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[54] APPARATUS FOR USE IN HANDWORKING GLASS
15 Claims. 7 Drawing Figs.

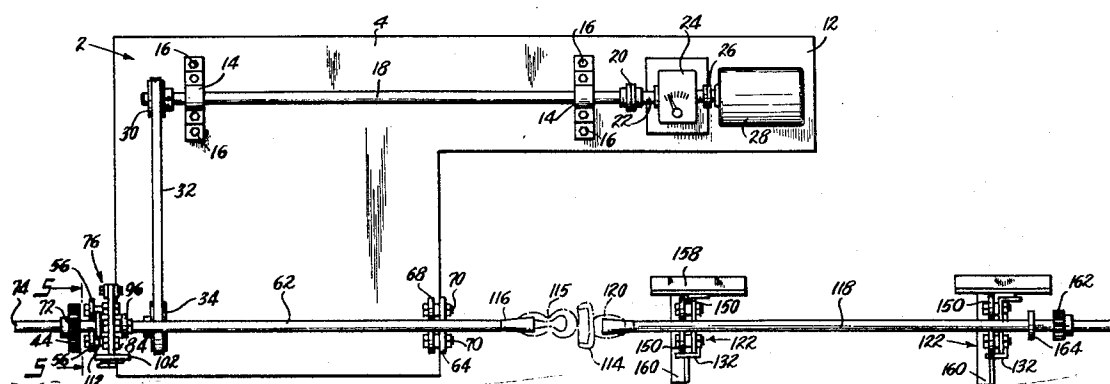
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[50]	Field of Search.....	65/228, 266, 261, 262, 66

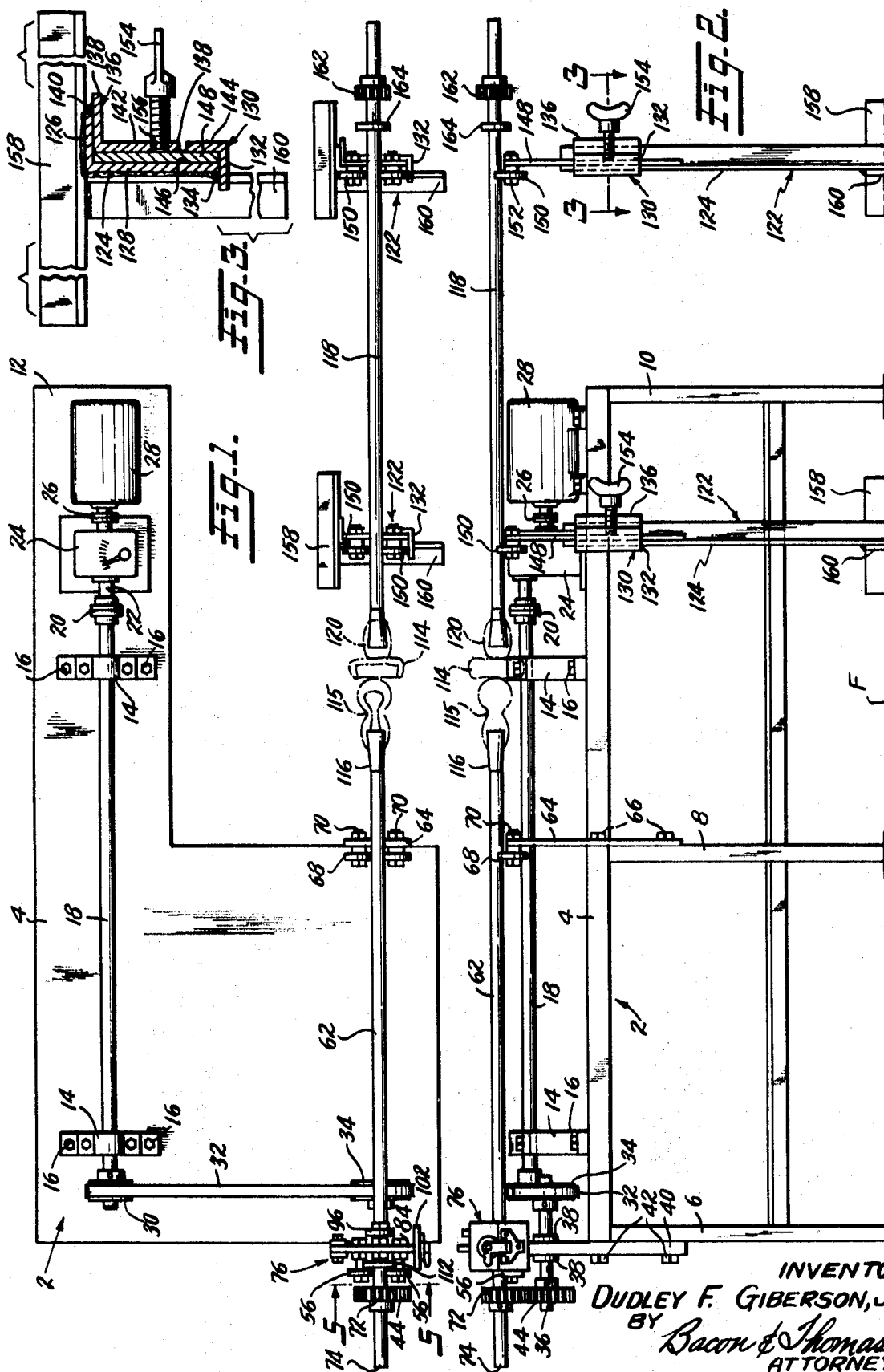
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ABSTRACT: Apparatus for enabling a lone craftsman to handwork hot glass without any assistants, comprising a bench having two spaced supports each carrying a pair of parallel rollers for centering a glassworking implement thereon. One of the supports carries a driven shaft with a drive gear at one end and a pulley at the other. A blowpipe is provided with a pinion gear that can be placed in mesh with the drive gear while the blowpipe is resting on the rollers. The support also carries a clamp for locking the pinion in mesh with the drive gear. Power is transmitted to the pulley on the driven shaft through a main shaft, a drive pulley, and a belt. The main shaft is driven by a conventional, variable speed transmission powered by an electric motor. The blowpipe carries a collar that is cooperable with the rollers and abutment means on the one support for preventing the blowpipe from shifting lengthwise when its pinion is in mesh with the drive gear. The clamp is releasable so that the blowpipe can be manually shifted to take its pinion out of mesh with the drive gear. The blowpipe is then free to be hand-manipulated on the roller supports. A punty is provided with a similar pinion and collar and can be engaged with or disengaged from the drive gear in the same manner as the blowpipe. A pair of stands, each having an adjustable member carrying self-centering roller supports for the punty, are positioned in axial alignment with the blowpipe to aid in supporting or working an object on the blowpipe.





