A. B. HELBIG.

METHOD OF AND MEANS FOR SUPPORTING ROTARY DRUMS.

APPLICATION FILED DEC. 22, 1908.

974,964. **Patented Nov. 8, 1910.**

2 SHEETS—SHEET 1.

Fig. 1.

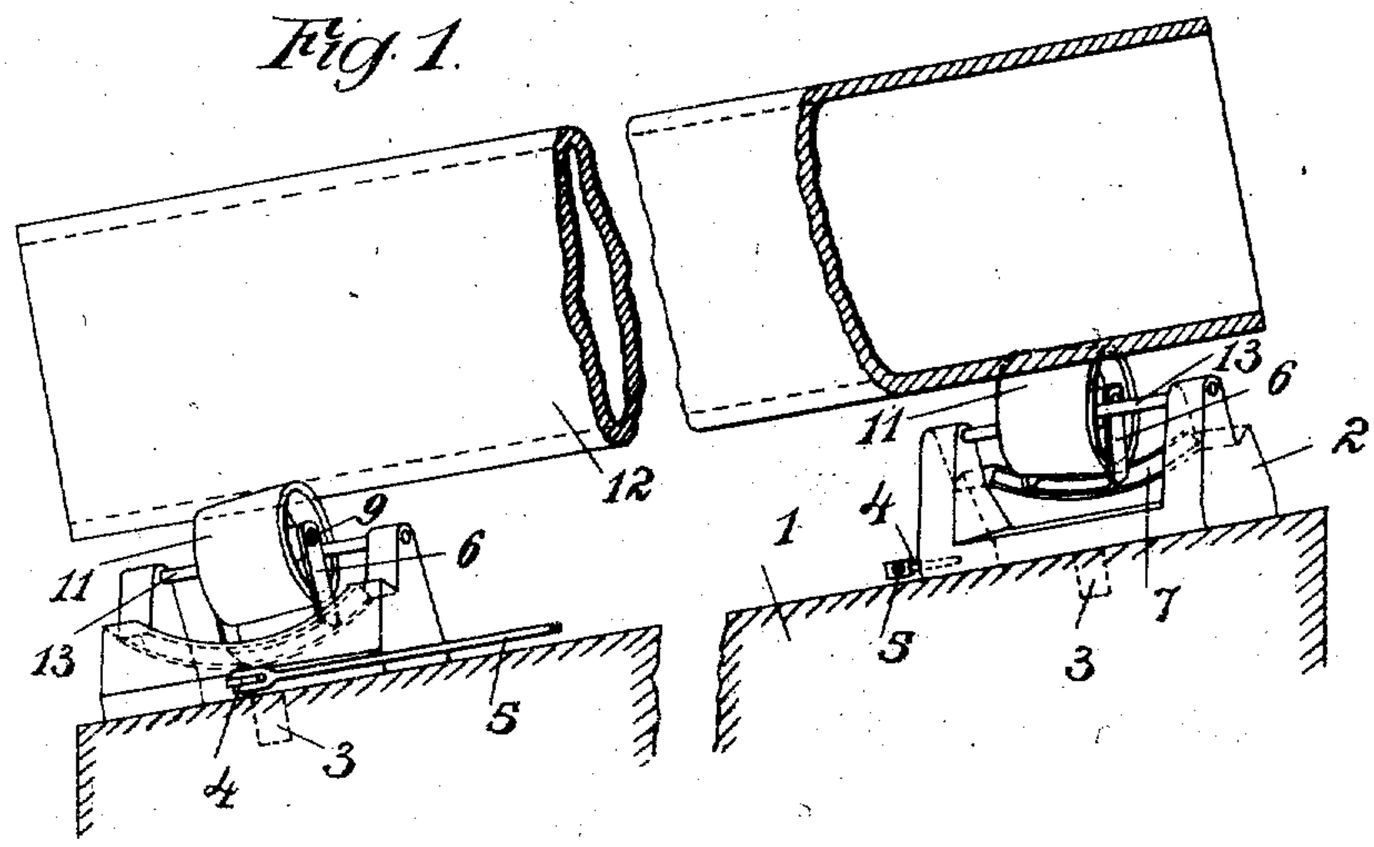

Fig. 2.

