June 26, 1923. 1,459,767

H. Y. HILDEBRAND

DISK ROLLING MACHINE

Original Filed May 3, 1920

Fig. 1.

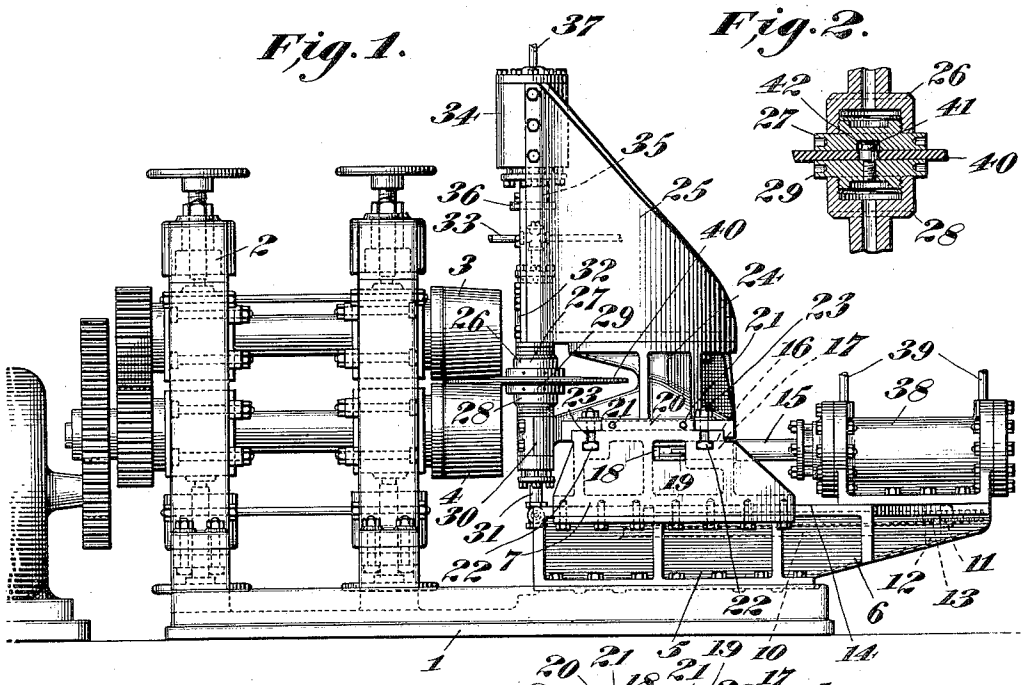


Fig. 2.

Fig. 3.

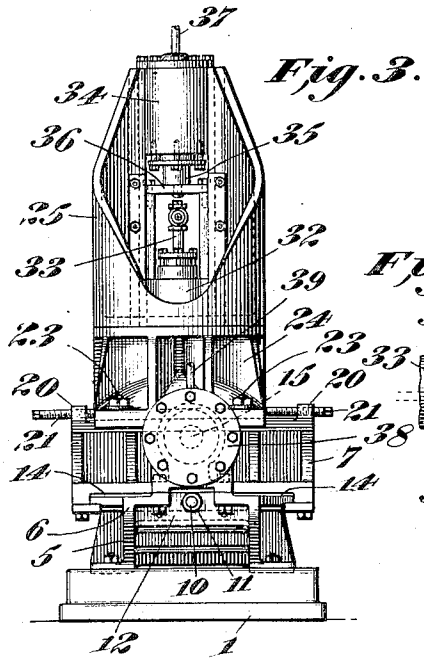


Fig. 4.

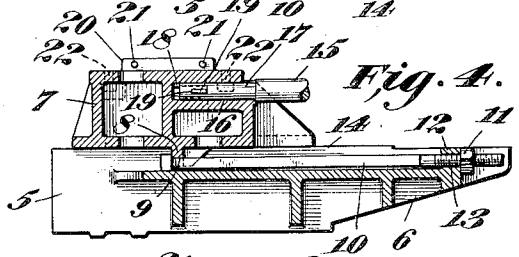
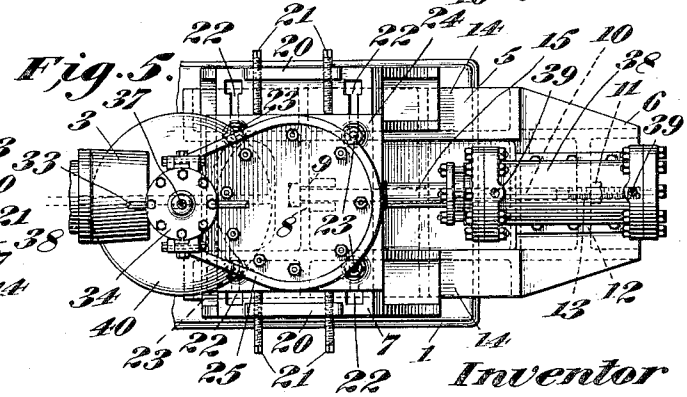


Fig. 5.