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Fig. 4.

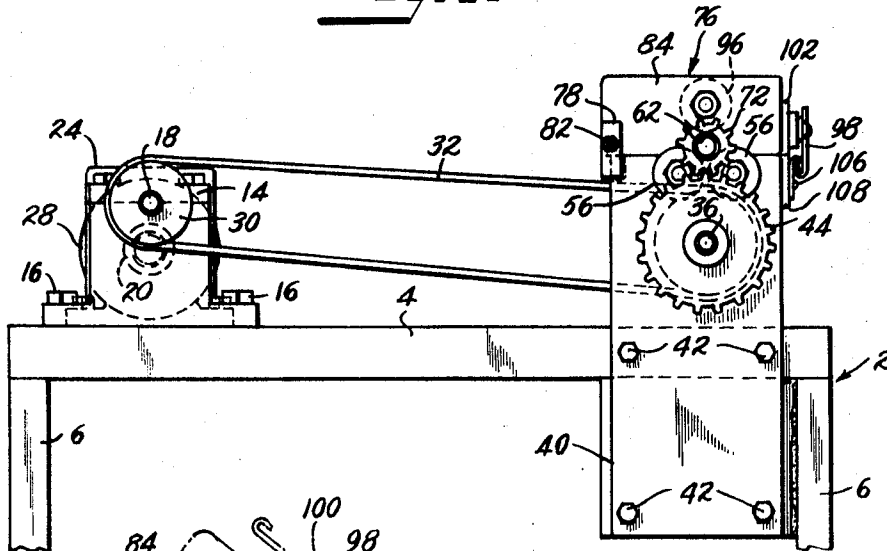


Fig. 5.