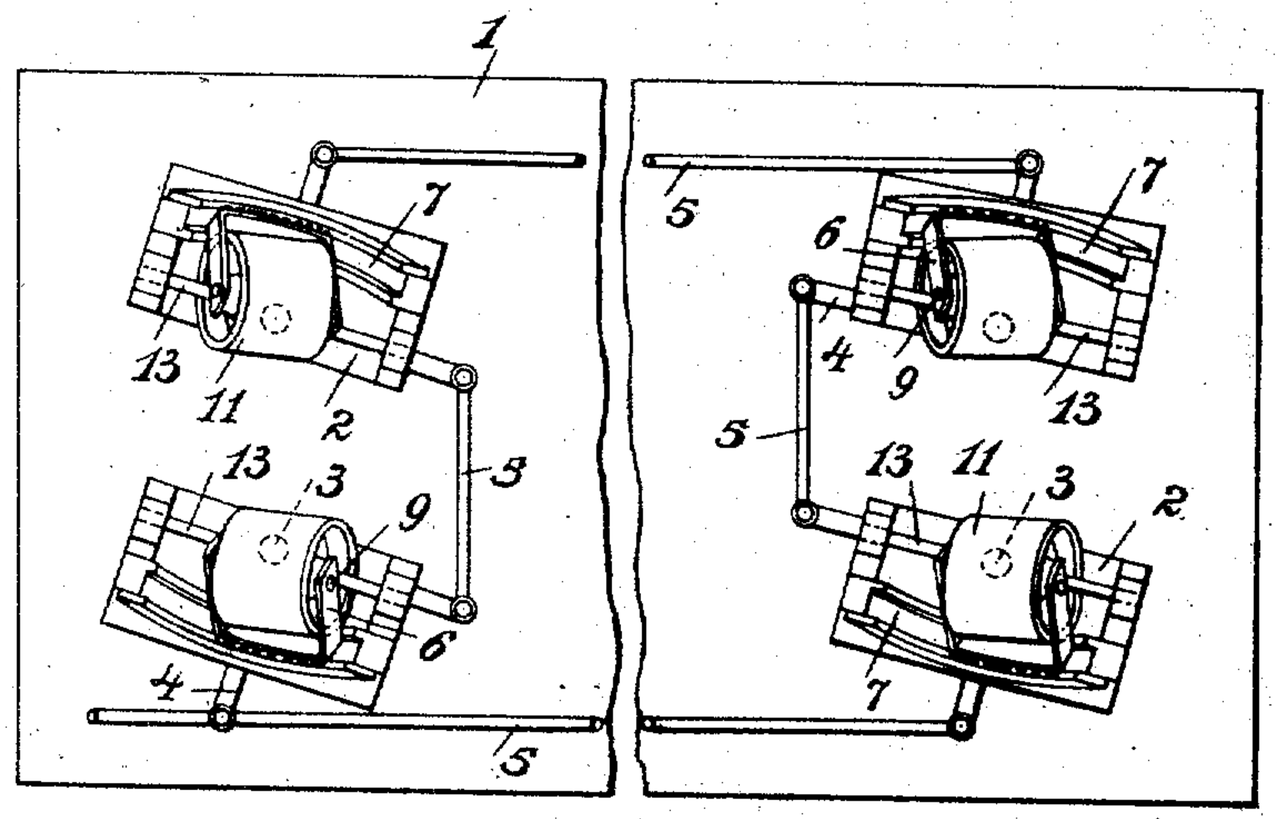

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Fig. 3.

