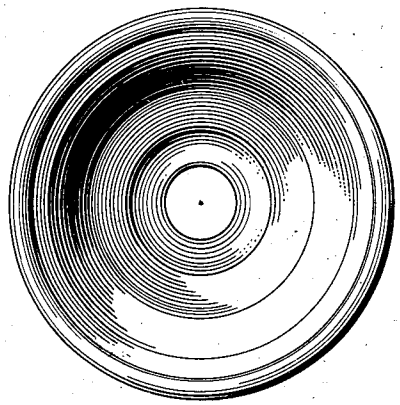
April 16, 1935. W. H. FARR 1,998,048

METHOD OF TREATING BRAKE DRUMS OR THE LIKE

Filed July 12, 1930

FIG. 1



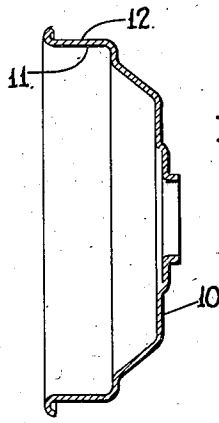


FIG. 2

FIG. 3

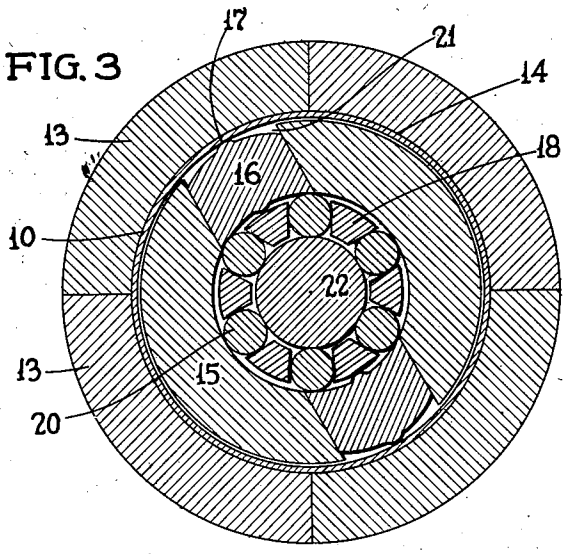
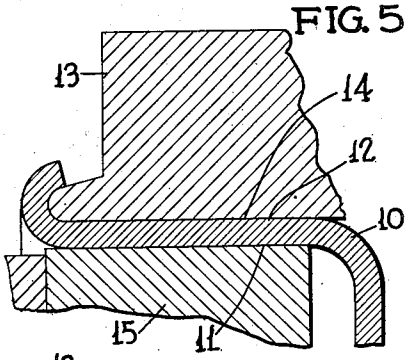


FIG. 5



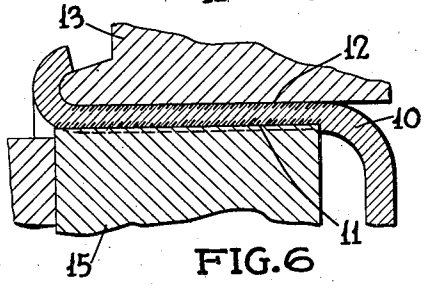


FIG. 6

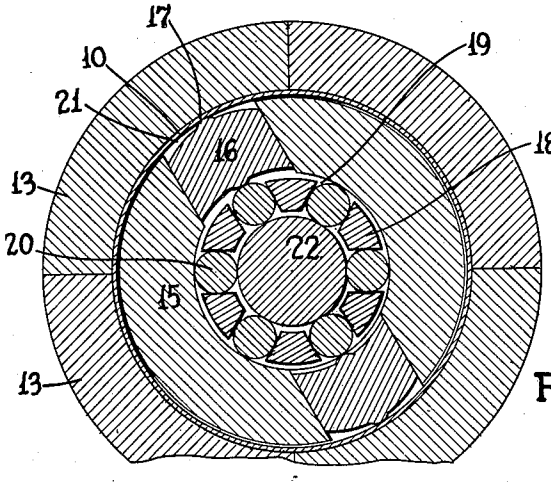


FIG. 4

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Patented Apr. 16, 1935 1,998,048

UNITED STATES PATENT OFFICE

1,998,048

METHOD OF TREATING BRAKE DRUMS OR THE LIKE

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Application July 12, 1930, Serial No. 467,536

10 Claims. (Cl. 29—152.2)

My invention relates to a method of treatment adapted to be applied to the internal peripheral surface of a brake drum or other annular work piece.

It is a main object of my invention to subject such work pieces to a method of treatment which will improve their wear resisting qualities and reduce them to accurate size and true surfaces of revolution.

