

Nov. 8, 1938.

A. B. PEARSON

2,135,643

DISK ROLLING APPARATUS

Filed April 23, 1936

5 Sheets-Sheet 1

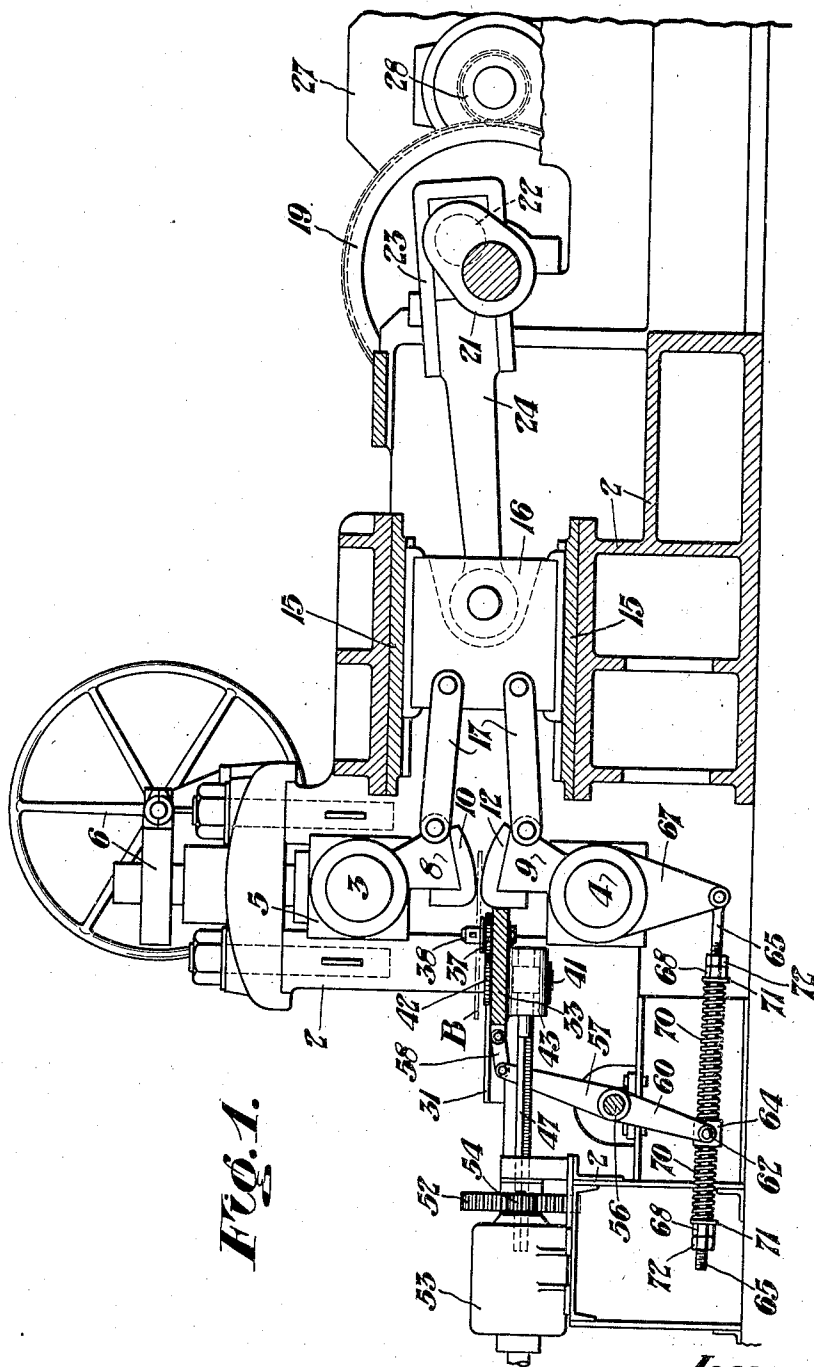


Fig. 1.

