Aug. 10, 1926. 1,595,725

W. H. PHILLIPS

GEAR RIM HOLDER

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Fig. 1.

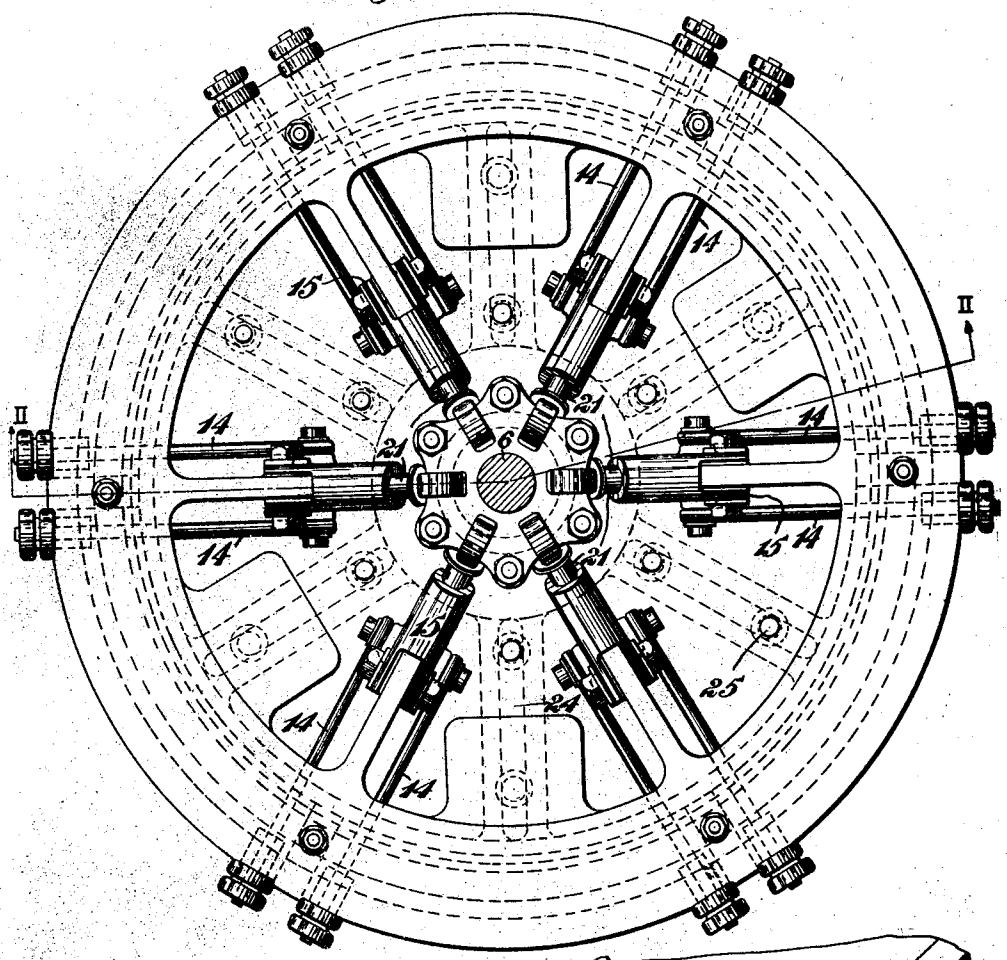
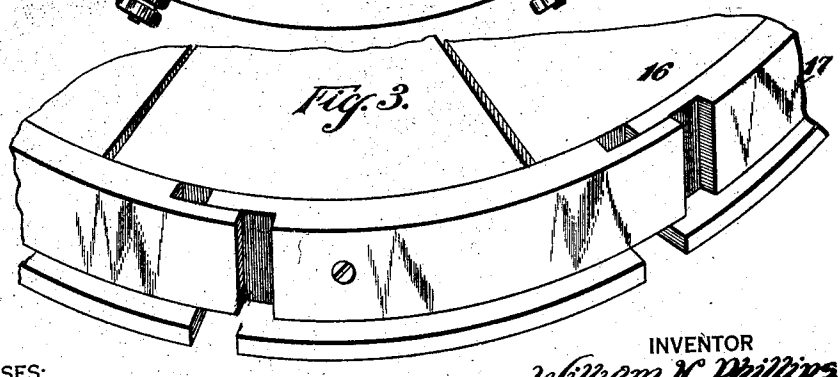



Fig. 3.