Brake drums have heretofore been produced by various pressing and rolling operations and, frequently, expensive heat treating and machining operations to reduce them to the accuracy of size and true surfaces of revolution and the hardness desirable for long life and smooth operation of the drums and the brake shoes cooperating therewith.

By my invention I am able to avoid a number of the operations heretofore required and to attain the objects of the invention by the simple expedient of swaging the internal periphery of the drum while supporting it on its external periphery. By this method I am also enabled to salvage brake drums having their peripheral surfaces distorted or undersize without expensive rolling or machining operations, and hence at very low cost. The method of my invention not only hardens the inner peripheral braking surface so as to greatly increase its life, but the swaging operation produces a similar effect in the outer peripheral surface, increasing the wear-resisting qualities of that surface, making the same brake drum very suitable for use either for external or internal braking or both.

In the practice of the method of my invention, the best results are obtained if but a relatively small arc of the surface is treated at an instant of time, and it is desirable to treat the surfaces at opposite ends of a diameter simultaneously by radially acting hammers to enable the forces to be equally balanced. To speed up the work and to treat all parts of the surface equally, the swaging means and the work are relatively rotated at an appropriate speed and the hammers are operated to strike the blows at great rapidity, whereby the entire surface of the work may be treated in a minimum of time.

Another feature of the method consists in the gradual feeding of the hammers outwardly into the work until the desired size is reached, and the continuation of the swaging after the feeding a sufficient length of time to reduce the entire surface to a true surface of revolution, due to the overlapping of the successive blows in the relative rotation of the work and swaging means.

In the accompanying drawing, I have illustrated, more or less diagrammatically, a form of apparatus which may be used to carry out the method of this invention.

In this drawing,

Figs. 1 and 2 show, respectively, an inside elevation and an axial sectional view of a work piece, in this case, a brake drum adapted to be treated by my improved method.

Figs. 3 and 4 show more or less diagrammatically transverse sectional views of a form of apparatus which may be used to carry out the method, in two different positions of the hammers and the actuating mechanism therefor.

Figs. 5 and 6 are detail axial sectional views of the work piece and the adjacent parts of the apparatus, respectively, at the beginning and the end of the swaging operation.

In the practice of my invention, I take a brake drum or other work piece as 10, having an inner peripheral surface, as 11, and an outer peripheral surface 12 adapted to be treated, as it comes from the forming press or otherwise roughly of the desired shape and size, and clamp it on its outer peripheral surface in a series of clamping jaws 13 of a form on their inner faces 14 conforming to the outer peripheral surface which it is desired to produce. These jaws, in the case illustrated, form dies, together forming an inner cylindrical surface entirely surrounding the outer face of the drum, i. e., they form a support or anvil against which the internal swaging means may act upon the work.

In a suitable annular support 15 arranged inside the inner peripheral face 11 of the drum which support is, in the practice of the invention, held in true axial alignment with the axis of the work clamping jaws are arranged a series of hammers 16 adapted to have limited radial movement in the support. These hammers have a working face extending axially, and of a width axially to operate in the width of surface to be treated. Preferably, in order to work but a small arc of the surface of the work at each blow of the hammers, the working face 17 is formed, as shown, on an arc of relatively small radius but, of course, the curvature of the working face will depend somewhat upon the nature of the metal being worked, whether hard or soft. For low carbon steel, such as is commonly used for die drawing a brake drum, I have obtained good results with a working face substantially of a radius relative to the surface to be welded such as that indicated in the drawing.

The hammers 16 are preferably arranged in

balanced arrangement about the axis of the support 15 and clamping jaws 16 and at opposite ends of a diameter, and, in the practice of the method, two diametrically arranged hammers are actuated simultaneously to work on opposite points of the work.

The hammers can be simultaneously actuated by any suitable means. In the illustrated embodiment of an apparatus adapted to practice the method I have shown an actuating means therefor which comprises a shaft 18 adapted to have a high speed of rotation relative to the support in which the hammers are mounted, and this shaft is provided with equally spaced radial slots 19 within which are located, also for limited radial movement, the rollers 20. These rollers are preferably of frusto-conical form, and they are swept around with the rotation of the shaft, to enable each in succession to strike an axially extending actuating rib 21 formed on the inner face of each hammer and adapted, when the hammers are in their inner positions radially, to project into the path of the rollers. These rollers shown in Figs. 3 and 4 in their outer positions where they actuate the hammers to deliver the finishing blows to the surface of the work, are supported on their inner sides by what may be called an actuator head 22, which is also preferably of frusto-conical form to match the incline of the surface of the rollers.

