral **98**, this piece of pipe or conduit being supported by member **82** and being received within the groove **72'** provided in the outer periphery of shoe means **72**. The end of the conduit portion **98** is in abutting relationship to the stop pad **92** for adjusting the amount of conduit extending beyond the shoe means and roller means to thereby determine the position at which the bend will be placed in the conduit.

The electric switching mechanism for controlling the operation of motor **34** is mounted within a compartment formed in the frame, the compartment being closed by a cover **100** which is seen in FIG. 2, this cover being held in place by suitable screws **101**. A service cord **102** extends into the compartment formed in the frame which houses the switching mechanism, this service cord being provided with a suitable plug for connecting the apparatus with a source of electrical energy for energizing motor **34**. A switch knob **104** is connected with the switching mechanism disposed within the compartment in the frame and permits manual operation of the switch mechanism from the exterior of the apparatus. This switching mechanism is substantially the same as that shown in the aforementioned patent, except that the external manually operable portion of the switching mechanism is slightly different.

In addition to the manually operable switch knob **104**, a remotely operable foot control mechanism is indicated generally by reference numeral **110** and includes a base portion **112** upon which is pivotally mounted a treadle portion **114**. This treadle portion is adapted to be operated by a person's foot and is operatively connected with a control cable assembly **116** which is connected with the switch mechanism and is adapted to remotely control operation of the switch mechanism in accordance with movement of the treadle **114**.

Referring particularly to FIG. 2, a handle means includes an elongated member **120**, the lower end **122** of which is threaded and which is adapted to be threaded into a cooperating threaded opening **124** provided in the frame. A hand grip member **126** formed of rubber or the like is secured about the upper end of member **120**, and the hand grip member includes a terminal end **128**.

Referring now particularly to FIG. 3, the solid line position as indicated in this figure shows the manner in which the apparatus is adapted to be supported in a second three point support position wherein the entire apparatus is supported by the two wheels **18** and by the terminal end **118** of the handle portion. It is apparent that the apparatus is readily moved into this position from the phantom line upright position as seen in this figure and which is shown in full lines in FIG. 1.

It will be noted that in the position shown in FIG. 3, the axis of rotation Y—Y of the driving means of the apparatus is disposed substantially perpendicular to the supporting surface, while the axis of rotation of the wheels still remains parallel with the supporting surface. It is obvious as seen in FIG. 3 that when the apparatus is supported in this position, it has a considerably less vertical dimension which thereby permits the apparatus to be supported in areas wherein the vertical space may be restricted and which would prevent the apparatus from being supported in its upright position as shown in FIG. 1.

It is apparent from the foregoing that there is provided according to the present invention a new and novel portable conduit bender which is more readily portable in that it is easier to maneuver and requires less effort to move from place to place. The apparatus may be readily maneuvered by means of a single handle portion, and the apparatus is adapted to be supported either in an upright position as shown in FIG. 1 wherein it is disposed substantially vertically or in a position at 90° thereto as shown in FIG. 3 where it is disposed substantially horizontally. In either operative position, the apparatus has a three point support means which provides a very stable arrangement and which further permits the bending operation to be readily carried out in either of the two operative positions. It is merely necessary to pivot the apparatus about the wheels thereof from one operative position to the other thereby facilitating such positioning of the apparatus. The portable conduit bender is quite simple and

inexpensive in construction, and yet is quite efficient and reliable in operation.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. A portable conduit bender comprising a support frame, shoe means supported on said support frame, roller means, lever means connected with said roller means for moving the roller means relative to said shoe means for cooperation therewith, rotatable drive means connected with said lever means for driving said roller means, said drive means being mounted on said support frame for rotation about a first axis, and support means for supporting said support frame for movement over a supporting surface, said support means being rotatable about a second axis which is substantially perpendicular to said first axis.

2. A portable conduit bender comprising a support frame, shoe means mounted on said support frame and having a groove in the outer portion thereof for receiving a conduit, roller means having a peripheral groove formed in the outer surface thereof, lever means supporting said roller means for rotation and movable for moving said roller means with respect to said shoe means during a bending operation, drive means operatively connected with said lever means, said drive means being rotatably supported on said support frame for rotation about a first axis of rotation such that rotation of the drive means causes movement of the lever means and the roller means to perform a bending operation, and support means including an axle for supporting said support frame, said axle having wheels rotatably mounted thereon, said wheels being mounted for rotation about a second axis of rotation which extends in a direction substantially perpendicular to that of said first axis of rotation.