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5 Sheets-Sheet 2

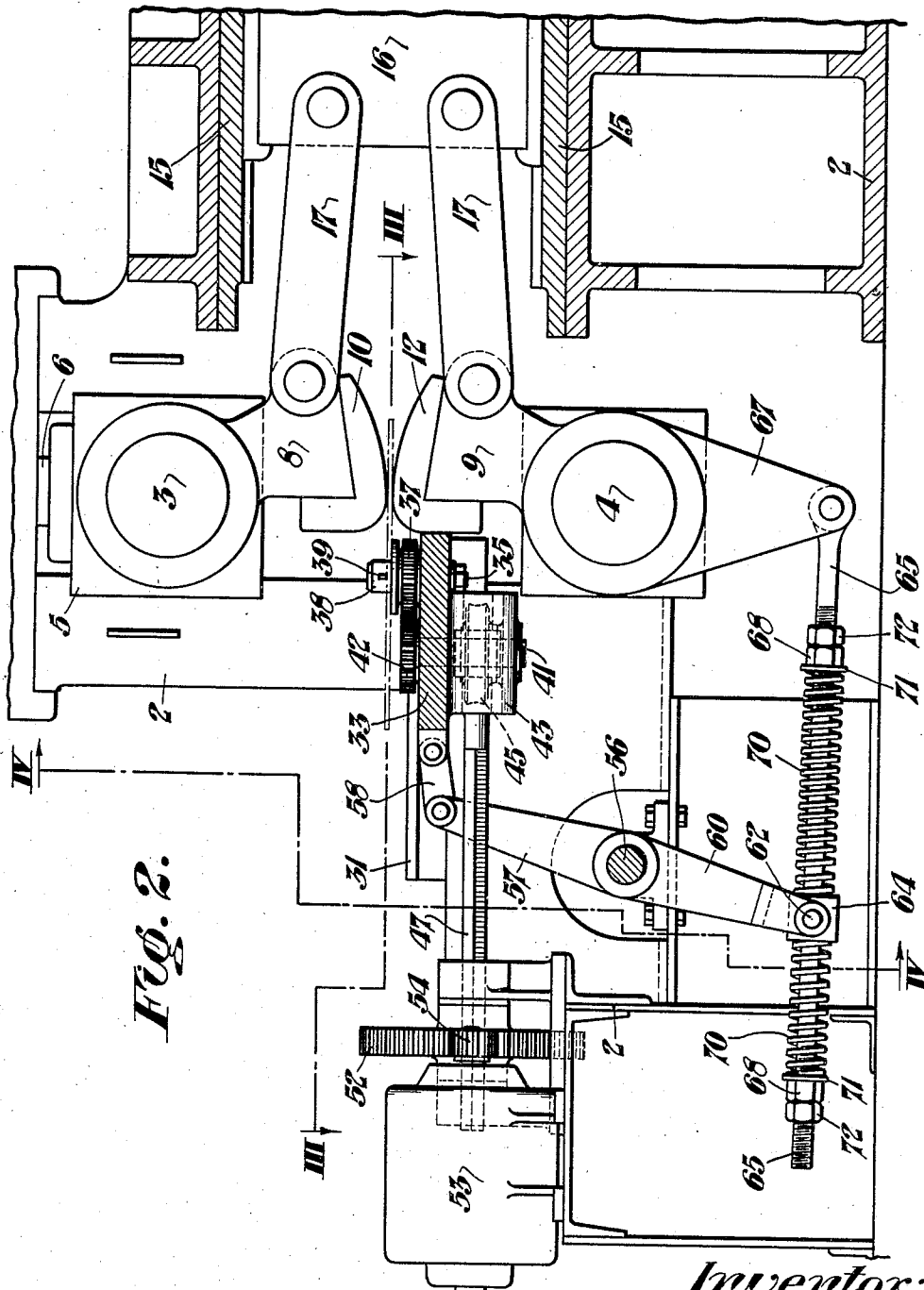


FIG. 2.