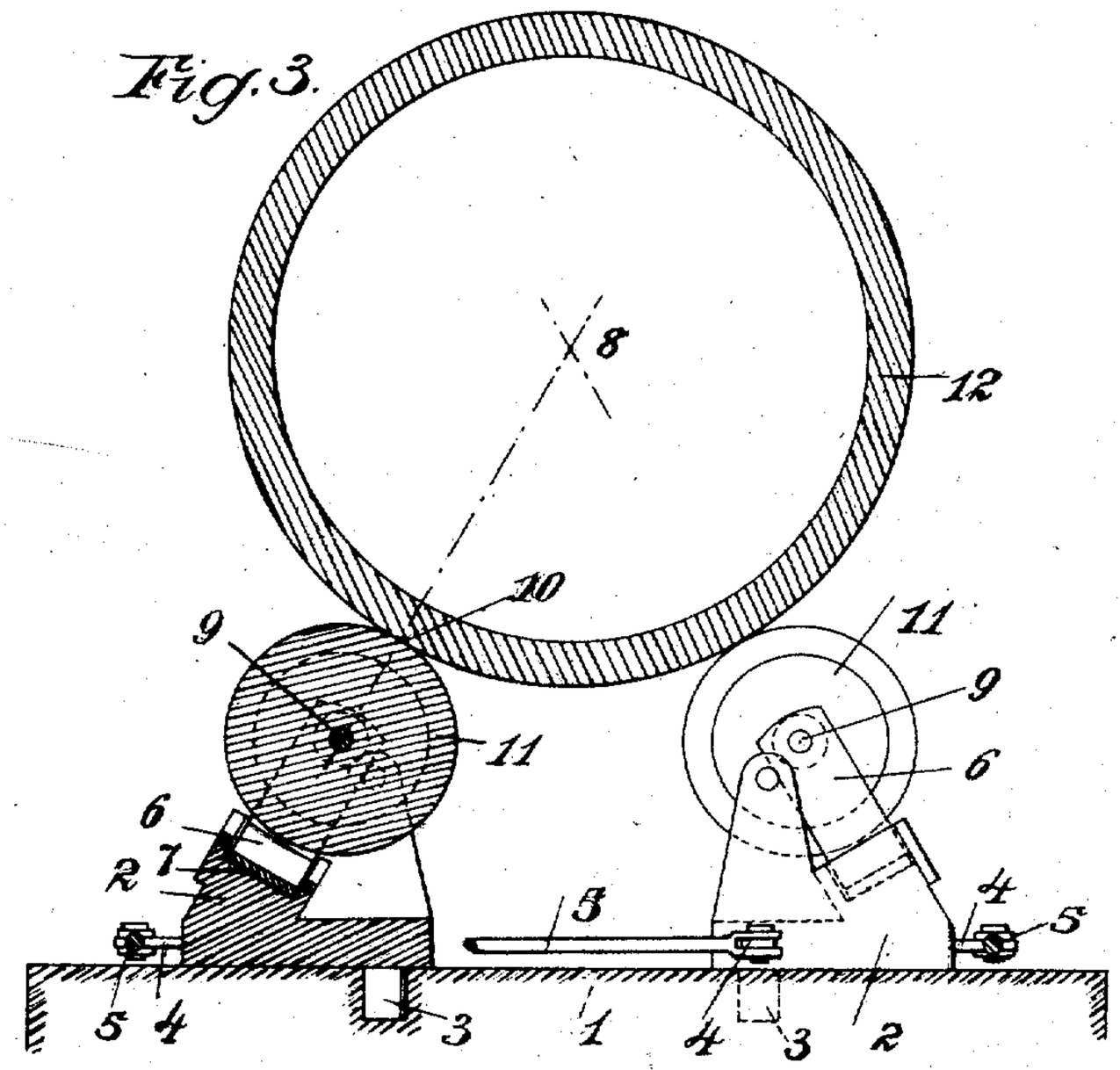