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Fig. 2.

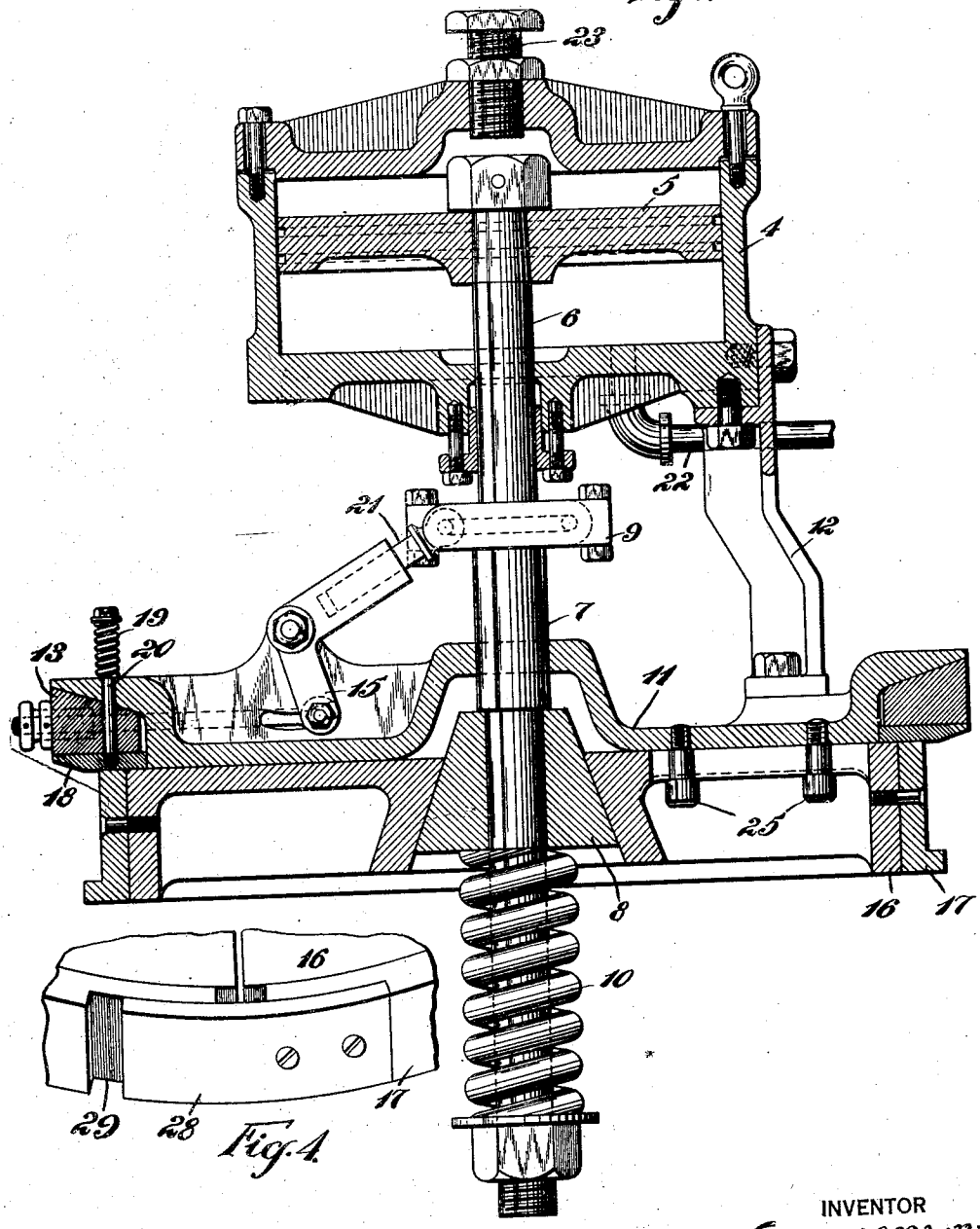






Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## GEAR-RIM HOLDER.