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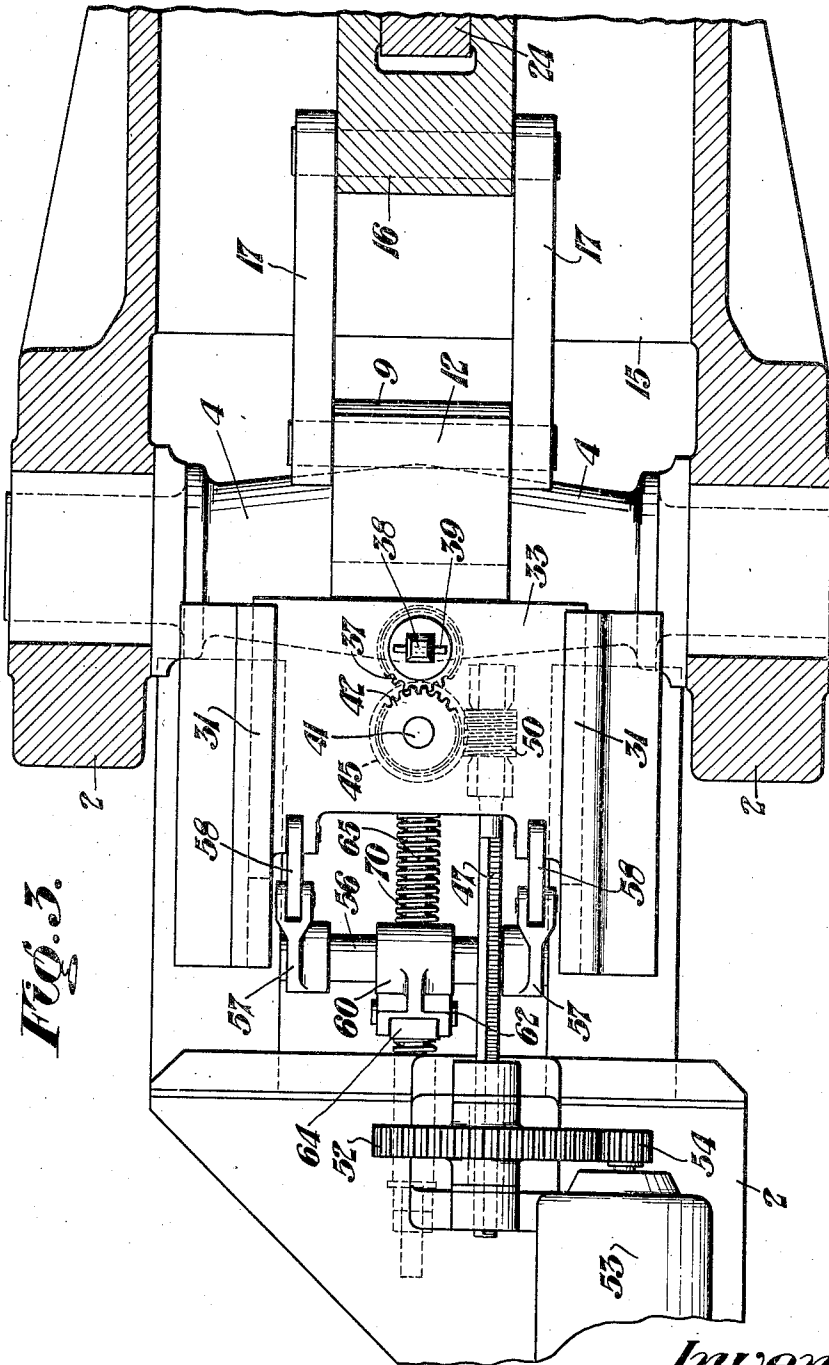
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DISK ROLLING APPARATUS

