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T. F. BRANDT

2,095,310

FORMING APPARATUS

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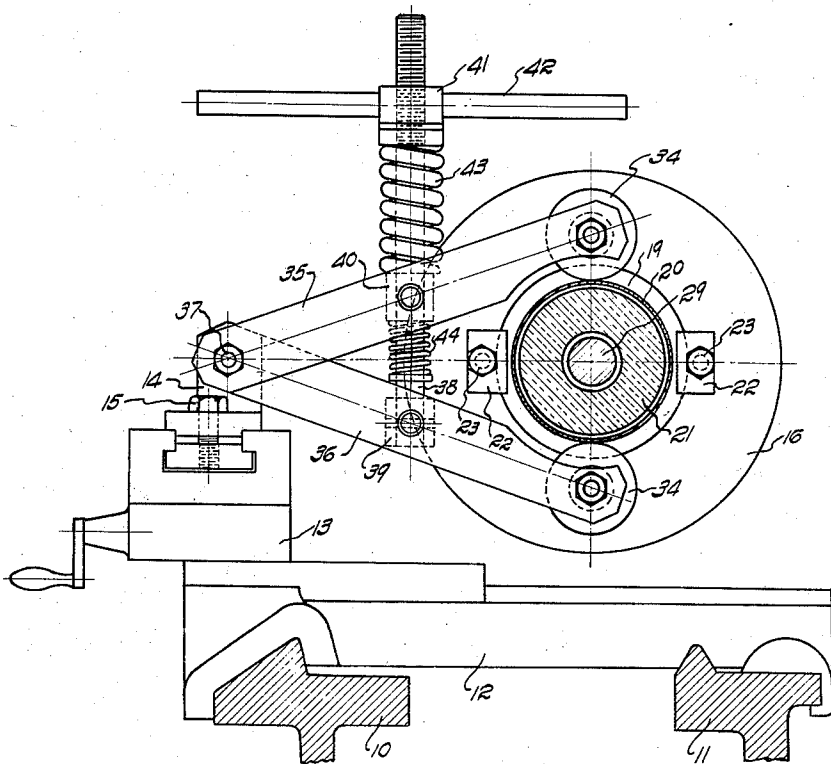


FIG. 1

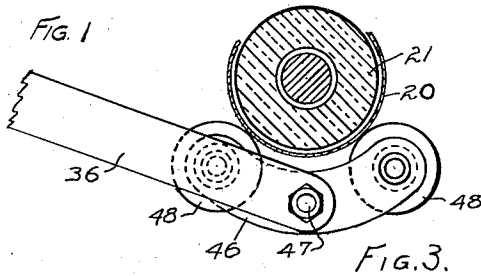


FIG. 3.

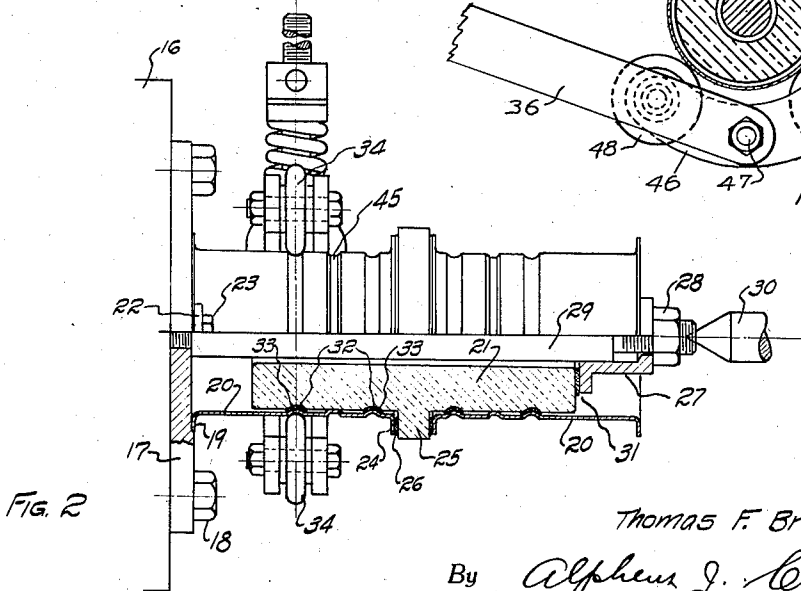


FIG. 2

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FORMING APPARATUS

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3 Claims. (Cl. 153—1)

This invention relates to a method and apparatus for spinning sheet metal and particularly for securing a collar or sleeve to an internal cylinder by pressing the sheet metal into circumferential grooves in the cylinder.