Application filed March 24, 1921. Serial No. 455,020.

My invention relates to holders for gear rims, and it has for its object the provision of means whereby gear rims may be handled expeditiously and maintained against distortion while undergoing heat treatment.

Heretofore, the practice has been to heat the gear rims in a furnace and then to remove them to a quenching bath. In cooling, the gear rim was apt to shrink unevenly thus becoming distorted both radially and axially. Frequently distortions occurred also while the rims were being heated.

By my device, the gear rim, on its removal from the furnace, is subjected to the action of shaping members which correct any irregularities of contour and maintain the rim against distortion while in the quenching bath. One form of construction for effecting these results is shown in the accompanying drawing, wherein—

Figure 1 is a plan view of the device, with the fluid pressure cylinder shown in Fig. 2 removed;

Fig. 2 is a view in section taken on the line II—II of Fig. 1,

Fig. 3 is a perspective view of certain of the rim-engaging members of my device, and

Fig. 4 is a detail view of a modification of the device of Fig. 3.

Referring more particularly to Fig. 2, I provide a cylinder 4 having a piston 5 connected to a rod 6. The rod 6 has a shouldered portion 7 against which abut a conical shaped wedge member 8 and a collar 9. A spring 10, carried on the outer end of the rod, maintains the wedge member 8 in yielding contact with the shoulder 7.

A bracket 11 is supported from the cylinder 4 by a plurality of bars 12, and carried in the circumferential offset of the bracket 11 are six wedge members 13 connected, by means of rods 14 and bell cranks 15, to the bracket 11 (see Fig. 1). Each pair of rods 14 serves to support the adjacent ends of two wedge members. Also carried on the bracket are a series of segments 16 provided with slots 24 which co-operate with screws 25 to form a sliding engagement between the bracket and segments. Removably secured to each of the segments 16 is a shouldered face plate 17.

Between the wedge members 13 and the segmental members 16 and 17 is a disc-like member 18 yieldingly held against the wedges 13 by a spring 19 and bolt 20, to normally maintain the member 18 in released position and to assist in moving the wedges to retracted position.

Pivotally mounted in the split collar 9 are six levers 21 which extend into the slots in the upper arms of the bell cranks, so that vertical movement of the collar will cause the arms 21 to rock the bell crank about their pivots.

In operation, the apparatus is carried by a crane to the furnace door. The piston 5 and wedge members 8 and 13 all being in retracted position, and the segments 16 also retracted, a gear rim is removed from the furnace and the lower end of the holder is dropped into place within the gear rim, so that the annular member 18 rests upon the gear rim. Fluid pressure is then admitted to the cylinder through a pipe 22, causing the piston to move upward and draw the wedge 8 against the segments 16 and expanding them until their face members 17 tightly engage the inner face of the gear rim. The length of travel of the rod 6, and consequently the amount of expanding pressure exerted on the gear rim by the spring 10, acting through the wedge 8 and segments 16, is governed by the adjusting screw 23. The pressure thus exerted against the gear rim corrects any radial distortion caused by the heat of the furnace, and holds it against radial distortion during the quenching and cooling operation.

The rod 6, on its upward movement, carries with it the collar 9, and, by reason of the engagement between the levers 21, bell cranks 15 and levers 14, the wedges 13 are drawn inwardly, thus forcing the annular member 18 against the upper edge of the gear rim and maintaining the gear rim in tight engagement between the member 18 and the shoulder on each of the face members 17. The pressure on the edges of the gear rim straightens any axial distortions resulting from the heating operation, and prevents any such distortions during the quenching and cooling operation. This movement of the annular member 18 is so

timed as to be slightly in advance of the expanding movement of the segmental members.

The segmental face plates 17, combined, present a substantially continuous support for the inner face of the gear rim, there being only sufficient space between each of these plates and between the segments 16 to permit retraction of the segmental members when applying or removing a gear rim. The segmental face members 17 overlap somewhat, as indicated in Fig. 3, for the purpose of sealing the gear rim at these points from contact with the quenching fluid, so that the entire inner face of the gear rim will be of uniform hardness.