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5 Sheets-Sheet 3



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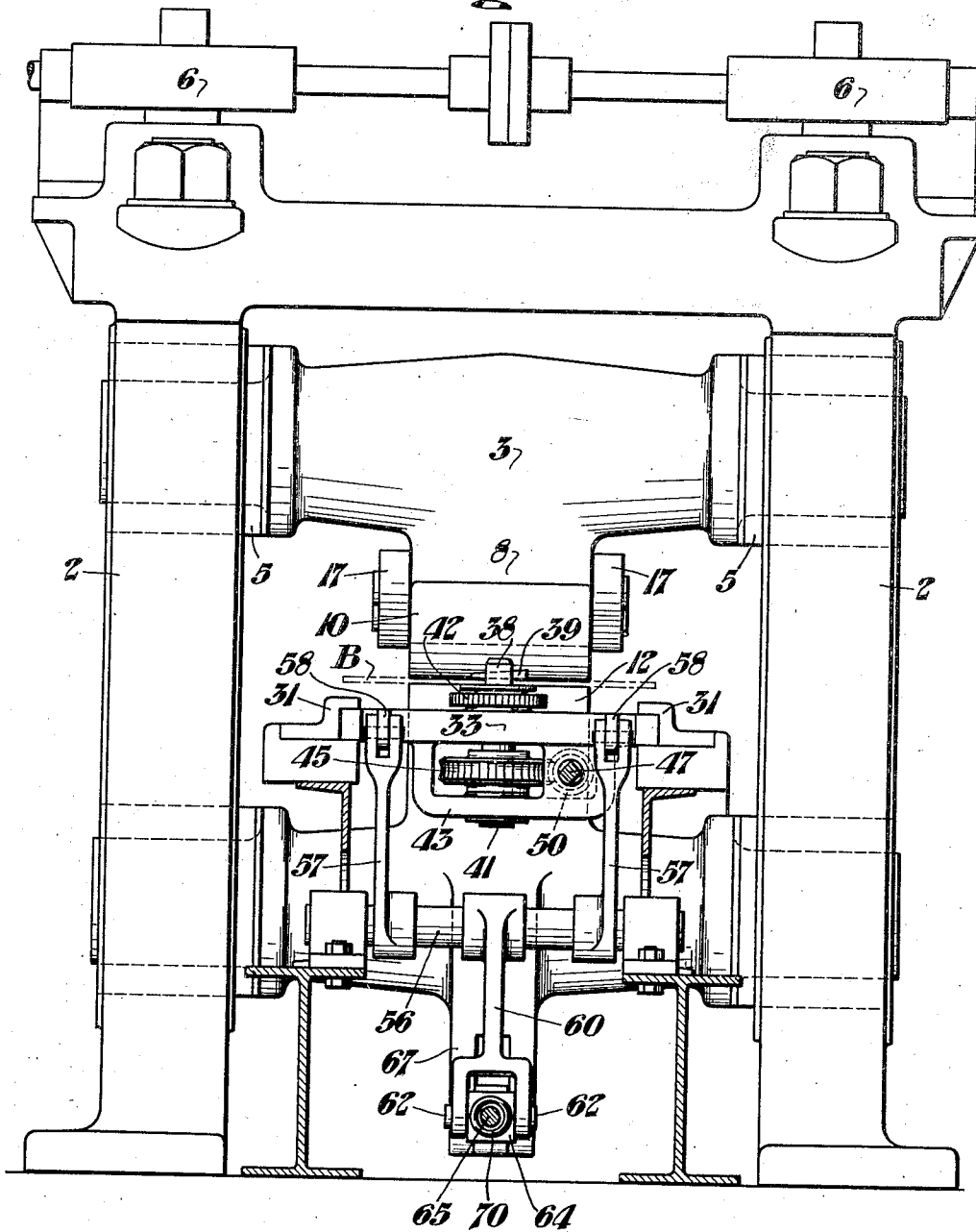
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5 Sheets-Sheet 4

Fig. 4.



