

Nov. 23, 1943.

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MILL FOR ROLLING DISKS

Filed July 21, 1941

2 Sheets-Sheet 1

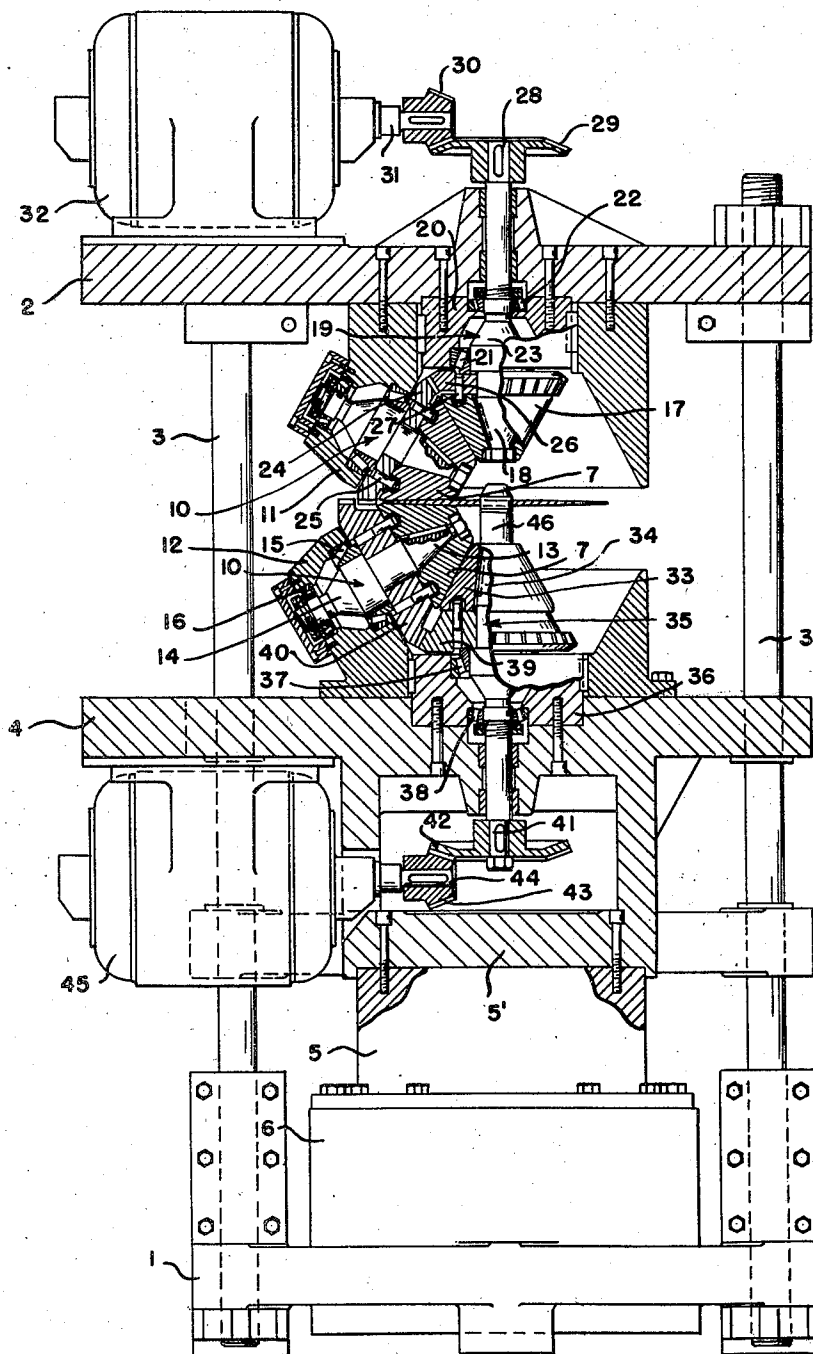


FIG. I.

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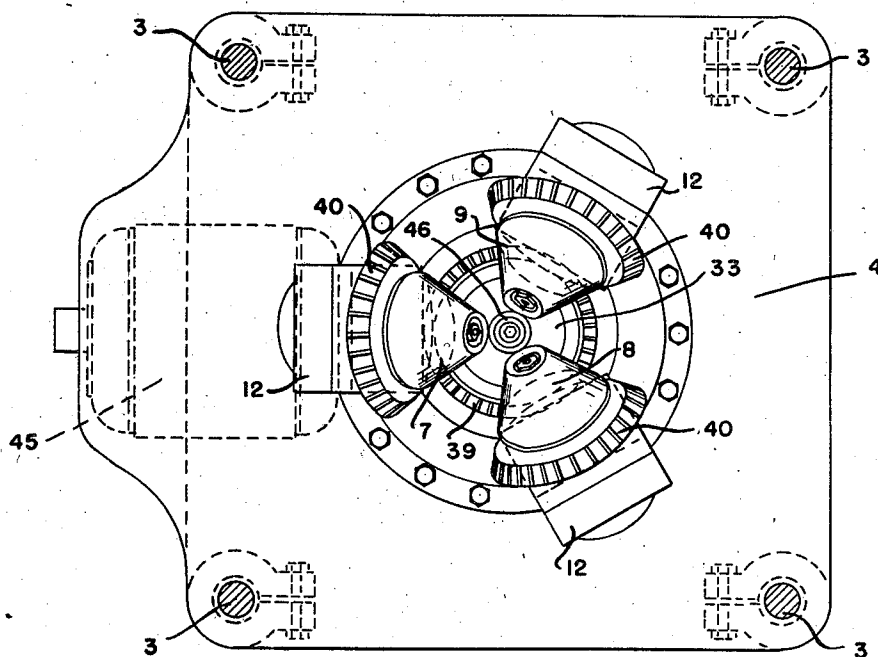
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2,334,879

