Aug. 23, 1932. H. FORD 1,873,568

MACHINE FOR MANUFACTURING BRAKE DRUMS

Filed Nov. 20, 1929 2 Sheets-Sheet 1

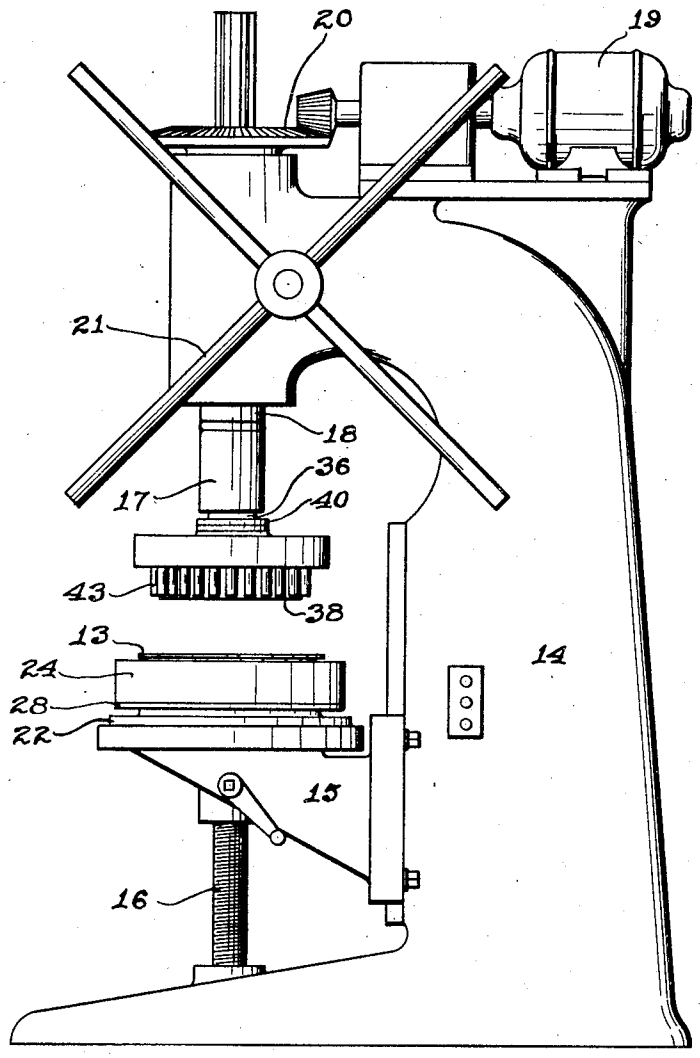


Fig. 1

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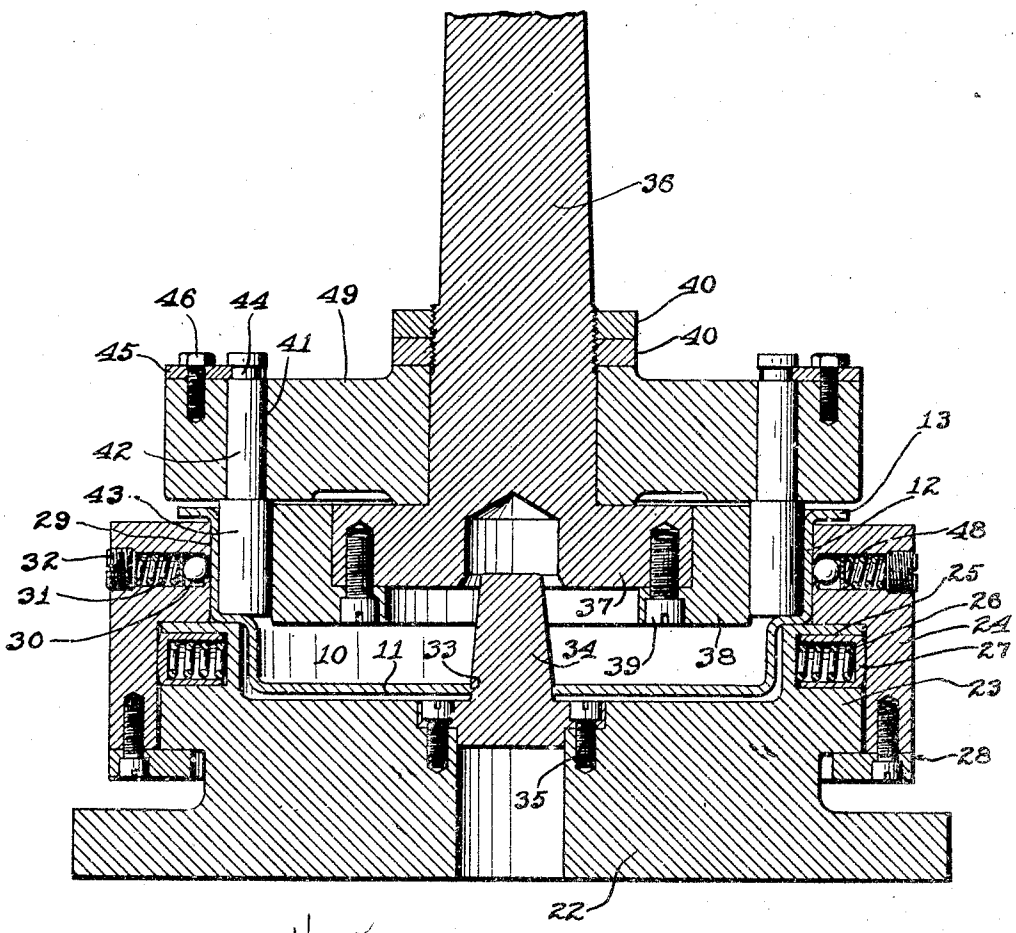


Fig. 2

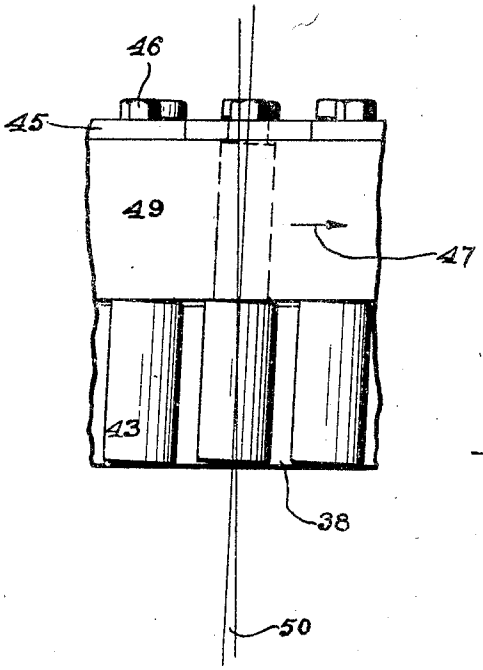


Fig. 3

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UNITED STATES PATENT OFFICE

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MACHINE FOR MANUFACTURING BRAKE DRUMS

Application filed November 20, 1929. Serial No. 408,638.

The object of my invention is to provide a brake drum of simple, durable and inexpensive construction.

A further object of my invention is to provide a brake drum having a braking surface superior to the ground surface ordinarily provided on brake drums.

Still a further object of my invention is to provide a machine for use in the manufacture of such drums, the purpose of the machine being to produce the superior braking surface by a rolling process instead of by grinding.

The conventional method of manufacturing brake drums consists in cutting a suitable blank from flat steel stock, then drawing the blank in a punch press to the shape of the drum, and then grinding the braking surface of the drum in a conventional grinding machine. The sheet steel used in the manufacture of brake drums varies slightly in thickness due to the rolling mill operations so that if the braking surface of the drum were not rendered smooth this uneven surface would soon destroy the brake lining. Further, the surface of such sheets of steel have small pieces of scale attached thereto which tend to unnecessarily wear down the brake lining if not removed or rendered smooth.