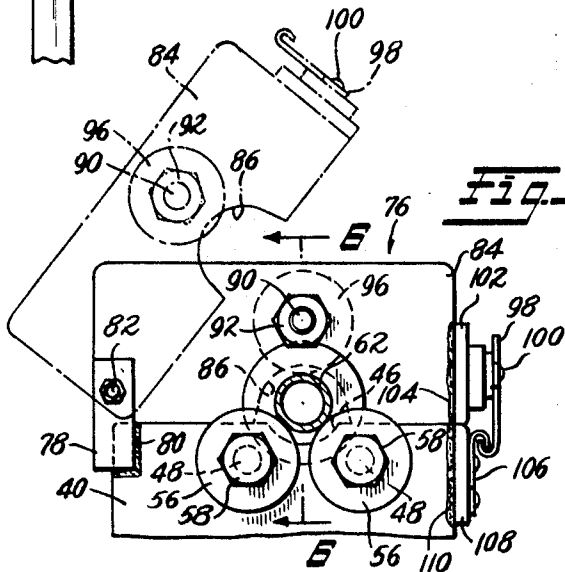


Fig. 6.

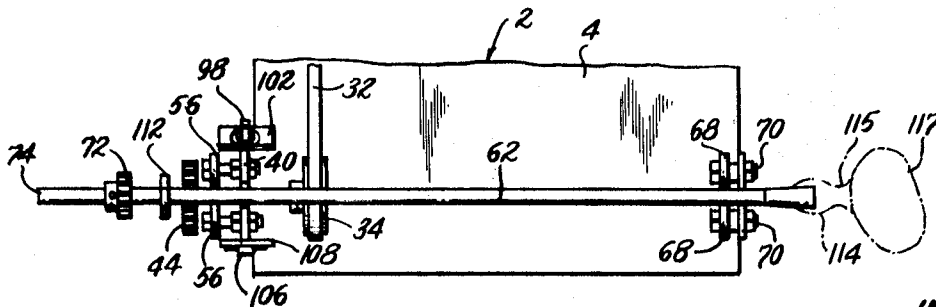
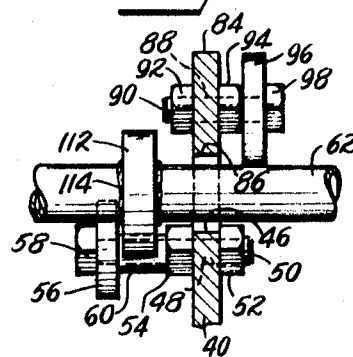


Fig. 7.

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APPARATUS FOR USE IN HANDWORKING GLASS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to apparatus for use in handworking hot glass, and more particularly to a novel bench equipped with blowpipe supporting and driving apparatus, and to punty supporting means that enable an artisan to be self-sufficient, and to work and shape glass articles which heretofore could not be made without the help of the customary gaffer, punty boy, or carrying boy.

2. Description of the Prior Art

It has been practically the universal practice in the handworking of glass to employ a gaffer's bench having two arms upon which the blowpipe is supported while the craftsman rolls the blowpipe back and forth on the arms with one hand and fashions the gather on the blowpipe with the other hand. The gaffer's bench was designed for use in factories or establishments where one or more persons are present to lend assistance to the craftsman. In such situation, operations requiring the use of two hands and which could not be performed by the craftsman while manipulating the blowpipe, did not create any problems.

Prior apparatus, such as the gaffer's bench, is not adaptable for one-man shop operation. For example, a craftsman working alone would have no difficulty in shaping and working the glass on a blowpipe to form, say, a bottle, but he would have difficulty in transferring the work to a punty for finishing and fire-polishing the neck of the bottle. Heretofore, the transfer has always required the assistance of a punty boy. Otherwise, the craftsman would have to set about the task of holding the blown work in one hand, while he attempted to gather and prepare a punty with the other. The punty gather is very important and contributes to the quality of the end product and varies with each type of glass article. The gathering of glass on the punty requires more than a one-handed thrust into a glass tank. A good punty can only be formed with two skilled hands and complete concentration. It is obvious, therefore, that the craftsman cannot properly support and maintain the partially completed work on the blowpipe and at the same time attempt to make a satisfactory gather. In this connection, it would not be practical for the craftsman to lay the blowpipe with the partially completed work on the arms of the gaffer's bench because it would fall offcenter by its own weight. Nor would it be practical for the craftsman to hand the blowpipe vertically, since the work would then tend to elongate. In addition, once the punty was readied, considerable time would be lost in laying the blowpipe back on the arms of the gaffer's bench and attaching the punty to the work.