3. A portable conduit bender comprising a support frame, shoe means supported by said support frame, roller means, lever means connected with said roller means for moving the roller means relative to said shoe means and in operative cooperating relationship with respect thereto, drive means rotatably supported by said support frame and being connected with said lever means for moving the lever means and the roller means upon rotation of said drive means, said drive means being mounted for rotation about a first axis of rotation, support means for the support frame and including an elongated axle having a pair of spaced wheels rotatably supported thereon, said wheels being mounted for rotation about a second axis of rotation which extends in a direction which is substantially perpendicular to that of said first axis of rotation, and auxiliary support means connected with said support frame and extending therefrom to terminate in a support portion which cooperates with said wheels to provide a three point support for the support frame such that when the three point support is operative with respect to a supporting surface, said first and second axes of rotation extend substantially parallel with the supporting surface.

4. A portable conduit bender comprising a support frame, shoe means supported by said support frame, roller means, lever means connected with said roller means for moving the roller means relative to said shoe means and in operative cooperating relationship with respect thereto, drive means rotatably supported by said support frame and being connected with said lever means for moving the lever means and the roller means upon rotation of said drive means, said drive means being mounted for rotation about a first axis of rotation, support means for the support frame and including an elongated

axle having a pair of spaced wheels rotatably supported thereon, said wheels being mounted for rotation about a second axis of rotation which extends in a direction which is substantially perpendicular to that of said first axis of rotation, and means extending from said frame and terminating in an end portion which is adapted to rest upon a supporting surface and to cooperate with said wheels to provide a three point support for the frame such that when the frame is supported on such three point support, said first axis of rotation extends substantially perpendicular to said support surface and said second axis of rotation extends substantially parallel with said support surface.

5. A portable conduit bender comprising a support frame, shoe means supported by said support frame, roller means, lever means connected with said roller means for moving the roller means relative to said shoe means and in operative cooperating relationship with respect thereto, drive means rotatably supported by said support frame and being connected with said lever means for moving the lever means and the roller means upon rotation of said drive means, said drive means being mounted for rotation about a first axis of rotation, support means for the support frame and including an elongated axle having a pair of spaced wheels rotatably supported thereon, said wheels being mounted for rotation about a second axis of rotation which extends in a direction which is substantially perpendicular to that of said first axis of rotation, auxiliary support means comprising a leg member extending obliquely from said support frame and including a support end portion adapted to rest upon a support surface to provide a three point support for the frame with said first and second axes of rotation extending substantially parallel with said support surface, and handle means extending obliquely from said frame and terminating in an end portion adapted to rest upon a support surface to provide a second three point support for the frame such that when the frame is supported upon said second three point support, said first axis of rotation extends substantially perpendicular to the support surface and said second axis of rotation extends substantially parallel with said support surface.

6. Apparatus as defined in claim 5 wherein said auxiliary support means extends outwardly from one side of said frame and said handle means extends outwardly from the opposite side of said frame, said shoe means and said roller means being mounted on the same side of the frame as said auxiliary support means.

7. A portable conduit bender comprising a support frame, a conduit supporting member adjustably supported

by said frame and adapted to receive a conduit to be bent, shoe means supported by said frame and having a curved groove formed in the outer surface thereof, roller means having a peripheral groove formed therein, lever means including a first portion pivotally connected with said frame, said lever means rotatably supporting said roller means for movement in cooperative relationship with respect to said shoe means, a gear wheel mounted for rotation on said support frame about a first axis of rotation, said gear wheel being pivotally connected with a second portion of said lever means whereby rotation of said gear wheel causes movement of said lever means and said roller means to perform a bending operation, support means including an elongated axle operatively connected with said support frame, a pair of wheels supported at opposite ends of said axle such that said wheels are mounted for rotation about an axis of rotation which extends in a direction which is substantially perpendicular to that of said first axis of rotation, auxiliary support means comprising a leg member extending outwardly of said support frame and terminating in a support end portion which is adapted to cooperate with said wheels to provide a first three point support for said frame, said frame being supported by said first three point support on a support surface such that said first and second axes of rotation extend substantially parallel with the support surface, and handle means extending outwardly from said frame and terminating in an end portion adapted to cooperate with said wheels to provide a second three point support for said frame, said second three point support adapted to support the frame upon a supporting surface such that said first axis of rotation extends substantially perpendicular to the support surface and said second axis of rotation extends substantially parallel with the support surface, said handle means and said auxiliary support means extending in opposite directions from said frame.

References Cited

UNITED STATES PATENTS

2,740,607	4/1956	Branick	254—2.4 X
2,921,619	1/1960	Bank	72—2
3,238,762	3/1966	Maring	113—56 X

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