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DISK ROLLING APPARATUS

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5 Sheets-Sheet 5

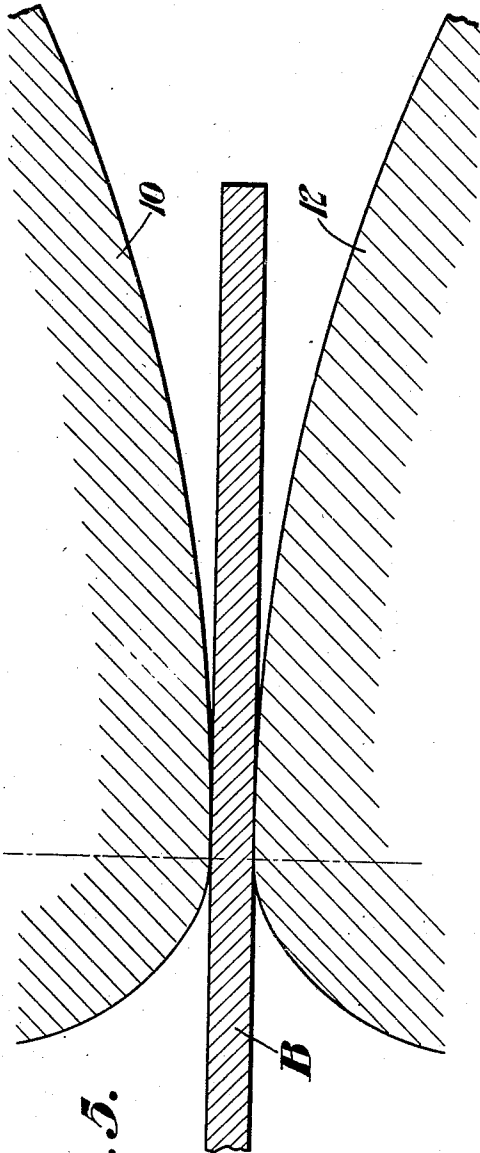


Fig. 5.

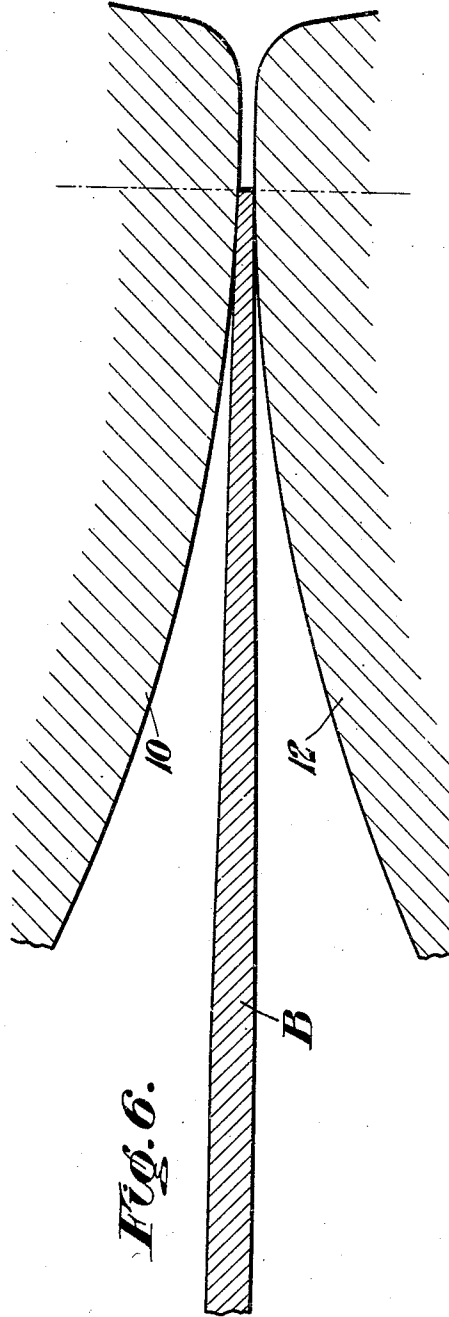


Fig. 6.

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UNITED STATES PATENT OFFICE

2,135,643

DISK ROLLING APPARATUS

Axel B. Pearson, Munhall, Pa.

Application April 23, 1936, Serial No. 76,027

2 Claims. (Cl. 80—16)

This invention relates to metal-working, and more particularly to apparatus for rolling disk-shaped blanks of tapering thickness. These blanks, or work-pieces, may be used for a variety of purposes, including the manufacture of wheels for road vehicles.

In my Patent No. 2,118,224, dated May 24, 1938, there is disclosed an apparatus for producing blanks of the type described.