Further problems beset the craftsman of a one-man shop in making blown articles which require the addition of one or more handles. As is well known in the glass art, handles are first formed from a glob of glass gathered on a punty and shaped. The shaped piece of glass is then added to the blown object to provide handles. It takes two hands to make and properly attach a handle. While the handle is being prepared for attachment, the blown work must, of course, be kept hot and on center. For the reasons stated above, it is not possible to keep the work on center on a gaffer's bench while the craftsman is performing other operations requiring the use of two hands. Additional difficulties are encountered in adding glass for the purpose of decoration, or theretofore the purpose of decoration, or in cutting glass from the workpiece, etc., unless the assistance of a second person is available. Thus, with prior apparatus, a lone craftsman was severely limited in the type of article he could design and produce. As a consequence, there has long been a need for apparatus that would assist the individual craftsman in maintaining a given blown shape while performing operations requiring the use of both hands.

SUMMARY OF THE INVENTION

The present invention overcomes the above problems and objections to prior glassworking equipment by providing apparatus that rotatably supports the blowpipe and partially blown workpiece, and automatically rotates it at a suitable speed to prevent the work from sagging and going offcenter, and by further providing stands for rotatably supporting a punty in axial alignment with the blowpipe. The present apparatus provides the further and important advantage of supporting and rotating the blowpipe, with or without punty attached to the work, leaving the craftsman free to use both hands for shaping the work, adding glass to the work, etc.

More specifically, the present invention provides apparatus for use in handworking glass and comprises a metal bench having a top portion with a lateral extension. Two spaced supports are secured to the sides of the bench adjacent its front. Each of the supports carries a pair of parallel rollers for centering and rotatably supporting a blowpipe thereon. One of the supports is vertically adjustable so that the blowpipe can be supported on the rollers in a true horizontal plane. The other of the supports serves as a mounting for a drive shaft, which has a pulley on one end and a drive gear on the other end. A motor and a variable speed transmission are mounted on the lateral extension of the bench top. A main shaft is mounted in pillow blocks on the bench top and is connected to the transmission. Power is transmitted by a belt from a pulley on the main shaft to the pulley on the shaft. The blowpipe has a pinion secured thereto that can be placed in mesh with the drive gear while the blowpipe is resting on the rollers. The support carrying the drive gear has a clamp pivotally mounted thereon for locking the pinion in mesh with the drive gear. The blowpipe carries a collar that is cooperable with one pair of rollers and abutment means for preventing the blowpipe from shifting lengthwise when its pinion is in mesh with the drive gear. The clamp is releasable so that the blowpipe can be manually shifted to take its pinion out of mesh with the drive gear when the craftsman desires to remove the blowpipe or wants it to be free for hand-manipulation on the rollers.

The invention further comprises a punty that is provided with a pinion and collar similar to that on the blowpipe, and which pinion can be engaged with or disengaged from the drive gear in the same manner as the blowpipe.

The invention still further comprises a pair of stands adapted to rest on the floor, each stand including a vertically adjustable member having spaced, parallel rollers mounted thereon for rotatably supporting the punty in axial alignment with the blowpipe.

The present bench with its mechanical drive means for rotating the blowpipe makes it possible for the first time for a craftsman to leave the blowpipe on the bench without danger of the work sagging or coming offcenter. Thus, both hands of the craftsman are left free to perform other details or operations on the workpiece without the help of any assistant.

Accordingly, the principal object of the invention is to provide apparatus that will enable a craftsman to completely handwork or fashion hot glass objects, such as vases, pitchers, goblets, bottles, etc., which heretofore required the help of one or more assistants, without the help of any assistant.

Another object is to provide apparatus for supporting and mechanically rotating a blowpipe with a partially formed object thereon, thus enabling the craftsman to perform operations on the object requiring the use of both hands, or to engage in other related work remote from the blowpipe, without danger of the work sagging or coming offcenter.

Another object is to provide apparatus that will automatically center a blowpipe or punty thereon for rotation about a true horizontal axis.