One object of the invention is to produce uniform results, notwithstanding irregularities in the work piece.

A further object of the invention is to provide an arrangement of apparatus in which the relation of the spinning wheel to the work will not be affected by the force exerted by the work upon the wheel.

A further object of the invention is to provide a spinning apparatus comprising two spinning wheels and an arrangement whereby the reaction of each will be received by the other to prevent displacement of the work relative to the apparatus, due to the pressure of the spinning wheel on the work.

A further object of the invention is to provide an improved method and apparatus of the class named.

Other objects and advantages will appear from the following description.

The invention is exemplified by the combination and arrangement of parts shown in the accompanying drawing and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is an elevation with parts in section showing one form of apparatus for practicing the present invention.

Fig. 2 is a side elevation partly in section, looking from the right in Fig. 1.

Fig. 3 is a fragmentary section showing a modification of the invention.

Heretofore in spinning sheet metal objects, it has been customary to rotate the object upon a spindle or other rotating support and to press the spinning wheel against the object so as to produce the desired contour. This method of operation has certain objections for some kinds of work. Where heavy work is being performed, the reaction between the spinning wheel and the work tends to displace the work relative to its support and produce imperfect operation. Another objection to this method of operation is that where it is desired to press an outer sleeve against an inner rotating member, any inequalities in the inner member will produce unequal pressure at the different points on the circumference of the rotating work. The present invention overcomes these difficulties and com-

prises other advantages, as will appear from the drawing and following description.

The invention is illustrated as being applied to the attachment of a sleeve or collar to a porcelain tube so as to form a liquid tight joint between the sleeve and tube. It will be understood, however, that the invention may be applied to a large variety of work other than that illustrated. The work may be mounted upon a lathe or any other suitable apparatus for producing rotation.

The form of apparatus shown in the illustration is that of a machine lathe having ways 10 and 11 upon which a tool carrier 12 is mounted to travel. A head 13 is adjustably mounted on the carrier 12 to which a post 14 is secured by clamping bolts 15. By this arrangement the post 14 may be adjusted to any desired position upon the lathe bed in a manner well understood in the art. The lathe is provided with a face plate 16 which is rotated in the usual manner. An adapter plate 17 is secured to the face plate 16 by cap screws 18. The adapter plate is provided with a recess for receiving the end flange 19 of a sheet metal sleeve 20 which, in the present instance, is to be attached to a porcelain tube 21. The flange 19 is clamped to the adapter plate 17 by plates 22 and cap screws 23. The outer end of the sleeve 20 is provided with a flange 24 which engages a circumferential flange 25 on the porcelain cylinder 21, a packing ring being interposed between the two flanges. The cylinder 21 is held in place in the sleeve 20 with the flange 25 pressed against the washer 26 by means of a collar 27 and nut 28 threaded on the outer end of a spindle 29, the inner end of which is threaded into the adapter plate 17. The outer end of the spindle 29 may be supported and centered by a dead center 30 mounted on the tail stock of the lathe in the usual manner. A cushioning washer 31 is preferably interposed between the collar 27 and the outer end of the porcelain cylinder 21. The cylinder 21 is provided with peripheral grooves 32 into which the metal sleeve 20 is compressed to secure the sleeve to the cylinder. Packing bands 33 are placed in the grooves 32 before the metal is compressed so that when the metal of the sleeve 20 is pressed into the grooves, it will bear against the packing 33 and form a liquid tight joint. Before the metal is compressed against the packing 33, the nut 28 is tightened to press the flange 25 against the flange 24 with sufficient pressure to form a liquid tight joint between the two flanges. When the metal of the sleeve 20 is spun into the

grooves 32 against the packing 33, the cylinder 21 and sleeve 20 will thus be interlocked so as to maintain the pressure on the packing 26 after the nut 28 has been released. In this way the sleeve 20 is firmly attached to the cylinder 21 and packing is provided at three different points to insure a liquid tight joint between the cylinder and sleeve.