When the drums come from the punch press dies they are not truly circular due to variations in these dies. These variations are unavoidable due to the enormous strain of the drawing operations so that the braking surface must be made round by a subsequent operation. Grinding has universally been used for smoothing the braking surface and making the drum truly circular.

The customary grinding operations consist of a rough grind and a finish grind. These operations remove the scale from the steel and produce a braking surface which is truly circular. Further the braking surface is smooth so that the life of the brake lining is materially increased. One disadvantage to these grinding operations is that their cost adds materially to the total cost of the drum.

The brake drum, about to be described, is considerably cheaper to manufacture than the conventional brake drum because no grinding operations are required thereon. The braking surface of the drum instead of being ground is rolled, as further described in the specification, so that a truly circular braking surface results and one that is much smoother than the ground surface in the ordinary brake drum. Further, this rolling operation may compact the metal of the braking surface so that a drum having a longer life results. Microscopic examination has shown that the surface produced by this rolling operation is much smoother than the commercially ground surface. The pores in the steel are closed and there are of course no emery particles imbedded in the surface to detract from its smoothness or cause excessive wear on the lining used with the surface.

Still a further object of my invention is to provide a machine having a plurality of rollers therein and to provide bearings for guiding these rollers in the brake drum. A novel feature of this machine is the method of operating these rollers so that the rolling strain is not taken through the bearings used to guide the rollers. Heretofore, when it has been desired to roll the surface of a piece of metal, such as in a knurling operation, the knurling roller has been rotatably mounted in a pair of bearings. These bearings are subject to the full strain produced by the knurling operation so that they frequently need to be renewed. If such a method were used by the applicant to hold his rollers it would be almost impossible to obtain consistently accurate results, and it is due to the improved rolling device described herein that such accurate results are obtained. The bearings used with the applicant's rollers function solely to guide the rollers. They do not support the rollers against the braking surface and are thus not subject to the rolling strain. The rollers are mounted at a slight angle to the rotating axis of the machine so that the device may be self-feeding.

With these and other objects in view my invention consists in the construction, combination, and arrangement, of the various parts of my improved device, as described in the specifications, claimed in my claims, and

illustrated in the accompanying drawings, in which:

Figure 1 shows a side elevation of my improved rolling machine.

Figure 2 shows a central, vertical, sectional, view through the rolling fixture shown in Figure 1, and

Figure 3 illustrates the method of mounting the rollers so as to obtain a self-feeding device.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate generally a brake drum for use with a motor vehicle. This drum consists of a radially extending web 11 having an annular sleeve 12 formed integral therewith and projecting from one side thereof. A radially extending stiffening flange 13 projects from the open end of the sleeve 12. The interior surface of the sleeve 12 forms the braking surface of the drum and the surface which in the ordinary internal brake, would normally be ground.

Referring to Figure 1, the machine for rolling the braking surface of my improved brake drum consists of a frame 14, similar to a large drill press frame, having a work-holding table 15 reciprocally mounted for vertical adjustment on the forward face thereof by means of a screw 16. A spindle 17 is rotatably mounted in a sleeve 18, this sleeve being reciprocally mounted in the upper part of the frame 14. An electric motor 19 is arranged to rotate the spindle 17 through suitable gearing 20 while the sleeve 18 and spindle 17 may be reciprocated by means of a hand-wheel 21.

The structure just described merely illustrates one of the many ways in which my improved brake drum rolling fixture may be operated, and I do not wish to limit the manufacture of my improved brake drum to this particular type of machine.

Referring to Figure 2, a base plate 22 is fastened on the table 15. This base plate is provided with an upwardly extending circular portion 23 over the outer edge of which a ring 24 is floatingly mounted, there being sufficient clearance between these two members to allow a slight radial movement therebetween. The portion 23 is provided with a plurality of radially extending openings 25 into which springs 26 and spring seats 27 are mounted. A plurality of lugs 28 are secured to the lower edge of the ring 24 by means of suitable screws so that the plate 22 and the ring 24 may not be accidentally separated.