Still another object is to provide rotatable support means for a punty to aid in supporting a body of glass on a blowpipe, while the blowpipe is being manually or mechanically rotated.

A further object is to provide apparatus for mechanically rotating a blowpipe, having a mass of hot glass on one end thereof, at any desired working speed.

A further object is to provide apparatus for supporting and/or rotating a blowpipe having a partially blown object thereon while the craftsman is making additions to or subtractions from the work in progress, without the shape of the work being altered, except by manipulation by the craftsman.

A still further object is to provide apparatus for rotatably supporting a punty in true axial alignment with a blowpipe.

A still further object is to provide apparatus for rotatably supporting a blowpipe or punty so that it can be optionally mechanically driven or manually manipulated.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a preferred bench structure for use in handworking glass, but showing two punty stands to be used in conjunction with the bench;

FIG. 2 is a front elevation view of the bench and stands shown in FIG. 1;

FIG. 3 is an enlarged horizontal sectional view through one of the punty stands, taken on the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary left end elevational view of the bench shown in FIGS. 1 and 2;

FIG. 5 is an enlarged fragmentary vertical sectional view, taken on the line 5—5 of FIG. 1, showing the clamp member in released position in dot-and-dash lines, and in locked position in full lines to hold the pinion on the blowpipe in mesh with the drive gear;

FIG. 6 is a fragmentary vertical sectional view, taken on the line 6—6 of FIG. 5, particularly illustrating the collar for preventing the driven blow pipe from moving longitudinally during a glass-forming operation; and

FIG. 7 is a fragmentary plan view of the apparatus shown in FIG. 1, but illustrating the blowpipe disengaged from the driving gear and shifted toward the left to permit manual manipulation of the blowpipe.

Referring to FIGS. 1 and 2, a workbench is generally identified by the numeral 2 and comprises a top 4 supported by three sets of legs 6, 8, and 10. The top 4 has a relatively narrow, laterally extending portion 12. A pair of pillow blocks 14 is secured to the top 4 by bolts 16. The pillow blocks 14 rotatably support a main shaft 18. One end of the shaft 18 is connected by a coupling 20 with the output shaft 22 of a conventional variable speed transmission 24 mounted on the extension 12. The transmission 24 has a speed of 0 to 400 r.p.m.. A coupling 26 connects the transmission 24 with the drive shaft of an electric motor 28. The opposite end of the main shaft 18 carries a pulley 30 connected by a belt 32 with a pulley 34 fixed to a driven shaft 36. The shaft 36 is rotatably mounted in roller bearings 38 secured to opposite sides of a vertical support or plate 40. The plate 40 is secured to the left end of the table 2 by bolts 42, and a drive gear 44 is fixed on the driven shaft 36 outwardly of the plate 40.

Referring to FIGS. 5 and 6, the upper end of the plate 40 has an arcuate notch 46 formed therein. An opening 48 extends through the plate 40 below and on either side of the notch 46. A bolt 50 extends through each opening 48 and carries nuts 52 and 54 positioned on opposite sides of the plate 40 for mounting the bolt 50 thereon. A conventional, sealed, ball bearing, which serves as a roller 56, is mounted on the bolt 50 between the bolthead 58 and a spacer 60 engaged with the nut 54. The notch 46 provides ample clearance for a hollow blowpipe 62 to removably rest upon the rollers 56, in a recess formed therebetween as is best shown in FIG. 5.

A plate 64 is adjustably secured by bolts 66 to the table 2 and has a pair of rollers 68 similar to the rollers 56 mounted thereon by bolts 70. The rollers 68 are spaced apart the same distance as the rollers 56 and serve to rotatably and removably support the blowpipe 62. The roller 56, 56 and 68, 68 are conveniently located near the front of the bench 2 and serve as self-centering means for the blowpipe 62.

