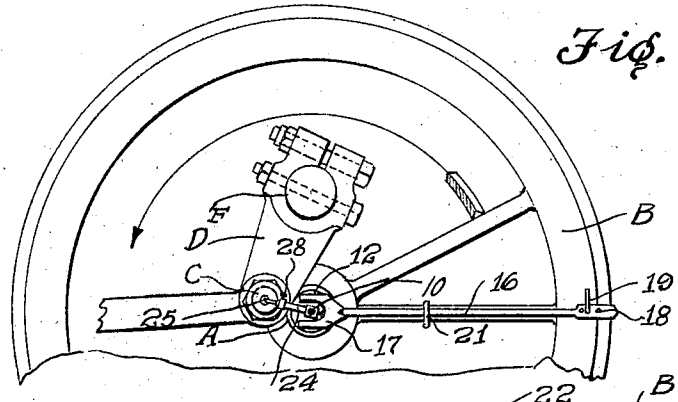
March 4, 1924. 1,486,019

J. M. HOPKINSON

ECCENTRIC ARM REPLACEMENT GAUGE

Filed June 14, 1922

Fig. 1.



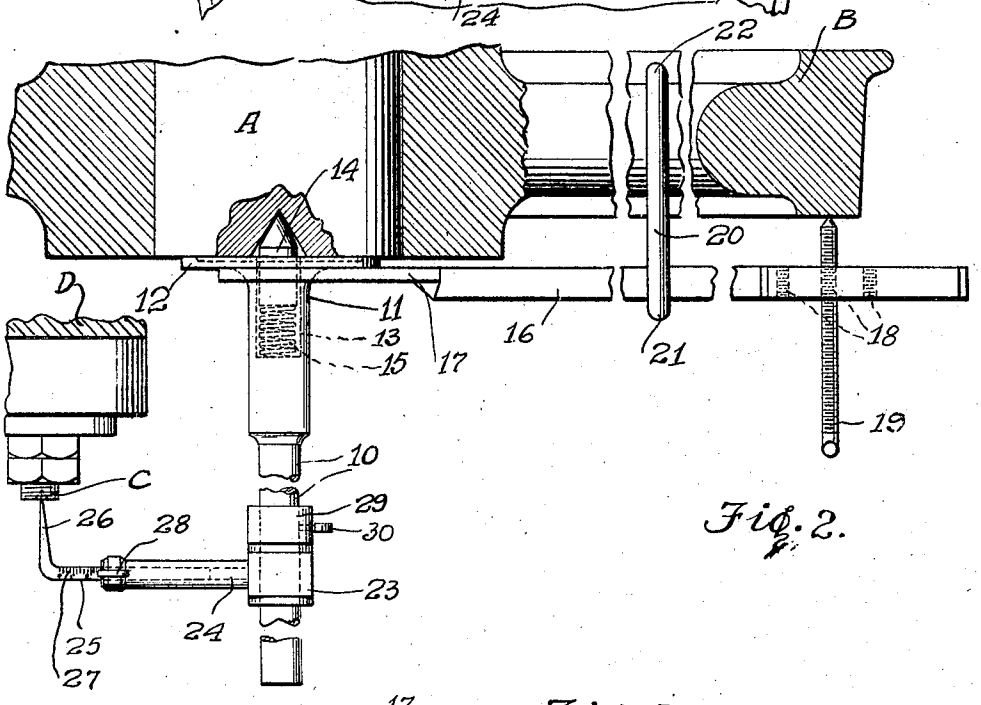


Fig. 2.

Fig. 3.

