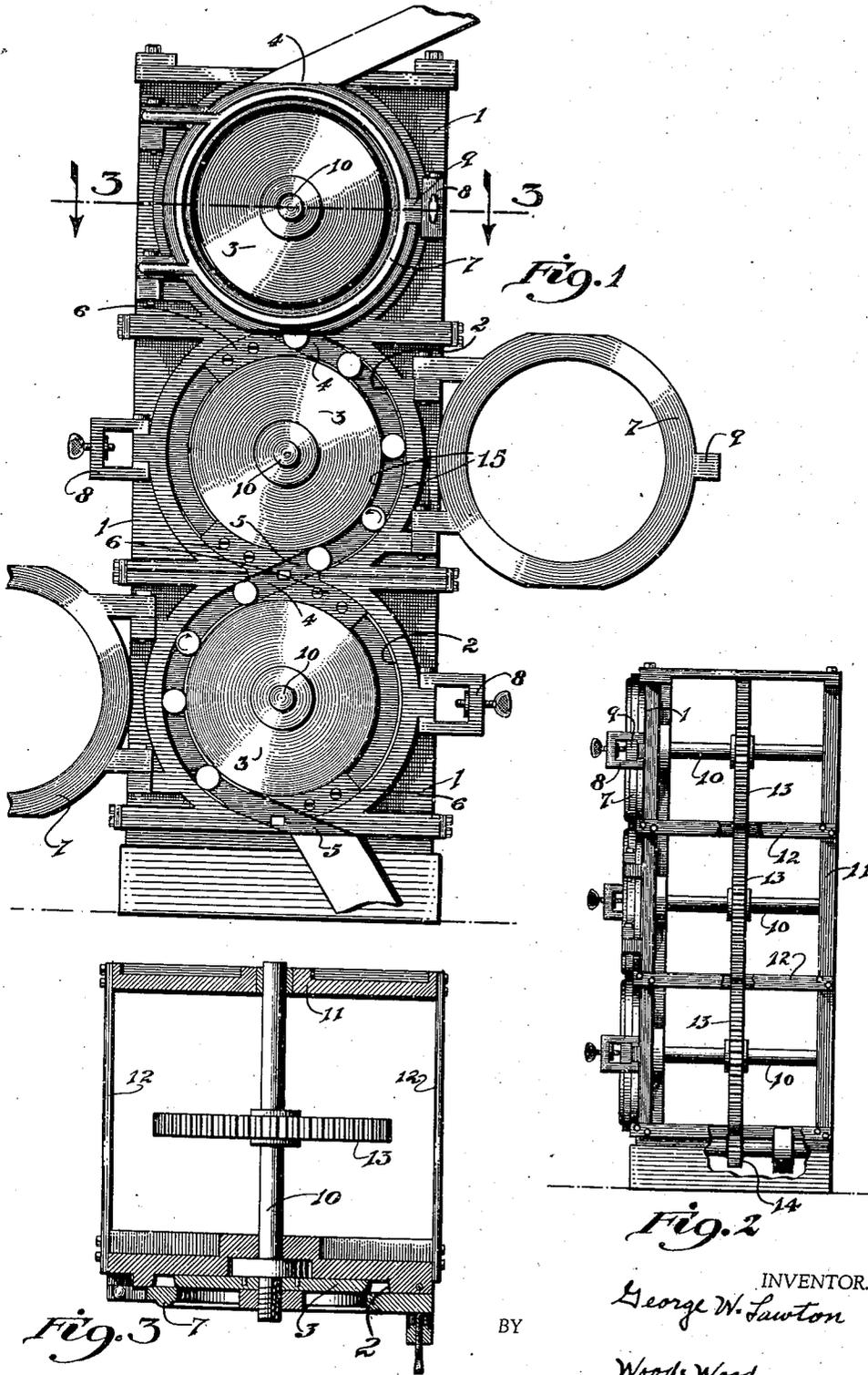


May 19, 1942.

G. W. LAWTON  
BUNG FORMING APPARATUS  
Filed July 18, 1938

2,283,331



INVENTOR.  
*George W. Lawton*

BY *Woods & Wood* ATTORNEYS.

# UNITED STATES PATENT OFFICE

2,283,331

## BUNG FORMING APPARATUS

George W. Lawton, Cincinnati, Ohio, assignor to  
The United States Bung Manufacturing Com-  
pany, Cincinnati, Ohio, a corporation of New  
York

Application July 18, 1938, Serial No. 219,816

2 Claims. (Cl. 144—284)

This invention relates to improvements in apparatus for making compressed, tapering wood bungs for barrels, drums, and the like.

The bung is formed by compressing a cylindrical wood blank between the curved surface of a stationary die and the periphery of a revolving roll concentric with the die surface, whereby the frictional contact of the blank with the periphery of the roll and the opposing die surface imparts a rolling motion to the blank, which motion compresses the blank equally on all points of its periphery as it advances from an inlet to a discharge end.