A pinion 72 is fixed to the blowpipe 62 near one end 74 thereof and is adapted to mesh with the drive gear 44 while the blowpipe carrying a glass charge is rotatably supported by the rollers 56, 56 and 68, 68 during the glassworking operation. In order to retain the pinion 72 in mesh with the gear 44, a clamping device 76 is pivotally mounted upon the plate 40. Thus, a pair of lugs 78 is welded at 80 to the plate 40 and has a bolt 82 extending therethrough. A clamp member 84 is disposed between the lugs 78 and is pivotally mounted on the bolt 82. The clamp member 84 has a notch 86 formed in its lower edge to clear the blowpipe 62 when resting upon the supporting rollers 56, 56. The clamp member 84 has an opening 88, which receives a bolt 90. The bolt 90 is secured to the clamp member 84 by nuts 92 and 94 that engage opposite sides of said clamp member, as shown in FIG. 6. A sealed ball bearing serves as a roller 96 and is mounted upon the bolt 90 between the bolthead 97 and the nut 94.

The clamp member 84 is shown in full lines in its closed position in FIG. 5, wherein the roller 96 lightly engages the uppermost surface of the blowpipe 62. The clamp member 84 is shown in dot-and-dash line in a partially retracted position to permit ready positioning relative to and/or removal of the blowpipe 62 from its supporting rollers 56, 56 and 68, 68. The clamp member 84 is held in a locked position by a latch 98 pivotally mounted at 100 on a plate 102 welded at 104 to the forward edge of the clamp member 84, and a keeper 106 mounted upon a plate 108 welded at 110 to the front edge of the plate 40. The clamp member 84 can readily be released by turning the latch member 98 to disengage it from the keeper 106, whereupon the clamp member 84 can be pivoted about the bolt 82 to swing it out of the way.

The clamp member 84 also serves the purpose of retaining the pinion 72 in engagement with the drive gear 44. In order to prevent the blowpipe 62 from moving longitudinally and disengaging the pinion 72 from the gear 44, a collar 112 is welded to the blowpipe 62, as indicated at 113. As is shown in FIG. 6, the collar 112 is positioned so that it lies between the rollers 56 and the nuts 54 when the pinion 72 is engaged with the gear 44. However, when it is desired to manually manipulate the blowpipe 62, the clamp member 84 is released and the blowpipe 62 is raised until the collar 112 clears the rollers 56, 56 and then moved toward the left, as viewed in FIG. 7. The blowpipe 62 is then lowered onto the rollers 56, 56 with the collar 112 disposed to the left of the drive gear 44. In this position, it is impossible for the pinion 72 to mesh with and be driven by the gear 44.

FIGS. 1 and 2 illustrate, in dot-and-dash lines, a partially blown glass object 114 carried by the working end 116 of the blowpipe 62. A dipstick punty 118 with a charge or glass gather 120, shown in dot-and-dash lines, is engaged with the object 114 in axial alignment with the blowpipe 62. The punty 118 is supported in such aligned position by a pair of stands 122.

Each stand 122, FIGS. 1 to 3, comprises an angle iron upright 124 consisting of a narrow leg 126 and a relatively wide leg 128. A piece of angle iron 130 has one leg 132 welded to the edge of the wide leg 128 of the upright 124, as indicated at 134. Another angle iron 136 has a leg 138 welded to an edge of the narrow portion 126 of the upright 124, as indicated at 140. The other leg 142 lies in the same plane as a leg 144 of the angle iron 130, and the legs 142 and 144 cooperate with the wide leg 128 of the upright 124 to provide a generally rectangular passageway 146 for slidably receiving a plate 148. The plate 148 has a pair of rollers 150, similar to the rollers 56 and 68, secured thereto by bolts 152 for rotatably and removably supporting the punty 118. The plate 148 is retained in adjusted position by a wingbolt 154 mounted in a threaded opening 156 in the angle iron leg 142, the end of the bolt engaging the plate 148 to clamp it against the leg 128 of the upright 124.

The upright 124 has a piece of angle iron 158 welded at its lower end to its narrow leg 126 and another piece of angle iron 160 welded to its wide leg 128. The angle irons 158 and 160

rest upon the floor F and serve to retain the stand 122 in an upright position. The table 2 and the stands 122 may all be secured to the floor F with the stands 122 aligned with the axis of the blowpipe 62 and with the plates 148 adjusted so that the blowpipe 62 and the punty 118 are horizontally, axially aligned.

The punty 118 has a gear 162, similar to the gear 72, that can be placed in mesh with the drive gear 44. A collar 164, similar to the collar 112, is welded to the punty 118 and is utilized in the same manner as the collar 112.