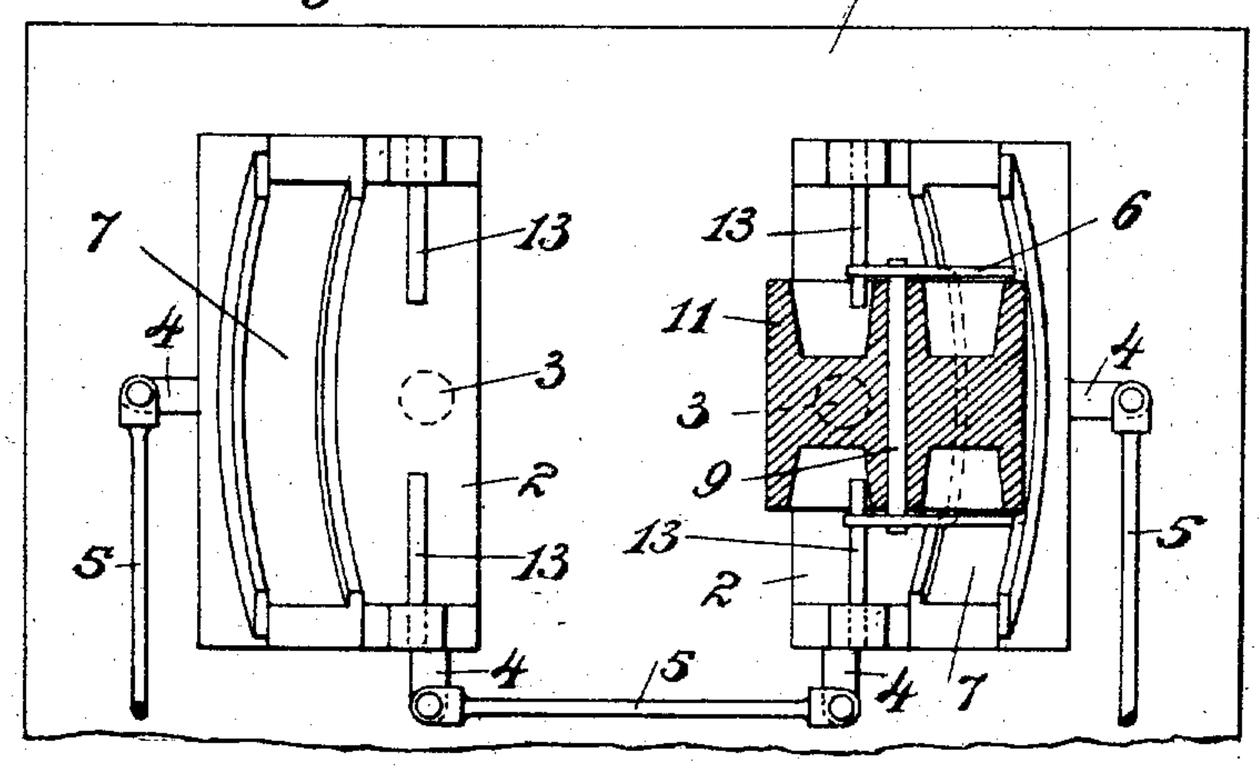