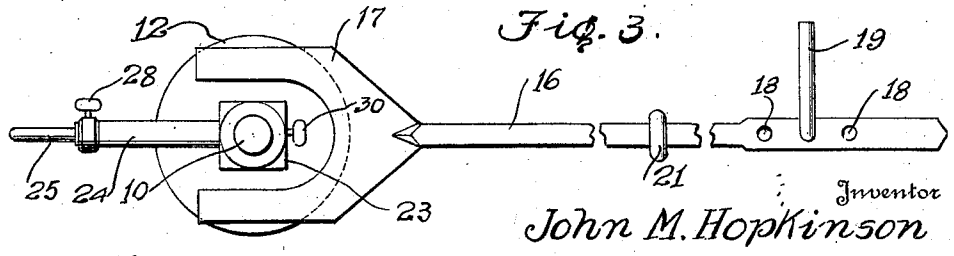
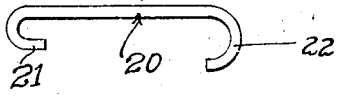


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN M. HOPKINSON, OF SAVANNAH, GEORGIA.

ECCENTRIC-ARM-REPLACEMENT GAUGE.

Application filed June 14, 1922. Serial No. 568,336.

To all whom it may concern:

Be it known that I, JOHN M. HOPKINSON, a citizen of the United States, residing at Savannah, in the county of Chatham and State of Georgia, have invented certain new and useful Improvements in Eccentric-Arm-Replacement Gauges, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to gauges for use in setting the valve gears of locomotives and the like, and particularly to a device for setting the eccentric arms of cranks of locomotive driving wheels, and the general object of the invention is to provide a device of this character whereby the relative angular position of the eccentric crank of the driving wheel of a locomotive may be quickly, readily and accurately determined.

In the construction and operation of locomotives, it is necessary that the eccentric crank on the driving wheel shall be disposed at an angle of 90° with reference to the crank pin and the driving wheel, as it is necessary to secure proper efficiency to maintain these eccentrics at this angle relative to the crank pin. This relative angular position of the eccentric crank has heretofore been determined by recourse to intricate mathematical calculations and by putting the wheels under the locomotive, assembling all of the valve gear and running over the same. This requires considerable time and expert knowledge.

It is a further object of the invention to do away with both of these methods of determining the proper position of the eccentric arm and permitting this operation to be performed in a few minutes without the necessity of assembling the valve gear.

A still further object is to provide a device of this character which obviates the necessity of extensive calculations and measurements and which permits the relative angular position of the eccentric crank to be quickly, readily and accurately determined with a material decrease in the expense of performing the operation of quartering the eccentric cranks in relation to the crank pin.

Another object is to provide a device of this character which is very simple, which may be readily clamped in position upon a locomotive wheel, and which may be set accurately to suit any desired radius of eccentric crank travel.

Still another object is to provide means whereby the gauge may be firmly held in place upon the locomotive wheel.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a fragmentary elevation of a locomotive indicator with my improved gauge applied thereto;

Figure 2 is a sectional view through a locomotive indicator with my improved gauge applied thereto;

Figure 3 is a front elevation of the gauge;

Figure 4 is a view of the member 20 whereby the shank of the gauge is engaged with the spoke of the driving wheel.

Referring to these drawings, it will be seen that my device comprises a shaft 10 which at its inner end is formed with an enlarged head 11, the extermity of the head terminating in a disk 12. The head is hollow, as at 13, and disposed within this recess 13 is a pin 14 or center which is urged outward by a compression spring 15 disposed within the recess 13 and bearing against this pin or center.

Coacting with the shaft 10 and designed for the purpose of holding this shaft in place in alignment with the driving axle of the locomotive is a bar 16 which at one end is formed to provide a relatively flat fork 17, the two arms of which are adapted to embrace the head 11 and bear against the outer face of the disk 12. The other end of this bar or arm 16 is flattened and provided with a plurality of interiorly screw-threaded apertures 18, and threaded through any one of these apertures is a screw 19, one end of which is angularly bent so that it may be manipulated by hand.

Adapted to embrace the bar 16 at any point between the screw 19 and the fork 17 is a shackle or link-shaped member 20 comprising a shank and oppositely disposed hooks, one of these hooks being larger than the other. One of these hooks, as for instance the hook 21, is adapted to engage over the middle portion of the bar, while the other hook 22 engages over the spoke or equivalent element of a locomotive wheel, as indicated in Figure 2.