If it were not for the springs 26 and the spring seats 27 acting against the inner surface of the ring 24, the ring would be free to rotate relative to the plate 22. However, these springs exert sufficient pressure so that the ring 24 is frictionally held by the seats 27 from rotation relative to the plate 22. The ring is substantially free to move a short distance radially on the plate 22.

The upper portion of the ring 24 forms a die for receiving the brake drum 10. The opening in this portion of the ring is of truly circular shape, and the metal of the ring is of sufficient hardness so the action of the rollers which will later be described will not deform this opening. For clearness this die face or opening has been given the numeral 29.

Several radially extending openings 48 are provided in the ring 24 and a ball 30 and spring 31 are secured in each of these openings by a screw 32.

A brake drum 10 is inserted web downwardly into the die 29 of the ring 24. The web portion 11 of the brake drum is provided with a squared opening 33 which co-acts with a similarly squared pilot 34 which is secured to the plate 22 by means of screws 35. The pilot 34 enters the squared opening 33 in the web 11 so that the brake drum may be resisted from turning relative to the plate 22. Considerable pressure is necessary to force the drum into this opening 29 against the urging of the balls 30 and springs 31. However, these members serve to keep the drum from accidentally being withdrawn from the die opening during the rolling operation.

The lower end of the spindle 17 is provided with a conventional tapered opening adapted to receive a tapered shank 36. A flange 37 extends radially from the lower end of the shank 36 and a ring-shaped driver 38 is secured to this flange by means of screws 39. The member 38 is hardened and ground to a true circle.

A roller retaining member 49 is rotatably mounted on the shank 36 above the flange 37 and is restrained from axial movement thereto by means of nuts 40. This retaining member 49 is provided with a plurality of bearings 41 drilled therein describing a circular locus somewhat larger than the driver 38. A bearing stem 42 is rotatably mounted in each of these bearings and rollers 43 formed integral with the stems 42 extend downwardly adjacent to the outer edge of the driver 38. An annular groove 44 is formed in the upper end of each stem 42 which co-acts with a lug 45 secured to the upper face of the retaining member 49 by screws 46, to thereby prevent axial displacement of the rollers 43. It will be noted that there is no positive driving connection between the shank 36 and the retaining member 49 or rollers 43.

Referring to Figure 3 means are shown for feeding the device. The bearings 41 are drilled at a slight angle 50, approximately one degree, relative to the axis of the retaining member 49. When the driver 38 is rotated in the direction shown by the arrow 47 the rollers 43 will follow a helical path down

into the brake drum so that little or no exertion is required to feed the device.

For producing my improved brake drum, a blank is drawn in a punch press to a size slightly smaller than the finished size of the drum, and is then inserted in the die 29. The driver 38 is then rotated in the direction shown by the arrow 47 and the handwheel 21 is rotated to bring the rollers into contact with the upper edge of the drum. As soon as the rollers meet the drum they not only roll on the surface of the drum but also on the driver 38. Due to the angle 50 the rollers feed themselves in a long spiral path until they are in the position shown at Figure 2. The motor 19 is then reversed and the rollers guide themselves out of the drum in a like manner. The drum is thus expanded to a true circle corresponding to the die 29.

Among the many advantages arising from the use of my improved device, it may be well to mention that an extremely smooth and perfectly round braking surface is obtained which in many respects is superior to a ground surface. Further, the floating die incorporated in this device eliminates the necessity for an extremely accurate setting of the dies. Still further, the rollers being driven by a master driver, do not exert the rolling pressure on the bearings 41 so that the life of the machine is prolonged.

Some changes may be made in the arrangement, construction, and combination, of the various parts of my improved device without departing from the spirit of my invention and it is my intention to cover by my claims such changes as may reasonably be included within the scope thereof.

