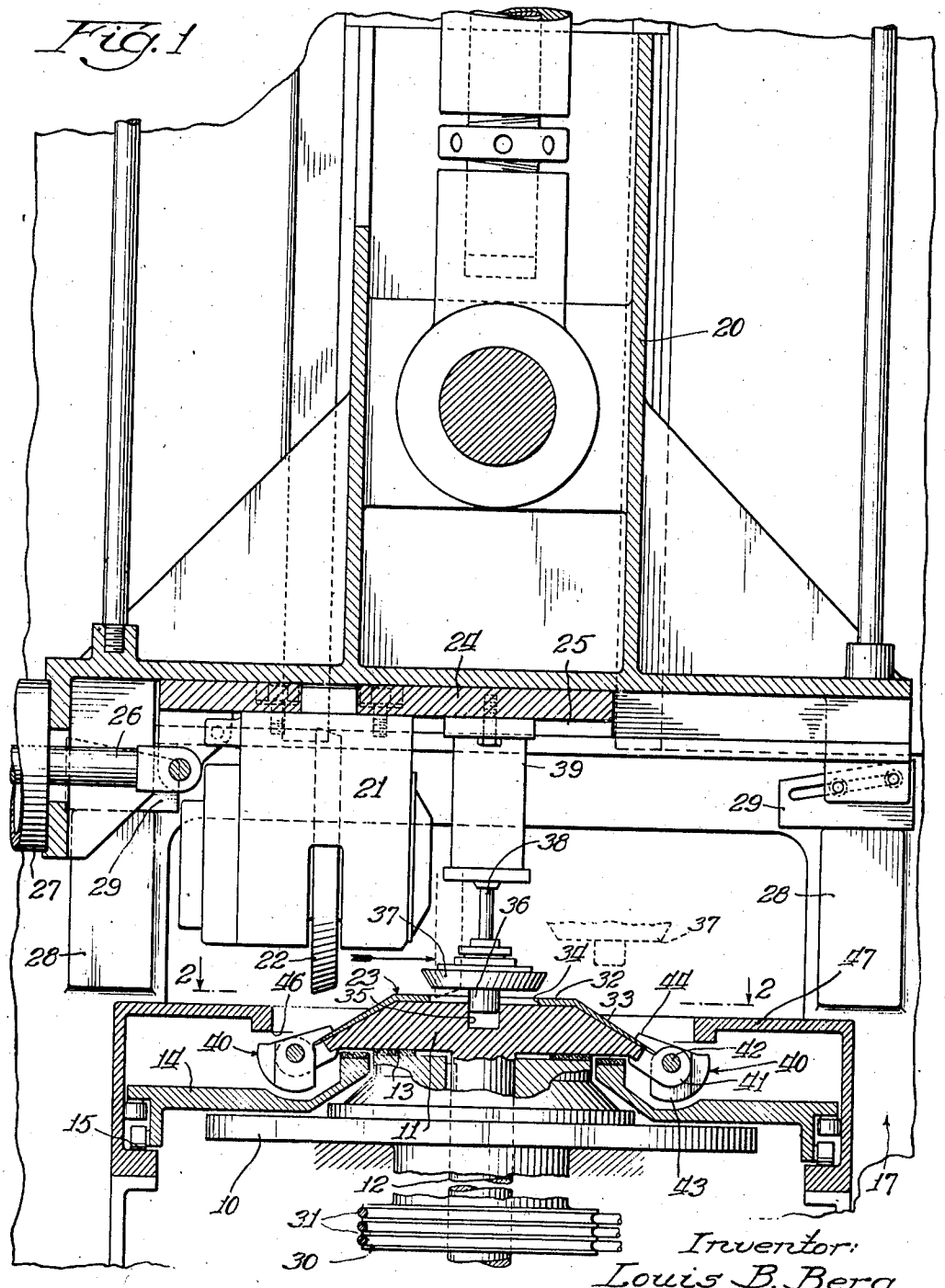
April 4, 1944. L. B. BERG 2,345,786

CENTRIFUGAL CLAMP

Filed Dec. 4, 1941 2 Sheets-Sheet 1

Fig. 1



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Filed Dec. 4, 1941 2 Sheets-Sheet 2