In the process of forming any blown object:

A gather of glass 114 is taken on the blowpipe 62 from a furnace and rolled on a steel plate, or marver, to chill its outside surface. It is then blown to form a small bubble. While chilling, a small indent 115 is made manually in the bubble just in front of the end 116 of the blowpipe 62. This step is conventional and is called "necking the first gather". The motor 28 will have been in operation at this time to impart rotation to the drive gear 44 at the desired speed so that after the glass has been "necked", the blowpipe 62 is placed on the rollers 56, 56 and 68, 68 with the pinion 72 in mesh with the gear 44, the rollers serving to automatically center the blowpipe 62 thereon. The gear 44 will then drive the pinion 72 to automatically rotate the blowpipe 62. The pinion 72 and gear 44 can be locked in engagement, if desired, by moving the clamp member 84 to its closed position and securing it in place, as previously described. Whether locked in place or not, the blowpipe 62 is mechanically rotated to keep the work centered until it cools to about 1,150° F.

The blowpipe 62 is then removed from the rolls 56, 56 and 68, 68 and again inserted into the furnace to make a second gather 117, which will be irregular in shape. Care is taken not to add glass above the "necked" line 115. The blowpipe 62 is again placed on the rollers 56, 56 and 68, 68 with the collar 112 to the left of the gear 44, as in FIG. 7, and manually turned in both directions alternately for the purpose of rotating the molten glass relative to a conventional wooden block (not shown) to chill the outer surface of the gather 117. After approximately twenty seconds of "blocking", the glass is not only cool enough to hold a blown form, but it is also warm enough to be formed to the desired shape. The blocking also forms the hot glob of glass 117 so that when it is blown to a larger size, the walls will be of substantially equal thickness. In certain situations, compressed air is supplied to the blowpipe 62 to enlarge the work. Otherwise, the blowpipe 62 is removed from the rolls 56, 56 and 68, 68 and the blocked gather is then manually blown to a larger diameter. The blowpipe 62 and work are then swung in midair, as a baton. The centrifugal force produced elongates the object to the extent desired. After elongation, the blowpipe 62 and work are again placed on the rolls 56, 56 and 68, 68 for mechanical rotation by the gear 44. A wooden paddle (not shown) is used to shape the glass form as it turns. This shaping process is not limited to a wooden paddle, but may utilize a block, pincers, wooden sticks, steel rods, etc. This portion of the shaping and other manipulations require the use of two hands and could not be performed by a lone craftsman without the aid of the automatic drive means of the present invention.

Once the shaping process has been completed, a small gather of glass is collected on the end of the punty 118. This is marvered, shaped, and slightly chilled to a point where it will slightly adhere to the hot bottom of the shaped glass form still on the blowpipe 62. The punty is pushed against the bottom of the blown glass form as previously described. The glass is then immediately chilled with running water at the "necked" region 115. The water cools and fractures the glass on contact. With a smart tap, the blown work is separated from the blowpipe 62 and a so-called "lip" is formed on the workpiece, as is well known in the glassworking art. The workpiece is now supported only on the punty 118.

The workpiece on the punty 118 is reheated to a point where the "lip" becomes molten (firepolishing). The punty 118 is then placed on the rolls 56, 56 and 68, 68, with its gear

162 in mesh with the drive gear 44 and locked in place by the clamp 84. The craftsman then has both hands free to use two sticks, pincers, or other tools, to wither enlarge the lip opening, as for a bowl, or to close the opening, as desired.

If a handle is to be added to the work, the glass is prepared on a second punty and suitably shaped and chilled. The motor 28 is stopped and the top of the handle is attached to the workpiece, the craftsman having both hands free to manipulate the second punty to firmly attach the tip and to use shears to cut off a suitable length of the gather, thereby forming a stump. The workpiece is then reheated until the stump begins to fall, whereupon it is elongated and its free end attached to the workpiece.

The work is then taken to a dismantling table (not shown), where with a light tap the work is detached from the punty 118. The work is placed in a hot (1,100° F.) kiln (not shown) where it remains until the last workpiece of the day has been placed in the kiln. The kiln is shut off and the work cools slowly throughout the night.

It will be understood that various changes may be made in the design, construction and arrangement of apparatus and/or process described hereinbefore, without departing from the principles of the invention.