Instead of overlapping the face plates, the gap between adjoining face members may be sealed, as shown in Fig. 4, by means of plates 28 lying in recesses 29 formed in the adjoining members and bridging the space between them, one end of each plate being screw-fastened in the recess of one face member, and the other end extending across the gap and lying in the recess of the adjoining segmental face member.

After the gear has been dipped in the quenching solution and cooled sufficiently, the fluid pressure is exhausted from the cylinder 4, allowing the rod 6 to drop by the action of gravity, thus moving the wedges 8 and 13 to their release position to permit retraction of the segments 16 to release the gear rim, and thus placing the parts in position to receive another gear rim from the furnace.

It is possible to substitute a positive stop member for the spring 10, to hold the wedge 8 in position, but in practice it has been found desirable to provide a yielding resistance to the radial shrinkage of the gear rim, for the reason that a rigid resistance is quite likely to cause the gear rim to crack. By providing a properly calibrated spring and regulating, by the adjusting screw 23, the length of travel of the rod 6, the pressure exerted by the spring 10 can be made sufficient to correct and to prevent radial distortions of the gear rim, but permitting it to yield under shrinkage strains which would otherwise cause the rim to crack.

To provide for the accommodation of gear rims of various widths and diameters, the face plates 17 are made removable, to permit other plates of a different width or thickness to be substituted when desired.

The foregoing is merely one of a number of mechanical arrangements which might be employed in carrying out my invention.

I claim as my invention:—

1. In combination, in a gear rim holder, a supporting bracket, a plurality of radially movable expansion members carried by the bracket, an annularly disposed compression member for engaging one edge of the gear rim and also carried by the bracket, means for engaging the other edge of the rim, and actuating means for moving the expansion members into engagement with the inner surface of the gear rim and for bringing the compression member to bear against the edge of the rim.

2. In a gear-rim holder, a plurality of resilient shaping members for engaging the inner periphery and side faces of a gear rim.

3. In a gear-rim holder, a plurality of resiliently movable shaping members for engaging the inner periphery and side faces of a gear rim, said shaping members having a common actuating means.

4. In a gear rim holder, the combination of a plurality of radially movable segments arranged coaxially with an expansion member, an annular compression member, operating mechanism yieldingly engaging the expansion member and pivotally connected to the compression member, and a fluid pressure cylinder having a piston connected to the operating mechanism in such manner that movement of the piston in one direction forces the said segments and compression member into engagement with the gear rim, while a movement thereof in the opposite direction effects the release of the gear rim.

5. In a gear rim holder, the combination of an adjustably resilient means for engaging the inner face of the gear rim to correct and prevent radial distortions, and means for engaging the edges of the gear rim to correct and prevent axial distortions thereof.

6. In a gear rim holder, an adjustably resilient means for engaging the inner face of the gear rim, means for engaging the edges of the rim, and a common actuating mechanism for both of said means whereby said means operate to correct and prevent circumferential distortions of the gear rim.

7. In a gear rim holder, a plurality of expansible segmental members the combined peripheries of which, when in expanded position, present a circumferential supporting surface broken at intervals by spaces between the edges of adjacent segments, and means covering the said spaces to prevent access of the quenching fluid therethrough to the inner face of the gear rim.

8. In combination, in a gear rim holder, a plurality of expansible segmental members the combined peripheries of which, when in expanded position, present a circumferential supporting surface to the inner face of the gear rim, said surface broken at intervals by the spaces between adjacent segments, and face plates substantially coextensive with the supporting surfaces of the segmental members but extend-

ing over the spaces between adjacent edges of the segmental members.

9. In combination in a gear rim holder, a plurality of expansible segmental members so combined as to form a circumferential supporting surface, and face plates substantially coextensive with said segmental members and detachably secured to the supporting surface.

In testimony whereof I have hereunto subscribed my name this 14th day of March 1921.

WILLIAM H. PHILLIPS.