Fig. 4.



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UNITED STATES PATENT OFFICE.

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METHOD OF AND MEANS FOR SUPPORTING ROTARY DRUMS.

974,964. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed December 22, 1908. Serial No. 468,768.

To all whom it may concern:

Be it known that I, ALBIN BERTHOLD HELBIG, resident of 73 Varrentrapstrasse, Frankfort-on-the-Main, Germany, subject of the German Emperor, have invented new and useful Improvements in Methods of and Means for Supporting Rotary Drums, of which the following is a specification.

Rotary drums having longitudinally inclined axes and of great length and weight are used more especially as rotary kilns of furnaces. These drums are always supported at both ends and when found necessary in the center also by pairs of rollers which are subjected to very great pressure. Such a rotary drum, owing to the action of gravity would move downward during rotation if the axes of the supporting rollers were not inclined at a small angle to the axis of the drum. This position of the rollers by iself would cause a spiral upward movement of the drum and this upward movement and the inclined position of the roller axes have to be so mutually adjusted with regard to the inclination of the drum toward the horizontal, that neither an upward nor a downward movement of the drum will result. For this purpose the supporting rollers must be angularly adjustable. But this adjustment leads to two difficulties. In the first place as the surface lines of the supporting rollers are no longer parallel to the surface lines of the drum, there is the danger that the drum will not rest on the middle of the width of the supporting roller so as to obtain sufficient surface contact, but will bear on one edge only of the roller. In the latter case pressures arise which in practice have often led to the destruction of the rollers. In the second place it is difficult to adjust the several rollers to the same angle and to distribute the load equally between them. The present invention is designed to overcome both these difficulties and to this end the adjustment of each roller in relation to the drum is effected in such manner that the rollers are automatically caused to receive the pressure at their mid-length and not on one edge only, and each roller bearing itself is movably mounted in such manner that it adjusts itself under the pressure of the drum. The similar simultaneous angular adjustment of all the rollers in relation to the drum is obtained by positively connecting together the carrier plates of all the roller bearings in such manner that they will always stand under the same angle to the common base plate of the entire drum.

The invention will be described with reference to the accompanying drawing wherein—

Figure 1 is a side view partly in section of a rotary drum, that roller which is toward the spectator being shown in the case of the lower pair, while in the case of the upper pair the roller on the other side is shown. Fig. 2 is a plan view of a set of four rollers. Fig. 3 shows, partly in section, the method of supporting one pair of rollers drawn to a larger scale. Fig. 4 shows a pair of roller supports viewed from above, only the bearing plate being shown in the case of the lefthand member of the pair, while the roller itself is shown in section in the case of the right-hand member.

Upon the base 1 the bearing plates 2 are rotatably mounted on pivots 3. The bearing plates 2 are provided with arms 4 which are connected by rods 5 in such manner that the whole of the bearing plates are constrained to turn together on their respective pivots 3. The bearing plates 2 carry the slides 6 each upon a segmental guide 7. This guide is arranged in a plane (Fig. 3) which passes through the drum axis 8 and through the roller axis 9 when the two axes are set parallel to each other. The radius of curvature of the guide 7 is struck from a center coincident with the contact point 10 between the roller 11 and the drum 12, and the slide 6 can therefore be shifted upon the guide 7 so that the roller is able to adjust itself. In addition to the support afforded by the guide 7 the slide 6 is supported near its upper part by two rods 13 which, when the angular position of the bearing plates 2 is varied have for effect to insure that the axes 9 of the rollers shall participate in the same movement. These rods 13 are arranged in such manner that when the axes 9 are parallel with the axis 8 both of said axes 8 and 9 lie in the plane of the middle line of curvature of the guide 7. The axis of the pivot 3 when prolonged upward must also pass through the contact point 10 of the drum 12 with the supporting roller 11. In this manner a turning movement of the bearing block 2 can take place without alteration in the position of the point of support 10 while the drum will tend to ascend or descend upon

its supports according as the bearing blocks are thus slewed around.

The geometrical relations here given are those which represent the best way of carrying out the invention, but in practice there may, within certain limits, be deviations from mathematical accuracy.

It is obvious that each of the two arrangements, *i. e.* the way in which each supporting roller is mounted and the connection of the several rollers by means of positively acting mechanism, can be usefully employed independently of each other, but that these two arrangements, when employed in conjunction with one another, render each other mutual assistance of a special character and thus enable the perfect object to be obtained.