Fig. 2

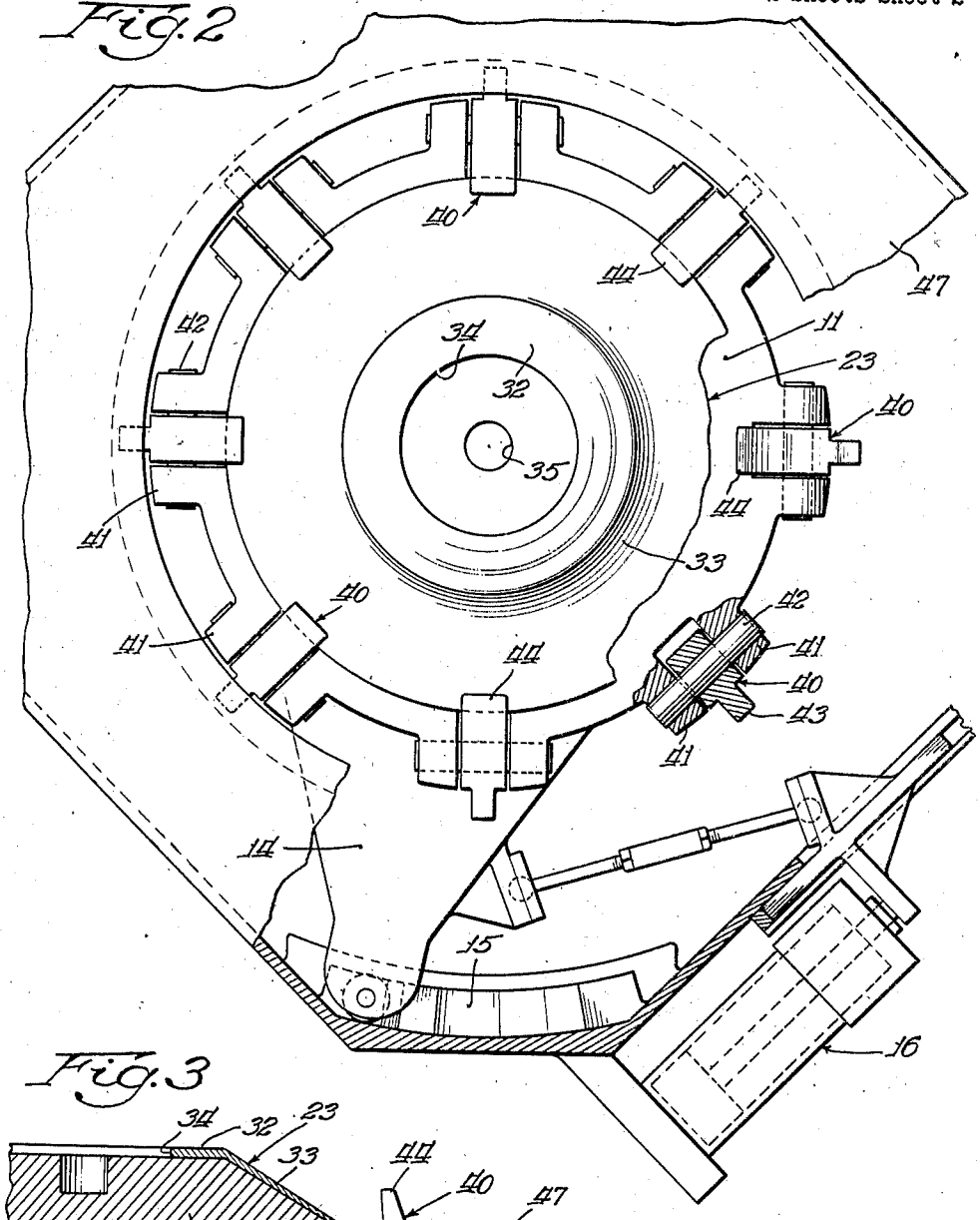
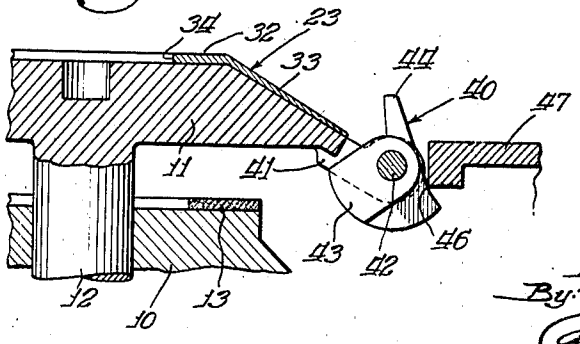


Fig. 3



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CENTRIFUGAL CLAMP

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Application December 4, 1941, Serial No. 421,613

2 Claims. (Cl. 80—16)

This invention relates to a clamping device for clamping a blank against a spinning form. The invention will be described with reference to its application to a disc rolling machine, but it is to be understood that the invention is of greater scope and is not to be limited to such application.