The metal of the sleeve is spun into the grooves 32 by means of a pair of rollers 34 journaled respectively at the outer ends of a pair of arms 35 and 36. The inner ends of the arms 35 and 36 are pivoted at 37 to the post 14. A bolt or rod 38 is attached at one end to a head 39 pivotally mounted on the arm 36 about midway between the ends of the arm. The rod 38 passes loosely through a head 40 pivotally mounted on the arm 35 about midway between the ends of the arm. A nut 41 is threaded on the rod 38 at its outer end and is provided with an operating bar 42. A relatively long heavy spring 43 is interposed between the head 40 and nut 41 so that when the nut 41 is tightened on the bolt 38, the spring 43 will be compressed, acting to draw the arms 35 and 36 together and to press the rollers 34 against opposite points on the periphery of the sleeve 20. A light spring 44 may be interposed between the heads 39 and 40 to spread the arms 35 and 36 when the spring 43 is released. By this arrangement pressure may be exerted upon the rollers 34 to press the metal of the sleeve 20 into the grooves 32 and the amount of pressure will be practically independent of any inequalities in the cylinder 21 because the rollers are free to move transversely of the axis of rotation of the cylinder 21 without affecting the pressure exerted upon the rollers by the spring 43. Any variation in the diameter of the cylinder 21 will have very little effect upon the pressure of the rollers 34, due to the relatively long pick-up of the spring 43 and to the fact that the relative movement of the heads 39 and 40 will be materially less than the relative movement of the rollers 34 caused by any variation in the diameter of the cylinder 21. Because of this ability of the apparatus to accommodate itself automatically to variations in the cylinder 21, it is possible to produce tight joints on porcelain cylinders as they come from the kiln, while heretofore in order to secure uniformly tight joints, it has been necessary to grind the grooves in the cylinder accurately in order to secure a uniformly tight joint about the entire periphery of the work piece. This adaptability of the device to variations in the work results in a very large saving in the cost of the finished product and in the time required for manufacture.

Another important advantage of this method of operation is that the force exerted by each roller upon the work is counteracted by the opposite force exerted by the other roller so that there is no resultant tending to displace the work upon its support. Furthermore, the force exerted by the rotation of the work upon the rollers is transmitted to the supports for the rollers 35 and 36 in the direction of the length of these links so that there is no tendency to bend the supporting links and displace the rollers relative

to the periphery of the work, as is the case where the roller is supported at the end of an arm pressed longitudinally toward the work. Even the longitudinal stresses on the links 35 and 36 largely counteract each other since the stress in the link 35, for instance, is in one direction and in the link 36 is substantially in the opposite direction and the two are transmitted to the same pivotal support 37. The only resultant stress on the post 34 is the slight tangential resultant of the two longitudinal forces in the links 35 and 36 tending to rotate the pivot 37 about the axis of the work.

In operation, the sleeve 20 is first secured in place upon the adapter plate 17 with the packing 33 in place in the grooves 32. The cylinder 21 is then tightened up against the packing 26 by the nut 28 and a locating groove 45 is first spun in the sleeve 20 by the rollers 34 in order to space the sleeve 20 uniformly from the periphery of the cylinder 21. The rollers 34 are then successively located in registration with the grooves 32 and the metal compressed against the washers 33. Where a sleeve 20 is to be attached to each end of the cylinder 21, as shown in the drawing, the sleeve is secured first to one end and then the piece is reversed and the operation is repeated to attach the cylinder to the other end.

In the modification shown in Fig. 3, one of the rollers 34 is replaced by a yoke 46 which is pivotally mounted at 47 on the end of the arm 36 and which carries a pair of rollers 48 similar to the rollers 34. Both arms 35 and 36 may be equipped with a pair of rollers or only a single arm may be so equipped, as shown in Fig. 3.

I claim:

1. Spinning apparatus comprising means for rotating a work piece, a pair of arms pivotally mounted at one side of the axis of rotation of said work piece, forming tools carried by said arms in position to engage said work piece at opposite sides of the axis of rotation thereof, and spring means acting on both of said arms for pressing said tools against said work piece.

2. Spinning mechanism comprising means for rotating a work piece, a pair of forming tools for engaging said work piece at points thereon at opposite sides of the axis of rotation of said work piece, arms for supporting said tools and extending away from said work piece, means for supporting said arms at one side of the line joining the points of contact of said tools with said work piece, and spring means cooperating with said arms for pressing said tools against said work piece.

3. Spinning mechanism comprising means for rotating a work piece, a tool support adjustably mounted at one side of the axis of rotation of said work piece, a pair of links pivotally mounted on said tool support, rollers carried by said links respectively for engaging said work piece at opposite sides of the axis of rotation thereof, and a spring connected to said links between said rollers and said tool support for drawing said links toward each other and pressing said rollers against said work piece.

THOMAS F. BRANDT.

CERTIFICATE OF CORRECTION.

Patent No. 2,095,310.

October 12, 1937.

THOMAS F. BRANDT.

It is hereby certified that the State of Incorporation of the assignee in the above numbered patent was erroneously given as "Ohio" whereas said State should have been given as New Jersey, as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of November, A. D. 1937.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.