The automatic adjustment of each slide 6 upon the curved guide 7 is of importance also in case the furnace should be heated while at rest, so as not to let it cool off before the next operation. Under these circumstances the upper side of the furnace gets much hotter than the lower side and as a consequence a bending of the drum results and the supporting rollers automatically adjust themselves according to the curvature. Furthermore, it would be possible to effect the automatic adjustment of the supporting rollers under the weight of the rotary drum during an angular variation in the position of the base plate, by means of a positive adjustment whereby a swinging movement of the axis of the supporting roller, corresponding to the turning movement of the bearing plates, would be produced. It is further to be remarked that the adjusting movement of the bearing block is the movement of a universal joint, the two axes of which pass through the point of contact between the drum to be supported and the supporting roller. One of these axes is the vertical which may be drawn through this point of contact and which passes through the point at which the bearing plate is rotatable relatively to the common base. The second axis passes through the point of support in a direction perpendicular to the plane of curvature of the segmental guide. From this it necessarily results that the line, upon the surface of the supporting roller, which passes through the point of support of the drum, always intersects the longitudinal axial plane of the drum at the point of support.

Now what I claim and desire to secure by Letters Patent is the following:

1. The combination of a rotary drum, supporting rollers for said drum, and means for changing the relative angle between each roller axis and the axis of the drum.

2. The combination of a rotary drum, supporting rollers for said drum, and means for changing the direction of each roller axis while leaving the drum axis unchanged.

3. The combination of a rotary drum, supporting rollers for said drum, and an adjustable support for each roller, said adjustment being in the plane common to the roller axis and to the point of contact between roller and drum.

4. The combination of a rotary drum, segmental guides, slides movable in said guides and rollers rotatably mounted on said slides for supporting said drum.

5. The combination of a rotary drum, rollers for supporting said drum, slides on which said rollers are rotatably mounted, and segmental guides in which said slides are movable, the curve of each of said guides being struck from the point of contact between each roller and the drum.

6. The combination of a rotary drum, rollers for supporting said drum, slides on which said rollers are rotatably mounted, segmental guides in which said slides are movable and rods for engaging and supporting the said slides at their upper portions.

7. The combination of a rotary drum, rollers for supporting said drum, slides on which said rollers are rotatably mounted, and segmental guides in which said slides are movable, said guides being fixed to rotatable bearing plates.

8. The combination of a rotary drum, rollers for supporting said drum, slides on which said rollers are rotatably mounted, and segmental guides in which said slides are movable, said guides being fixed to rotatable bearing plates, and said plates being each rotatable about an axis which extends through the point of contact between each roller and the drum.

9. The combination of a rotary drum, rollers for supporting said drum, slides in which said rollers are rotatably mounted, segmental guides in which said slides are movable, said guides being fixed to rotatable bearing plates, each of which is rotatable about an axis which extends through the point of contact between each roller and the drum and rods connecting all of the plates together to cause said plates to move in unison.

10. The combination of a rotary drum, supporting rollers for said drum, a support for each roller, a bearing plate for each support, means for adjusting said support circularly upon the bearing plate and means for independently adjusting said bearing plate circularly.

11. The combination of a drum, rollers for supporting said drum, movable supports for said rollers and means for causing all of said supports to move in unison.

12. The combination of a drum, rollers for supporting said drum, supports for said rollers, rotatable plates for carrying said supports and connections between said plates to cause them all to move in unison.

13. The combination of a drum, rollers for supporting said drum, and rotatable plates on which said rollers are mounted, said plates being each movable about an axis which extends through the point of contact between the rollers and the drum.

14. The combination of a drum rollers for supporting said drum, and rotatable plates on which said rollers are mounted, said plates being each movable about an axis which extends through the point of contact between the rollers and the drum, and connections between each of said plates to cause them all to move in unison.

15. The combination of a drum, rollers for supporting said drum, bearing plates rotatably mounted on a base and supports for the said rollers rotatably mounted on the bearing plates.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this eighth day of December 1908.

ALBIN BERTHOLD HELBIG.

Witnesses:
HEINRICH ROOS,
ALFRED ABICHT.