It has been proposed to form a centrally apertured blank for a wheel body or the like by rolling and spinning a heated circular blank radially inwardly from an intermediate diameter to decrease the size of the central opening which had been previously formed therein and to decrease the thickness of the central portion of the blank. In order for the rolling operation to be performed in a minimum amount of time, it is necessary to complete the rolling operation in one step to avoid repeated handling of the blank. This requires that the blank be rotated at a relatively high speed and also that rather large pressures be exerted upon the blank during the rolling and spinning operation. The radial inward forces developed by the roll as it contacts and works the blank become very large and the blank must therefore be securely clamped to the spinning form if it is to withstand such radial forces. Since the rolling is done toward the center, it becomes inexpedient to attempt to clamp the blank to the spinning form at its center as would normally be the case. The clamp therefore must be placed at or near the outer periphery of the blank.

I have found that when a clamp of the usual ring type is used at the outer periphery of a spinning form, the centrifugal force developed in the clamp as a result of the rotation of the form becomes large enough to expand the clamp and render it ineffective to hold the blank on the form. Thus when such a clamp is used, insufficient resistance to radial inward movement of the blank is developed at high speed to retain the blank on the form, and as a consequence the blank is moved bodily relative to the form with a resulting destruction of the blank and, which is still more serious, with great danger of injury to the operator.

The principal object of this invention is to provide a clamp for a blank which is to be worked while rotated, said clamp being most effective under the conditions existing at the time the blank is to be worked.

Another object of this invention is to provide a clamp for a spinning object, the efficiency of the clamp being a function of the speed of rotation of the blank, such that radial forces, either toward or away from the center of the blank, will be resisted.

These and other objects and features of this invention will become apparent from the following detailed description when taken together with the accompanying drawings in which:

Fig. 1 is a fragmentary elevation, partly in section, of a disc rolling machine to which this invention may be applied;

Fig. 2 is a fragmentary plan view, partly in section, of the apparatus of Fig. 1 taken along lines 2—2 thereof; and

Fig. 3 is a fragmentary elevation in section of the clamp showing the clamp in released position.

Referring now to the drawings for a detailed description of the invention, the machine illustrated is comprised of a platform 10 which is adapted to be rotated by any suitable means such as a pulley 30 and a rope drive 31 from a prime mover (not shown). A platen 11 is mounted on platform 10 and is provided with a central shaft 12 which is slidably retained in rotatable platform 10. A friction clutch connection 13 is provided between platform 10 and platen 11 whereby to drive the latter from the former. Said platen 11 may be raised or lowered relative to platform 10 by any suitable means, such for example as a lever 14 riding on a cam 15 and operated by an external control 16 which may be in the form of a piston and cylinder. Obviously, any other suitable means for raising and lowering platen 11 may be substituted for the lever and control disclosed.

A frame 17 straddles platen 11 and supports a crank shaft and a connecting rod (not shown) which are used to raise and lower a slide 20. The details of the crank shaft and connecting rod are disclosed in a copending application of A. Doderer, Serial No. 419,280, filed November 15, 1941, and hence will not be described herein. Said slide 20 supports a roll carriage 21 in which is rotatably mounted a roll 22 for operating against or upon a blank 23 which may be mounted upon platen 11. Said carriage 21 is bolted to a plate 24 which is slidably supported from slide 20 by means of gibs 25 extending across said slide 20. Plate 24 is adapted to be moved over the surface of platen 11 by means of a piston rod 26 connected to plate 24 and driven from a cylinder 27 through a piston (not shown) located therein and controlled by suitable fluid under pressure. The details of the cylinder are not a part of this invention and accordingly likewise are not described in detail herein.

Downward movement of slide 20 is limited by

stop blocks 28 formed in frame 17, said blocks contacting adjustable blocks 29 in slide 20.

In the form selected for illustrating this invention, blank 23 is comprised of a flat central section 32 and a conical tapered section 33, platen 11 being suitably formed to receive a blank so shaped. Blank 23 further is provided with an aperture 34 located centrally thereof, said aperture being of greater diameter initially than the central opening in the finished blank. It is contemplated that the central flat section 32 of the blank will be rolled and spun radially inwardly in the machine illustrated, to decrease the size of the central opening and to work the metal so rolled and spun to a denser and more homogeneous grain structure.