I claim:

1. Apparatus for use in handworking glass, comprising: means having a first support and a second support positioned thereon in spaced relation, each of said supports having a pair of rollers mounted thereon forming a recess for rotatably and removably supporting a charged glassworking implement in a horizontal plane during a glassworking operation; and drive means connectable with said glass working implement for mechanically rotating said glassworking implement while so supported and while the charge is being shaped.

2. Apparatus as recited in claim 1, wherein the glassworking implement is a blowpipe, and wherein the apparatus includes an additional pair of spaced stands, each stand having a pair of rollers mounted thereon forming a recess for rotatably and removably supporting a dipstick punty in axial alignment with the blowpipe.

3. Apparatus as recited in claim 2, wherein each stand includes a vertically adjustable member, and wherein one pair of rollers is mounted upon each adjustable member.

4. Apparatus as recited in claim 3, wherein the glassworking implement is a blowpipe or punty; and wherein the drive means for mechanically rotating the glassworking implement comprises a variable speed drive.

5. Apparatus as recited in claim 4, wherein the drive means for the blowpipe or punty further comprises a pinion mounted upon the blowpipe and punty, respectively, and a drive gear, driven by the variable speed drive, said drive gear being engageable by either of said pinions for rotation during a glassworking operation.

6. Apparatus as recited in claim 1, wherein the glassworking implement has a pinion mounted thereon, and wherein the means connectable with and for mechanically rotating the charged glassworking implement includes: a driven shaft rotatably carried by the first support in parallel relation with the rollers thereon, a driven pulley on said driven shaft, and a drive gear on said driven shaft engageable by said pinion.

7. Apparatus as recited in claim 6, wherein the means for mechanically rotating the charged glassworking implement further includes a main shaft driven through a variable speed transmission, a drive pulley on said main shaft, and a belt for transmitting a drive from said drive pulley to the driven pulley mounted on the driven shaft carried by the first roller support.

8. Apparatus as recited in claim 1, wherein the second support is adjustable to position its rollers to support the charged glassworking implement with its axis in a true horizontal plane.

9. Apparatus as recited in claim 1, wherein the means having the first and second supports positioned thereon is a bench; and wherein the means for mechanically rotating the charged glassworking implement includes power-driven means mounted on the bench.

10. Apparatus as recited in claim 9, wherein the charged glass working implement is a blowpipe, and wherein the apparatus includes an additional pair of spaced stands, each stand having a pair of rollers mounted thereon forming recess, for rotatably and removably supporting a dipstick punty, and wherein the stands are aligned with the first and second supports on the bench for supporting the punty in axial alignment with the blowpipe during a glassworking operation.

11. Apparatus as recited in claim 9, wherein the first support comprises a plate secured to the bench; and wherein one pair of rollers is mounted upon the plate in spaced relation to center the glassworking implement thereon; and wherein a clamp member is pivotally mounted upon said plate and carries a roller for engaging the upper side of the glassworking implement.

12. Apparatus as recited in claim 11, wherein the glassworking implement carries a pinion, and wherein the first support carries a drive gear for meshing with said pinion, and wherein the power-driven means drives said drive gear.

13. Apparatus for use in handworking glass, comprising: a bench; a blowpipe for receiving a charge and having a pinion mounted thereon; a first support and a second support mounted upon said bench in spaced relation; a pair of rollers mounted upon each of said supports in parallel relation each

pair forming a recess for centering thereon and rotatably and removably supporting said blowpipe in a horizontal plane during a glassworking operation; a driven shaft rotatably mounted upon said first support; a pulley mounted upon one end of said driven shaft; a drive gear mounted upon the other end of said driven shaft; means connected with said pulley for driving said driven shaft, the pinion on said blowpipe being engageable with said drive gear to effect automatic driving thereof while supported on said pairs of rollers; clamping means mounted upon said first support for holding said pinion in mesh with said drive gear; and longitudinal positioning means carried by said blowpipe between said first support and the rollers thereon, cooperating therewith to prevent longitudinal movement of said blowpipe while being driven by said drive gear.

14. Apparatus as recited in claim 13, wherein the means for driving the driven pulley on the driven shaft includes a variable speed drive.

15. Apparatus as recited in claim 13, including in addition a pair of stands each having a pair of rollers mounted thereon and being positioned relative to the bench to rotatably support a punty in axial alignment with the blowpipe during a glassworking operation.

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