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UNITED STATES PATENT OFFICE.

HENRY Y. HILDEBRAND, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BETHLEHEM STEEL PRODUCTS COMPANY, A CORPORATION OF PENNSYLVANIA.

DISK-ROLLING MACHINE.

Application filed May 3, 1920, Serial No. 378,631. Renewed August 8, 1922. Serial No. 580,566.

To all whom it may concern:

Be it known that I, HENRY Y. HILDEBRAND, a citizen of the United States, residing in the city of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Disk-Rolling Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This application is supplementary to my co-pending application filed September 30, 1919, Serial No. 327,509.

My invention relates to a machine for rolling suitable blanks into substantially circular disks which have a relatively thick central portion tapering thence to a thinner periphery. These disks are adapted for use in various constructions and particularly for automobile and other vehicle wheels.

The object of my invention is to provide a disk rolling machine that will roll suitable blanks into substantially circular disks, of tapered or reduced form, which are adapted to the uses outlined. Tapered disks have heretofore been made by slow and expensive machine turning, but disks so made do not possess the requisite strength, whereas disks formed in my disk rolling machine show far greater strength for equivalent sizes and dimensions.

My invention comprises apparatus which firmly clamps and holds the central portion of a blank or disk and permits free rotation of the blank or disk as the outer portion thereof is inserted between a pair of overhung rolls, which are tapered or otherwise shaped to conform to the desired cross-section of the disk. The clamping means may be moved to or from the rolls in the general direction of the roll axes so that the blank or disk or portions thereof are grasped by the rolls, when they are rotating, to thin, taper or otherwise shape the blank or disk and simultaneously to increase the diameter thereof to the required degree. The clamping means may also be adjusted transversely of the rolls so that the axis of rotation of the blank or disk can be moved to or from the rolls in the plane of the axes thereof or in other planes as desired. The blanks may be of any reasonable thickness and diameter and are preferably circular disks, although they may be of other shapes, if desired.

Having thus given a general description of my invention, I will now, in order to make the matter more clear, refer to the annexed sheet of drawings in which like characters refer to like parts:—

Figure 1 is a side elevation of my improved disk rolling machine; Figure 2 is a detail, in vertical sectional elevation, of the fluid-pressure operated clamping jaws for holding the blank or disk while it is being rolled; Figure 3 is an end elevation of my disk rolling machine; Figure 4 is a vertical longitudinal sectional elevation of the carriage support and carriage illustrating the attachment of the piston rod and longitudinal bolt thereto; and Figure 5 is a top plan view of the disk holding mechanism.

Referring now to the characters of reference on the drawings:—1 is the base of the machine on which the various parts are mounted and 2 indicates the rolling mill in general, the rolls 3 and 4 of which are geared together, as illustrated, and driven by an electric or other motor. The rolls 3 and 4 are carried in suitable housings provided with adjustable bearings and are shown overhanging or projecting outwardly from one of the housings so that a blank or disk can easily be inserted within or withdrawn from the tapered or otherwise shaped space between the rolls.

The guide frame 5 is secured to the base 1 and the overhanging portion 6 projects outwardly therefrom. The carriage 7 reciprocates on the slideways 14 of the guide-frame 5 and is provided with a flange 8 which contains a notch 9. The notch 9 engages the preferably square shank of the longitudinal bolt 10 which passes through a hole 13 in the flange 12 of the guide-frame 5 and carries the nut 11. The limit of the forward travel of the carriage 7 may therefore be varied by changing the position of the nut 11 on the bolt 10.

The adjustable frame 24 is mounted upon the carriage 7 and is secured thereto by the bolts 23, the heads of which set in slots 22 in the carriage 7. Set screws 21 in the flanges 20 of the carriage 7 provide means for moving the adjustable frame 24 and the

parts mounted thereon transversely of the roll axes. A journal bearing 30, secured to the adjustable frame 24, carries the lower rotatable clamping jaw 28 which is supplied with cooling fluid through the pipe 31. The lower clamping jaw 28 is provided with a face-plate 29 in which is secured the centering pin 41. The centering pin 41 engages a central hole in the disk or blank 40 and projects therefrom into the recess 42 in the face-plate 27 of the upper clamping jaw 26.

The top frame 25 is rigidly mounted upon the adjustable frame 24 and carries a movable fluid-pressure operated and fluid-cooled rotatable clamping jaw 26 to which is secured a face-plate 27. This upper rotatable clamping jaw 26 is supplied with cooling fluid through the pipe 33.