I claim as my invention:

1. In a machine for rolling the braking surface of brake drums, a base plate, a die resiliently mounted upon said base plate adapted to receive said drum, a driver rotatably driven within said drum, and a plurality of rollers disposed between said driver and drum for the purpose described.

2. In a device for smoothing and truing the cylindrical walls of a sheet metal brake drum, a cylindrical die adapted to loosely receive said drum, a non-circular shaped pilot associated with said die coacting with a correspondingly shaped opening in said drum preventing relative rotation between the die and drum, and rollers adapted to rotate around the inside of said drum to thereby squeeze the material of the drum against the die and circumferentially expand the drum to intimately fit said die.

3. In a device for smoothing and truing the cylindrical walls of a sheet metal brake drum, a rigid die having a truly cylindrical brake drum receiving opening therein materially larger than said drum, and a non-circular pilot associated with said die coacting with a correspondingly shaped opening in said drum preventing relative rotation between the die and drum, and a roller adapted to progressively squeeze each portion of the drum against the die thereby circumferentially expanding the drum to intimately fit said die.

4. In a device for smoothing and truing the walls of a flexible metal cylinder, a cylindrical die adapted to loosely receive said cylinder, means associated with said die for preventing relative rotation between the die and cylinder, a cylindrical driver adapted to be rotated within said die, a roller retaining member rotatably mounted upon said driver, and a plurality of rollers rotatably mounted in said retainer to roll between said driver and the cylindrical member, the driver and rollers and die being so proportioned that the metal of said member is expanded circumferentially into intimate contact with said die.

5. In a device for smoothing and truing the cylindrical walls of a sheet metal brake drum, a rigid die having a cylindrical drum receiving opening therein adapted to loosely receive said drum, means associated with said die for preventing relative rotation between the die and drum, a cylindrical driver adapted to be rotated within said die, a roller retaining member rotatably mounted upon said driver, and a plurality of rollers rotatably mounted in said retainer to roll between the driver and brake drum, said rollers progressively squeezing the individual portions of the drum against the die so as to circumferentially expand the drum into intimate contact with said die.

6. In a device for smoothing and truing the cylindrical walls of a sheet metal brake drum, a rigid die having a truly cylindrical brake drum receiving opening therein materially larger than said drum, a pilot associated with said die preventing relative rotation between said die and the drum, a cylindrical driver adapted to be rotated within said die, a roller retaining member rotatably mounted relative to said driver and die, and a plurality of rollers rotatably mounted in said retainer to roll between the driver and brake drum, said rollers progressively squeezing the individual portions of the drum against the die so as to circumferentially expand the drum into intimate contact with said die.

7. In a device for smoothing and truing the cylindrical walls of a sheet metal brake drum, a rigid die having a cylindrical drum receiving opening therein materially larger than said brake drum, a non-circular shaped pilot associated with said die coacting with a correspondingly shaped opening in said drum preventing relative rotation between the die and drum, a cylindrical driver adapted to be rotated within the die and drum, a roller retaining member rotatably mounted within said die and on said driver, and a plurality

of rollers rotatably mounted in said retainer to roll between the driver and brake drum, said rollers progressively squeezing the individual portions of the drum against the die so as to circumferentially expand the drum into intimate contact with said die.

8. In a device for smoothing and truing the cylindrical walls of a sheet metal brake drum, a rigid die having a cylindrical drum receiving opening therein materially larger than said drum, a square pilot associated with said die projecting through a squared opening in the web of said drum whereby relative rotation between the die and drum is prevented, a cylindrical driver adapted to be rotated within said die, a roller retaining member rotatably mounted upon said driver, and a plurality of rollers rotatably mounted in said retainer to roll between the driver and brake drum, said rollers progressively squeezing the individual portions of the drum against the die so as to circumferentially expand the drum into inimate contact with said die.

HENRY FORD.