In the present apparatus the blank is traversed through a plurality of differently gauged die and roller units interconnected for advancing or transferring the blank from one unit to a second to progressively compress the blank from its original blank diameter to its final gauge measurement and taper. Each unit compresses the blank a determined degree which is constant but progressive as the blank advances from one unit to another until, upon final discharge from the terminal unit, the blank has attained the exact degree of taper desired.

It has been an object of the present inventor to provide an apparatus for rapidly and efficiently making wooden bungs, which apparatus continuously passes the bungs through a series of compressing operations, each of which operations accentuates the degree of taper provided by the previous operation until at the conclusion of the final operation, the bung has a degree of taper predetermined at the outset.

It has been another object of the present inventor to provide an apparatus for compressing a cylindrical bung blank by a series of gradual and progressive operations in order to avoid the inaccurate and oftentimes injurious results attending the substantially universal practice of providing the taper by the single operation of ramming the cylindrical bung blank into a cup-shaped die under great pressure.

It has been a still further object of the present inventor to apply a taper to a cylindrical bung blank through an apparatus providing a series of compression operations, each of which applies the pressure directly and uniformly to the sides of the blank, the degree of taper being increased in each succeeding operation.

The method disclosed and described here is claimed in a copending divisional application filed March 20, 1941, and bearing Serial No. 384,390.

Various other advantages and features of the

invention will be more fully set forth in the description of the accompanying drawing, in which:

Figure 1 is a front elevation of the bung forming apparatus with a hinge closure for the raceway of two of the compressing units, of a three unit assembly, in open position.

Figure 2 is an end view of the apparatus.

Figure 3 is a section on line 3—3 of Figure 1.

Heretofore compressed taper bungs for barrels generally have been made by turning or cutting out a cylindrical blank from a board material and pressing the blank into a hollow cup-shaped die. Another method of giving a bung a tapering form has been by rolling the bung blank between bevel bottomed grooves or having beveled opposing walls either straight or curved longitudinally and converging both longitudinally and transversely with the degree of convergence increasing from one end to the other. The first method is a very harsh one which has a tendency to split the blanks and, at the best, results in an inaccurate bung, while the second method has a tendency to compress the cylindrical blank unevenly and to provide a bung in which the inner end is slightly oval in cross section and which, accordingly, does not make an efficient seal for a circular opening.

Referring to the drawing, Figure 1 discloses an assembly of three units of similar construction in superimposed arrangement and adapted to transport or transfer the bung from one unit to another by gravity, each unit effecting a relatively different degree of compression of the bung as it is transformed from its original cylindrical blank form, to a finished bung having a predetermined degree of taper. Each unit includes a sufficient length of raceway to permit repeated revolutions of the blank under a uniform degree of compression for the full length of the way, so that as the blank leaves the raceway, the degree of compression will be substantially uniform at all points on the periphery. The number of units or stages is optional, depending upon the degree of compression required to reduce the same from its original diameter to its finished diameter, or degree of taper, and depending also on the hardness or softness of the wood or other material being utilized.

As the units are of similar construction, for the sake of brevity and clearness, the detailed description will be confined to the singular. Each unit comprises a front plate having flanged top and bottom ends for supporting and connecting one unit to another, and each unit has its front face flanged or machined to provide

a circular recess with its wall 2 tapered or beveled to constitute a concave stationary die which cooperates with the tapered periphery of a rotatable roll 3 spaced from the wall 2 and provides a raceway for receiving and compressing a cylindrical blank or disk by the rotation of the roll and impetus of the disk caused by its frictional contact with the periphery of the rotating roll, thereby rotating the disk and advancing the same through the raceway. The opposing disk compressing walls of the raceway are uniformly spaced for approximately the entire length of the raceway. The raceway is of a length sufficient to permit one or several complete revolutions of the disk to insure a uniform compression.

As illustrated, the length of the raceway may be approximately one-half of the circumference of the roll 3 so that the entrance and exit ends are diametrically disposed vertically, with the entrance 4 at the top and the exit 5 at the bottom. This arrangement permits the disk to be assisted by gravity in its passage through the raceway to the discharge end of one unit which, in the case of all units but the last, coincides with the entrance to the raceway of the next unit.

The path of the raceway deflects tangentially at the entrance and exit points and is defined at these points by filler blocks 6-6, fixed within the way and rigidly secured to the plate 1. As shown, each filler block completely fills the gap between the stationary die wall 2 and the periphery of the roll 3.

The front or face side of the way is sealed by a closure ring 7 hingedly mounted upon the front side of the plate 1 so that it can be swung to an open position to permit access to the raceway for the removal of clogged disks or for general repairs. The door or closure is locked by a hinged loop clamp 8 which engages over a lug 9 projecting radially from the closure ring.

The roll 3 is fixed upon an end of a shaft journaled within a bearing in the front plate and within a bearing in a rear plate 11 joined to the front plate by cross strips 12. A gear 13 is fixed upon the shaft 10 intermediate of the front and rear plates and preferably is of a diameter to permit its teeth to mesh with a corresponding gear of a second unit to entrain the gears of a series of units, the end gear of the train being in mesh with a driving gear 14 driven from any suitable source.