10 In the apparatus of my Patent No. 2,118,224, the die elements engage and work the blanks, or work-pieces, during their movement in one direction (i. e., toward the work-piece) and are free during their return movement.

15 The present invention has among its objects the efficient production of disk-shaped blanks of tapering thickness, as in the co-pending application, and seeks to go further by substantially decreasing the time required to perform the operation by working the blanks in both directions.

The foregoing and other objects will be apparent after referring to the drawings, in which:

25 Figure 1 is an elevation, partly in section, of the apparatus of the invention.

Figure 2 is an enlarged fragmentary elevation, partly in section, of the apparatus of Figure 1.

Figure 3 is a view on the line III—III of Figure 2.

30 Figure 4 is a view on the line IV—IV of Figure 2.

Figures 5 and 6 are working diagrams illustrating the effect of the apparatus on a wheel-blank, or other work-piece.

Referring more particularly to the drawings, 35 the numeral 2 designates a housing which rotatably supports a pair of upper and lower shafts 3 and 4 respectively. More specifically, the upper shaft 3 rides in chocks 5 which are adjusted with respect to the lower shaft 4 by a conventional screwdown 6.

40 A downwardly extending lobe 8 is carried by the upper shaft 3 and a similar but upwardly extending lobe 9 is carried by the lower shaft 4. A die member 10 is mounted on the upper lobe 8 and a similar and coacting die member 12 is mounted on the lower lobe 9.

45 A horizontal slideway 15 is disposed adjacent the lobes 8 and 9 and carries a slidable block 16 which is connected to each of the lobes by means of links 17.

50 A gear 19 is rotatably mounted adjacent the horizontal slideway 15 and carries on its shaft a crank 21. This crank 21 carries a crankpin 22 which is mounted in a frame 23 that is carried on one end of a connecting-rod 24. The other

end of the connecting-rod 24 is connected to the slidable block 16 in the slideway 15. The gear 19 is driven by an adjacently disposed motor 27 through a pinion 28. From the foregoing description it can readily be seen that the die members 10 and 12 will be operated in both directions upon each revolution of the crank 21 on the shaft of the gear 19. This permits the rolling of a disk from a point near its center toward its periphery as well as in the opposite direction (i. e., from its periphery toward its center).

The housing 2 carries a pair of horizontal guideways 31 at a point below the line of pass between the upper and lower die elements 10 and 12, respectively. A horizontal table 33 is slidably disposed in the horizontal guideways 31 to support the wheel-blank, or other work-piece. This horizontal table 33 carries on its end adjacent the die elements 10 and 12 a vertical rotatable shaft 35. The upper end of the shaft 35 extends substantially above the upper surface of the horizontal table 33 and has a gear 37 secured thereto. A blank-centering pin 38 extends upwardly from the gear 37 and may, for example, be square in section in order to seat in a correspondingly contoured aperture in the center of the wheel-blank, or other work-piece. This blank-centering pin 38 is provided adjacent its upper extremity with a right-angular aperture which accommodates a wedge-pin 39, the function of which is to make the blank secure on the horizontal table 33.

The horizontal table 33 also carries a vertical shaft 41 which is parallel to the vertical shaft 35. This vertical shaft 41 extends slightly above the upper surface of the horizontal table 33 and is provided at this point with a gear 42 which is secured thereto and meshes continuously with the gear 37 on the shaft 35. The lower end of the vertical shaft 41 is journaled in a frame 43 which depends from the horizontal table 33. Immediately below the lower surface of the horizontal table 33 a worm gear 45 is secured to the shaft 41.

A horizontal shaft 47 is journaled on one of its ends on the housing 2 and extends into the frame 43 which depends from the horizontal table 33. This shaft 47 is square in section and carries on its extended end a worm 50 which is journaled in the frame 43. This worm 50 is constantly in mesh with the worm gear 45.

50 The end of the horizontal shaft 47 which is journaled on the housing 2 has secured thereto a gear 52 which is driven from an adjacently disposed motor 53 through a pinion 54. Thus, the motor 53 may be operated to rotate the blank-centering pin 38 on the horizontal table 33 re-

gardless of the position of the latter with respect to the horizontal guideways 31.