In order to assist in centering the blank on platen 11, said platen 11 is provided with a central opening 35 into which is adapted to be inserted a pin 36 extending downwardly from a conical disc 37. Said disc 37 is in turn connected to a piston rod 38 which is operated by a hydraulic cylinder 39 secured to plate 24 so as to be movable laterally therewith. Blank 23 will be approximately centered on platen 11 by virtue of the inherent centering effect produced by the conical portion 33 as it settles over platen 11. Final centering is accomplished by lowering conical plate 37 until it contacts the edges of aperture 34. Since pin 36 is accurately aligned with aperture 35, conical plate 37 will likewise be accurately aligned with platen 11 and, except for irregularities which might exist in the aperture 34, blank 23 will therefore be accurately centered upon platen 11. It is contemplated that plate 37 and its associated pin 36 will be raised completely from platen 11 and blank 23 during the rolling operation so as not to interfere with lateral movement of roll 22 across the surface of the blank.

It will be apparent thus far that unless blank 23 is securely clamped to platen 11 by a peripheral clamp, roll 22, as it moves across the blank, will tend to draw the blank over the surface of platen 11, thereby destroying the concentric relation between the platen and blank and rendering impossible the successful rolling-in of the central portion 32. Furthermore, should the blank become eccentric to the platen, large unbalanced forces will be developed which will tend to eject the spinning blank from the machine, thereby endangering the life of the operator. To avoid such a contingency the novel apparatus hereinafter described is employed.

The required clamping action is obtained by means of a plurality of individual clamps 40 which are secured to the periphery of platen 11 at spaced intervals as shown in Fig. 2. Platen 11 is provided with pairs of lugs 41 which are apertured to receive a pin 42. Said pin passes through clamps 40 and provides a pivoted support therefor. Clamps 40 in turn are comprised of a depending mass 43 and an inwardly extending finger 44, the latter being designed to extend over the outer edge of blank 23. It is contemplated that finger 44 may have any desired shape and masses 43 likewise may be of any contour desired.

When in operation, that is to say, when platen 11 is rotating at operating speed, clamps 40 will develop sufficient centrifugal force by reason of the location of the center of gravity below pins 42 to hold blank 23 upon the platen despite any force which might be normally produced by roll 22 during its travel across blank 23. This centrifugal force of course increases with the square of the angular velocity and hence, instead of decreasing the holding ability of the clamp, it increases the holding ability and renders perfectly safe the operation of the machine.

When it is desired to remove a finished blank and to insert a fresh blank upon platen 11, said platen is raised by means of control 16 and lever 14 to the position shown in Fig. 3. The raising of platen 11 from platform 10 breaks the friction connection 13 and permits platen 11 to be held against rotation. The platen may thus be brought to rest before the clamp is released and the blank removed with safety. Weights 43 first strike the corner 46 of a guard 47 which is fixed to frame 17 against relative movement therewith. The continued vertical movement of platen 11 causes clamp 40 to rotate about its pin 42 to the position shown wherein finger 44 is removed from the surface of the blank beyond the greatest radius of the blank.

It is understood that the foregoing description is merely illustrative of a preferred embodiment of the invention and that the scope of the invention, therefore, is not to be limited thereto, but is to be determined by the appended claims.

I claim:

1. A rolling machine for rolling and spinning a circular blank against a rotating form, said form comprising a central flat section and a conical section adapted to accommodate corresponding flat and conical sections in the blank, the rolling operation being performed by a radially inward movement of a roll against the flat section such that radial inward forces are developed in the blank, a plurality of fingers disposed at the outer periphery of the conical section and adapted to contact the outer periphery of the blank, said fingers at no time extending into the plane of the flat section, thereby avoiding interference with the roll, and means responsive to centrifugal force developed as a result of the rotation of the form for operating the fingers to clamp the blank against the form, said means providing a clamping force for the fingers which is proportional to the square of the speed of rotation of the spinning form, such that the clamping force exceeding the radial force developed as a result of the rolling operation.

2. A rolling machine for operating upon a circular blank against a rotating form, said form including a flat section to accommodate a flat section in the blank, the rolling operation being performed by a radially inward movement of a roll against the flat section such that radial inward forces are developed in the blank, and means for holding the blank upon the form, said last-mentioned means comprising pairs of lugs symmetrically disposed about the periphery of the form, and clamps pivotally supported by said pairs of lugs, said clamps comprising fingers rotatable to a position over the blank, and centrifugal weights formed integrally with the fingers and disposed on the side of the lugs opposite the fingers such that when the form is rotated a centrifugal force will be developed in the weights which will act in a direction to force the fingers against the blank and the form.

LOUIS B. BERG.