In order that the upper rotatable clamping jaw 26 may be moved to and from the lower rotatable clamping jaw, so as to grip or release a blank or disk placed between the jaws, it is carried in a sliding journal bearing 32 mounted on the top frame 25. The longitudinal movement of the upper rotatable clamping jaw 26 is accomplished by fluid-pressure in the cylinder 34 which is provided with a piston on the piston rod 35. The piston rod 35 is secured to the crosshead 36 which is attached to the sliding journal bearing 32. Fluid under suitable pressure is supplied to the cylinder 34 through the pipe 37. It is therefore evident that a blank or disk 40 centered on the pin 41 of the lower rotatable clamping jaw may be securely held or gripped by supplying fluid under suitable pressure to the cylinder 34 and simultaneously therewith the blank or disk may be rotated.

In order that the blank or disk may be moved to and from the rolls 3 and 4, a fluid-pressure advancing and retracting means is provided. This comprises a cylinder 38 which is mounted on the overhanging portion 6 of the guide-frame 5 and is supplied with fluid under suitable pressure through the pipes 39, thereby actuating a piston on the piston rod 15. The piston rod 15 of the cylinder 38 has a reduced end 17 which passes through the hole 16 in the carriage 7 and is secured thereto within the transverse opening 18 by the key 19.

The operation of my apparatus is as follows:—Fluid under suitable pressure is admitted to the front end of the cylinder 38 so as to retract the disk holding mechanism sufficiently clear of the rolls to admit the required blank between the clamping jaws, and the upper clamping jaw is retracted by the upward movement of the piston in cylinder 34. The blank which is preferably red or white hot and provided with a central hole, is placed on the lower clamping jaw face-plate 29 with the central hole fitting over the centering-pin 41. The piston of the fluid-pressure cylinder 34 is then forcibly advanced thereby causing the face-plates 27 and 29 of the clamping jaws to firmly grip and hold the blank. Fluid under pressure is now admitted to the rear end of cylinder 38 thereby advancing the disk holding mechanism. In this way the blank is presented to the bite of the rotating rolls 3 and 4, the advancement being so regulated as to gradually feed the blank into the rolls and produce the form of disk illustrated or any other forms which may be made by this apparatus.

A reversal of these operations will withdraw the disk in its finished form and prepare the apparatus for another blank whereupon the operation proceeds as before.

Although the blanks or disks may be rolled when the roll axes intersect the axis of rotation of the blank or disk, I prefer to arrange my apparatus so that the axes of the rolls are slightly removed from the axis of rotation of the blank or disk as the rolling action will then tend to knead or pull the material toward the periphery of the blank or disk and further tend to increase its diameter, as is necessary when it is being rolled to tapered or reduced form. To this end the transverse movement of the adjustable frame 24 by the set screws 21 is provided.

Although I have described and illustrated my invention in considerable detail, I do not wish to be limited to the exact and specific details thereof as shown and described, but may use such modifications in, substitutions for, or equivalents thereof, as are embraced within the scope of my invention, or as pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. A disk rolling machine comprising a pair of overhung rolls, means for rotating the same, a guide-frame, the guides of which extend longitudinally thereof in the general direction of the roll axes, a carriage slidably mounted upon said guide-frame, fluid-pressure operated means adapted to reciprocate said carriage on said guide-frame, a superstructure mounted upon said carriage and adjustable transversely thereof, a pair of fluid cooled, rotatable clamping jaws mounted on said superstructure, and a fluid-pressure advancing, retracting and holding means for one of said clamping jaws.

2. In a disk rolling machine, the combination of a pair of overhung rolls, a superstructure mounted on a carriage and transversely adjustable thereof, a pair of fluid cooled rotatable clamping jaws mounted on said superstructure, fluid-pressure operated means for advancing, retracting and holding one of said jaws, a guide-frame supporting said carriage, the guides of which frame

are substantially parallel to the roll axes, and a fluid-pressure operated means for advancing and retracting said carriage.

3. In a disk rolling machine, a pair of overhung rolls, means for rotating the same, a base, a guide frame mounted longitudinally thereon, the guides of which extend longitudinally thereof in the general direction of the roll axes, a carriage slidably mounted on said guide-frame, fluid-pressure operated means for advancing and retracting said carriage, a superstructure mounted upon said carriage, means for adjusting said superstructure transversely of said carriage, a pair of opposed rotatable clamping jaws mounted on said superstructure and fluid-pressure operated means adapted to advance, retract and hold one of said clamping jaws.

In witness whereof I hereunto affix my signature.

HENRY Y. HILDEBRAND.