MILL FOR ROLLING DISKS

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Application July 21, 1941, Serial No. 403,437

10 Claims. (Cl. 80—16)

The invention relates to mills for rolling disks and refers more particularly to mills for rolling tapered disks.

The invention has for one object to provide an improved construction of mill having sets of rolls engageable with the opposite sides of a disk blank to roll and thereby enlarge the blank simultaneously at a plurality of angularly spaced zones.

The invention has for another object to provide a mill of strong and substantial construction in which provision is made for counteracting the rolling pressure of the rolls by means other than the bearings usually employed for supporting the rolls, whereby the strength, size and weight of the bearings may be greatly decreased.

The invention has for a further object to provide a mill having a simple driving arrangement for each set of rolls.

These and other objects of the invention will become apparent from the following description, taken in connection with the accompanying drawings, in which

Figure 1 is a vertical section through a mill embodying my invention;

Figure 2 is a plan view of the lower set of rolls.

The mill, as illustrated, has the base 1 and the upper plate 2 which is supported upon the base by the upright rods 3 extending between and fixedly connected to the base and upper plate. 4 is an intermediate plate between the base and upper plate sleeved on the rods 3 and adapted to be reciprocated by means of the piston 5 slidable in the cylinder 6. As shown, the intermediate plate has a concentric depending flange resting on the head plate 5' which is secured to the upper end of the piston and sleeved on the upright rods. The cylinder is mounted on the base and is adapted to receive a suitable medium under pressure.

The upper plate 2 and the intermediate plate 4 carry like sets of processing rolls which are engageable with the opposite upper and lower sides of the disk blank to roll and thereby enlarge the same. Each set of processing rolls comprises the rolls 7, 8 and 9 which are angularly spaced with respect to the disk blank at equal distances from each other and are tapered so that different portions of their surfaces engageable with the disk blank move at speeds substantially corresponding to the speeds of the corresponding portions of the disk blank. The different rolls of one set are opposite the different rolls of the other set so that it might be said that the rolls are arranged in pairs. The lines

of contact between the pairs of rolls and the disk blank converge radially outwardly of the disk blank and toward the larger ends of the rolls. Each of the rolls 7, 8 and 9 is keyed to a spindle 10. The spindles for the upper set of rolls are journaled in the carrier 11 fixedly secured to the lower side of the upper plate 2 and the spindles for the lower set of rolls are journaled in the carrier 12 fixedly secured to the upper side of the intermediate plate 4. The rolls are keyed to the tapered portions 13 of the spindles, the bodies 14 of which are journaled in the carriers through the anti-friction bearings 15 and 16 which are constructed and arranged to take care of both radial and end thrust upon the rolls.

For the purpose of counteracting the rolling pressure exerted by the rolls of the upper set of rolls on the disk blank, the rolls are engaged by the tapered roll 17, the axis of which coincides with that of the disk blank when mounted in the mill. The roll 17 is keyed to the tapered portion 18 of the spindle 19 which is journaled in the carrier 20 fixedly secured to the lower side of the upper plate 2 concentrically within the carrier 11. Suitable anti-friction bearings 21 and 22 between the carrier 20 and the body 23 of the spindle take care of both radial and end thrust on the roll 17. To drive the rolls of the upper set of rolls, each roll has secured thereto a bevel gear 24 by suitable means such as the axially extending pins 25. The back-up roll 17 also has secured thereto the bevel gear 26, the teeth of which mesh with the teeth of the bevel gears 24. The bevel gear 26 is connected to the back-up roll, as shown, by the axially extending pins 27. The spindle 19 has secured to its upper end the shaft 28 which extends upwardly beyond the upper plate 2 and has secured to its upper end the bevel gear 29 which is in mesh with the bevel pinion 30 upon the shaft 31 of the electric motor 32. The motor is supported upon the upper plate 2.