At the beginning of the swaging operation, this actuator head, which is adjustable axially to feed the rollers outwardly and thus feed the hammers into the work, to expand it against the faces 14 of outer supporting jaws 13, are permitted to move inwardly when they come opposite the actuating ribs 21 on the hammers, because the actuator head is so axially adjusted as to permit this. When the swaging operation commences, the work supporting jaws 14 and the work held therein are rotated relative to the hammer support 15 at a relatively slow speed and the actuator head is gradually fed axially in a direction to cause the rollers to meet their support on it on a larger and larger diameter, and in this movement, the hammers are at each passage of a roller past their actuating ribs forced deeper and deeper into the work, until they reach their outer position shown in Figs. 3 and 4, where the hammers are exerting their finishing blows upon the work. The rollers are so arranged, see Figs. 3 and 4, that the diametrically opposed hammers, are simultaneously operated to strike their blows, but these blows are only momentary ones, since the arcuate faces 18 of the actuator ribs are formed on a relatively small radius. By reason of the roller contact with these arcuate faces, and the high rate of speed of the actuator shaft 18, the blows are struck with great rapidity, and yet without absorbing a great deal of energy. The rotation of the work insures each part of its peripheral surface being struck many blows during the treatment.

Thus the method of my invention is rapidly carried out. The metal of the brake drum is worked between the surfaces 14 of the clamping jaws, which act as an anvil, and the hammers 16 which act to expand and true the inner peripheral surface 12 of the drum, and to give it the exact dimension desired, and the outer peripheral surface 11 of the drum is at the same time, through its engagement with the inner true surface of the clamping jaws also given the exact size desired. The swaging so carried out by striking a great number of hammer blows against all parts of the periphery of the drum, especially if the swaging is continued for a time after the actuating rollers have been moved to their outer position for a given diameter of surface, will produce a very true surface, and since the metal is excessively worked on the inner peripheral surface of the drum through the repeated impact blows of the hammers, it is materially hardened by the swaging operation, which is an important feature of the invention, since by such hardening of the braking surface, the life of the drum is prolonged.

The swaging by this method, has the effect not only of hardening the inner peripheral face 12 of the work, but also of hardening the outer surface 11 as well, thus simultaneously producing in one operation a brake drum having an outer and inner surface hardened to provide a wear resisting braking surface.

From the foregoing description it will be seen that not only have I produced a novel method of treatment which adapts existing types of brake drums made of low carbon steel or other metals adapted for die drawing, but not having long-wear resisting qualities, to be readily converted into brake drums having such qualities because my method imparts these qualities to them, but I am also able to salvage, by the practice of my method, brake drums which have become distorted after the drawing operation, so as to be unfit for use, except through expensive re-heating and rolling or machining operations, and to make out of them an accurately sized, true and long-life product.

What I claim is:

1. The method of treating brake drums which consists in supporting them peripherally and swaging them internally by application of successive blows, each of which extends on a line parallel to the axis of a drum.

2. The method of treating brake drums which consists in supporting them peripherally and swaging them internally by application of successive blows, each of which extends on a line parallel to the axis of a drum and rotating them while swaging.

3. The method of treating brake drums which consists in supporting them over substantially the entire circumference of their outer peripheral surfaces and swaging them internally over the circumference of their internal peripheral surface to increase the wear resisting qualities of both said outer and inner surfaces simultaneously by application of successive blows, each of which extends on a line parallel to the axis of a drum.

4. The method of treating a brake drum which comprises swaging the braking surface thereof by application of successive blows, each of which extends on a line parallel to the axis of a drum.

5. The method of treating a brake drum which comprises swaging an interior surface thereof to produce a suitable braking surface by application of successive blows, each of which extends on a line parallel to the axis of a drum.

6. The method of forming a brake drum which comprises selectively compacting the braking surface thereof by application of successive blows, each of which extends on a line parallel to the axis of a drum.

7. The method of treating annular work pieces which consists in supporting them peripherally and swaging them internally by operating simultaneously upon diametrically opposite sides thereof, by application of successive blows, each of which extends on a line parallel to the axis of a drum.

8. The method of treating brake drums which consists in supporting them peripherally and swaging them internally by operating simultaneously upon diametrically opposite sides thereof while rotating them, by application of successive blows, each of which extends on a line parallel to the axis of a drum.

9. The method of working an annular object, which comprises radially backing the object entirely about its perimeter at one side, and beating it against the backing from the opposite side by applying an annular series of radially oppositely directed simultaneous blows successively over small areas and of sufficient force to locally distort the object over such small areas.

10. The method of working an annular object, which comprises setting up a rotary motion about the axis of the object and converting such motion into a rapidly applied annular series of rectilinear oppositely directed simultaneous radial thrust blows toward, and covering only small areas of, the object and sufficient to distort the object on such small areas.

WARREN H. FARR.