By this method of gear train transmission, the gear 13 of one unit rotates in an alternate direction from that of its next adjoining unit or units which permits the relative positioning of the several units so that the blanks follow a serpentine course as they pass from one unit to another, and no sharp corners which might obstruct their passage are presented at any point in the course.

The entrance end of the assembly may be provided with any suitable conductor means for transporting the disks to the raceway opening, and corresponding receiving means may be provided at the discharge end.

Upon placing a bung blank of cylindrical form into the raceway at the top of the apparatus, transformation of its shape is commenced as soon as it comes into cooperation with the roll 4 and stationary die surface 2 of the face unit. As it is advanced by the rotation of the roll, it will be subjected to a relatively uniform pressure during its passage through the raceway and, as it leaves, will have been tapered to a degree corresponding to the taper of the raceway walls.

As the blank passes from the first unit it descends into a second unit for another compression treatment corresponding to that of the first but preferably under an increased pressure and thence to a third, and so on until it is compressed to its final form. In the process, the pressure upon the bung blank may be increased stage by stage being with the pressure of each stage uniform.

In the preferred operation of the apparatus, the width of the raceway at each stage of the operation coincides almost exactly with the width of the bung blank as it reaches this stage. However, the angle of bevel of the die surface and the roll will be slightly greater (or less, depending on whether the walls are concave or convex) than the degree of taper of the bung blank, so that in the preferred operation of the apparatus the bung blank will not pass through the raceway solely by means of gravity, but will require the impetus imparted to it by the rotation of the roll. In the commercial operation of the apparatus it is preferable to provide a width of raceway which will permit the bung blanks to move smoothly and evenly down the course, but still, to sufficiently confine the blanks so that a determined degree of compression will be applied to them by the revolution of the roll.

Further advantages of the invention reside in the fact that the compression is imparted entirely to the sides of the blanks instead of partially to one end, as is the case with bungs which are forced into a cup shaped die. Also, the application of pressure in stages tends to provide a much more accurate degree of taper, as when the taper is applied in a single operation, the wood will have a tendency to spring back and resume its normal position after the operation has been completed. It has been found in practice that in the case of bungs tapered in accordance with the present invention the wood will tend to spring back only about one-third as much as bungs which have been tapered by the cup shaped die method.

By the method and apparatus of the invention, a large number of blanks can be operated upon at the same time, as the blanks may be continuously fed into the apparatus. The completed bungs will be found to have a high degree of uniformity of taper while the culls are kept to a minimum because the degree of compression obtained by any single operation is seldom sufficient to crack or split the blanks.

The filler blocks 6-6 define a passageway between the successive forming passageways. This passageway is of a width slightly greater than the greatest width of the forming passageway from which the blanks are discharged. Referring to the drawing, it will be observed that the space between the related filler blocks 6-6 is slightly greater than the space between the lines 15-15 representing the widest portion of the forming passageway in each instance. Since the machine stands in vertical position (see the ground line indicated in Figures 1 and 2), the bung blanks will roll by gravity between the filler plates and will there be relieved of compressive force prior to being engaged by and passed through the forming die in the next compressing stage.

Having described my invention, I claim:

1. Apparatus for compressing the sides of a cylindrical bung blank in a series of distinct stages, said apparatus comprising a plurality of units in spaced relationship, each unit compris-

ing a base plate, a revolving roll journalled in the base plate, a curved die surface projecting from the base plate exterior of the roll and spaced therefrom and removable means positioned over the space between the outer periphery of the roll and the inner edge of the die surface to form therewith a completely enclosed passageway, the passageway being of uniform width throughout any single unit but progressively narrower in succeeding units, the passageway in each unit being connected to the passageway in the preceding unit by an extension portion of not less width than the passageway in the preceding unit, said extension portion being formed from separate surfaces between which the bungs are adapted to pass by gravity, said separate surfaces being spaced apart a distance slightly greater than the widest portion of the preceding completely enclosed passageway so as to permit the bungs to pass freely by gravity from one completely enclosed passageway to the next, whereby a distinct compressing action is applied to the bung in each individual unit but the compression is relieved as the bung passes from unit to unit.

2. Apparatus for compressing the sides of a cylindrical bung blank in a series of distinct stages, said apparatus comprising a plurality of units in spaced relationship, each unit compris-

ing a base plate, a revolving roll journalled in the base plate, a curved die surface projecting from the base plate exterior of the roll and spaced therefrom and removable means positioned over the space between the outer periphery of the roll and the inner edge of the die surface to form therewith a completely enclosed passageway, the passageway being of uniform width throughout any single unit but progressively narrower in succeeding units, the periphery of the roll and the die surface of each unit providing a passageway of constant taper throughout, each succeeding passageway being of slightly greater taper, the passageway in each unit being connected to the passageway in the preceding unit by an extension portion, said extension portion being formed from separate surfaces between which the bungs are adapted to pass by gravity, said separate spaces being spaced apart a distance slightly greater than the widest portion of the preceding completely enclosed passageway so as to permit the bungs to pass freely by gravity from one completely enclosed passageway to the next, whereby a distinct compressing action is applied to the bung in each individual unit but the compression is relieved as the bung passes from unit to unit.

GEORGE W. LAWTON.