For the purpose of counteracting the rolling pressure exerted by the rolls of the lower set of rolls on the disk blank, the rolls are engaged by the tapered roll 33, the axis of which coincides with that of the disk blank when mounted in the mill. The roll 33 is keyed to the tapered portion 34 of the spindle 35 which is journaled in the carrier 36 fixedly secured to the upper side of the intermediate plate 4 concentrically within the carrier 12. As shown, suitable anti-friction bearings 37 and 38 are positioned between the carrier 36 and the body of the spindle to take

care of both radial and end thrust on the roll 33. The rolls of the lower set of rolls are driven by the bevel gear 39 secured to the back-up roll 33 and having its teeth meshing with the teeth of the bevel gears 40 secured to the rolls. It will be noted that the axial extents of the bevel gears 39 and 40 are greater than the axial extents of the bevel gears 26 and 24 so that the teeth of the bevel gears 40 will clear the teeth of the bevel gears 24 in substantially the plane of the disk blank. The spindle 35 has secured to its lower end the shaft 41 which extends beneath the main portion of the intermediate plate 4 and has secured to its lower end the bevel gear 42 which is in mesh with the bevel pinion 43 upon the shaft 44 of the electric motor 45. The motor is supported upon the under face of the intermediate plate 4.

The pilot 46 for the disk blank is carried by the back-up roll 33, preferably by threading the shank of the pilot into the upper end portion of the back-up roll.

The construction is such that the electric motors are preferably driven, in unison, or at the same rate. The construction is also such that the rolls are adapted to operate on the opposite sides of the disk blank at angularly spaced zones, and the rolls being arranged in sets and having their rolling pressure counteracted by central back-up rolls, rolling units are, in effect, formed at the opposite sides of the disk blank in balanced relation, thereby providing a strong and substantial construction of mill without the necessity of enlarging and strengthening the spindles carrying the rolls and the anti-friction bearings for the spindles.

What I claim as my invention is:

1. A mill for rolling disks, comprising sets of rolls engageable with the opposite sides of a disk blank, the rolls of each set being arranged in angularly spaced zones, and a revoluble member common to and arranged centrally of the rolls of one set for counteracting their rolling pressure.

2. A mill for rolling disks, comprising sets of tapered rolls engageable with the opposite sides of a disk blank, the rolls of each set being arranged in angularly spaced zones, one of said sets being movable toward and away from the other set, and a roll common to and arranged centrally of and engaging the processing faces of the rolls of each set for counteracting their rolling pressure.

3. A mill for rolling disks, comprising sets of angularly spaced rolls engageable with the opposite sides of a disk blank with the rolls of one set opposite the rolls of the other set, and a roll between and arranged centrally of and engaging the rolls of each set for counteracting their rolling pressure.

4. A mill for rolling tapered disks, comprising sets of tapered rolls engageable with the opposite sides of a disk blank, a gear connected to each of said rolls, a roll common to the rolls of one set

for counteracting their rolling pressure, and a gear connected to said pressure counteracting roll and meshing with the gears of said rolls common to said pressure counteracting roll for revolving said rolls common to said pressure counteracting roll with said pressure counteracting roll.

5. A mill for rolling disks, comprising sets of tapered rolls engageable with the opposite sides of a disk blank, a roll common to and engaging the rolls of each set for counteracting their rolling pressure, means for moving one of said sets and the roll common to the rolls thereof toward and away from the other set, and a pilot for the disk blank movable with said movable set.

6. A mill for rolling tapered disks, comprising sets of tapered rolls engageable with the opposite sides of a disk blank, a roll between and engaging the rolls of each set for counteracting their rolling pressure, plates movable toward and away from each other and carrying said sets, and a pilot for the disk blank carried by one of said plates.

7. A mill for rolling tapered disks, comprising sets of angularly spaced tapered rolls with the rolls of one set opposite the rolls of the other set and engageable with the opposite sides of a disk blank, rolls having their axes extending generally axially of the disk blank, said last mentioned rolls being common to and engaging the rolls of each set for counteracting their rolling pressure, and a pilot for the disk blank associated with one of said last mentioned rolls and extending generally axially.

8. A mill for rolling tapered disks comprising sets of tapered rolls engageable with the opposite sides of a disk blank with each roll carried at one end only, a roll common to and engaging the processing faces of the rolls of one set for counteracting their rolling pressure, a gear connected to each of said rolls of said last mentioned set, and a gear connected to said pressure counteracting roll and meshing with said first mentioned gears for revolving said rolls of said last mentioned set.

9. A mill for rolling disks comprising a set of rolls arranged in angularly spaced zones and engageable with one side of a disk blank, a revoluble member common to and arranged centrally of said rolls for counteracting their rolling pressure, and means engageable with the opposite side of the disk blank for counteracting the pressure of said set of rolls on the disk blank.

10. A mill for rolling disks comprising sets of rolls engageable with the opposite sides of a disk blank, the rolls of one set being arranged in angularly spaced zones, a revoluble member arranged centrally of and engageable with said last mentioned rolls for counteracting their rolling pressure, and means for revolving said last mentioned rolls and revoluble member in unison.

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