A horizontal shaft 56 is journaled on the housing 2 below the horizontal guideways 31 and has secured thereto a pair of upwardly extending levers 57, the upper ends of which are connected to the horizontal table 33 through short pivoted links 58.

A downwardly extending bifurcated lever 60 is also secured to the horizontal shaft 56. The bifurcations of this lever 60 carry inwardly extending studs 62 which support a trunnion 64. A horizontally slidable rod 65 is extended through the trunnion 64 and one end thereof is pivotally connected to a lever 67 which is secured to and extends downwardly from the lower shaft 4 in the housing 2.

The horizontally slidable rod 65 is screw-threaded at portions spaced from and on each side of the trunnion 64 to carry nuts 68 between which and each end of the trunnion there is a compression spring 70. These springs 70 have equal initial compression, thus fixing the distance when idle between the trunnion 64 and the end of the horizontally slidable rod 65 which is pivotally connected to the lever 67 which is secured to and extends downwardly from the shaft 4. In order to provide for smoother adjustment, the ends of the springs 70 which are remote from the trunnion 64 are backed-up with washers 71 and each of the nuts 68 is provided with a lock-nut 72.

The horizontal table 33 in the horizontal guideways 31 is arranged to move at the same speed as the surfaces of the die elements 10 and 12 when the apparatus is idling. When the wheel-blank or work-piece B is gripped between the die elements 10 and 12 and moved, the movement of the horizontal table 33 is less when traveling toward the right, as shown in Figures 1 and 2, than when traveling toward the left. This, however, is compensated by the springs 70 on the horizontally slidable rod 65 which are thus alternately compressed or extended after each rolling stroke. As the die elements 10 and 12 approach the end of each rolling stroke, and they no longer grip the work-piece B, one of the springs 70 immediately returns the trunnion 64 on the horizontally slidable rod 65, which effects the return of the horizontal table 33 to its idle position.

The rolling strokes of the die elements 10 and 12 are such as to permit a slight overtravel at the ends thereof which makes it possible to partially rotate the work-piece B prior to the next succeeding

stroke. At the end of each stroke the motor 53 is momentarily set in motion, automatically or otherwise, to partially rotate the work-piece the required amount preparatory to making the next rolling stroke. The approaches of the ends of the rolling strokes and the effects of each on the work-piece B are graphically illustrated in Figures 5 and 6.

While I have shown and described one specific embodiment of my invention, it will be understood that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of my invention, as defined by the following claims.

I claim:

1. In an apparatus for radially rolling and tapering a disk-shaped metallic work-piece, a pair of coaxing oscillatory rolling cams, the working surfaces of said coaxing oscillatory rolling cams being constructed and arranged for rolling contact with the work-piece in both directions and for oscillation in a direction which is opposite the direction of reduction during each of the rolling operations, a movable work-piece carriage, means for moving said work-piece carriage toward said coaxing oscillatory rolling cams prior to each of the rolling strokes, and means for moving said work-piece carriage away from said coaxing oscillatory rolling cams after each of the rolling strokes, said work-piece carriage being freely movable during each of the rolling operations with said coaxing oscillatory rolling cams and opposite the direction of reduction thereof.

2. In an apparatus for radially rolling and tapering a disk-shaped metallic work-piece, a pair of coaxing oscillatory rolling cams, the working surfaces of said coaxing oscillatory rolling cams being constructed and arranged for rolling contact with the work-piece in both directions and for oscillation in a direction which is opposite the direction of reduction during each of the rolling operations, a movable work-piece carriage, means for moving said work-piece carriage toward said coaxing oscillatory rolling cams prior to each of the rolling strokes, means for moving said work-piece carriage away from said coaxing oscillatory rolling cams after each of the rolling strokes, said work-piece carriage being freely movable during each of the rolling operations with said coaxing oscillatory rolling cams and opposite the direction of reduction thereof, and means independent of the movement of said work-piece carriage for rotating said work-piece.

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