Mounted upon the shaft 10 is a block 23

having an aperture for the passage of the shaft 10, the block fitting in this shaft snugly, and extending from this sliding block 23 is a hollow arm 24. Fitting within this hollow arm is the shank 25 of an indicator 26. This shank is graduated, as at 27, and the extremity of the hollow arm 24 carries a set screw 28 whereby the indicator may be held in adjusted position relative to the shaft 10. Also slidingly mounted upon the shaft 10 is a block 29 which constitutes a stop and against which the sliding block 23 is adapted to bear. This block 29 is held in position by a set screw 30.

In the use of this device, the shaft 10 is clamped upon the end of the driving shaft of the locomotive by the fork 17 and is brought into central position by the centering pin 14 which is forced into the usual recess in the end of the axle A by the spring 15. This pin 14 and spring 15 serve to bring and hold the shaft 10 in a central position when the fork is tightened up. By engaging the double hook 20 with the clamp bar 16 and the spoke of the driving wheel B and then screwing in the screw 19, the double hook acts as a fulcrum and the forked end of the bar 16 is forced inward so as to hold the disk 12 in clamped engagement with the hub of the driving wheel and with the shaft 10 in alignment with the axle center of said wheel.

It will be understood that two distinct circles are described by the main crank pin F and the eccentric pin C around the center of the axle when the locomotive is in motion with the eccentric pin making the inner or smaller circle. This circle made by the eccentric pin as well as the circle made by the main crank pin are determined by the manufacturer of the locomotive and valve gear and the eccentric set in a fixed or given position at the plant. One-half or the radius of the diameter of the circle made by the eccentric pin is termed the eccentricity of the eccentric. For instance, should the eccentric pin describe a circle 10″ in diameter, 5″ would be the eccentricity of the eccentric and would be given on the tables of the locomotive furnished by the manufacturer. Therefore, in the use of my device after the device has been put in place upon the locomotive wheel, the indicator 26 can be revolved around the center which is coincident with the axis of the axle and if set by the scale 27 to an amount equal to the eccentricity of the eccentric as given by the manufacturer, the indicator 26 will move in the same path as that which should be taken by the eccentric pin, and if it is found that the eccentric pin does not describe the same circle as that of the indicator 26, the crank arm D may be advanced or retarded until the circles coincide. It is not necessary that the indicator 26 shall describe a full circle but it is merely necessary to move the indicator to a point as near as possible to the center of the eccentric pin, then bring the crank around until the given eccentricity is established. The setting of this indicator readily determines the proper position for the eccentric arm, eliminating mathematical calculations and measurements by a mechanic. This accurate setting of the eccentric arm is very important, as the eccentric arm controls the entire valve motion on those locomotives which are equipped with a Walschaert Southern or any gear of a similar nature. Different size locomotives have different size circles which this crank arm describes and the device is adjustable to set any eccentric arm regardless of the diameter of the circle which said arm describes. Under the practice now in use it takes approximately eight hours to assemble the entire valve gear and run over the valves to locate the proper positions for the eccentric arms. My device can be applied to the arm in approximately five minutes and without the necessity of using any particularly skilled labor.

It is to be understood that I have illustrated the preferred embodiment of my invention and one which has been found to be thoroughly effective in practice, but I do not wish to be limited to this exact form, as it is obvious that many changes might be made in the detailed construction and arrangement of parts without departing from the spirit of the invention as set forth in the appended claims.

I claim:—

1. A device of the character described including a shaft having means whereby it may be centered upon and held in alignment with a driving axle, an arm mounted upon this shaft, and an angular indicator having its shank adjustably engaged with said arm for movement of the indicator toward or from the axis of the shaft.

2. A device of the character described comprising a shaft, means for centering and holding the shaft in alignment with the axis of a driving shaft, and an indicator carried by said shaft, the indicator having a shank extending toward the shaft at a point extending approximately parallel to the shaft, the indicator being adjustable toward or from the axis of the shaft.

3. A device of the character described comprising a shaft carrying a centering point whereby it may be centered with relation to a driving axle, a clamp engaging the shaft to hold it centered but permitting a rotation of the shaft, a member mounted upon the shaft and having a radially extending hollow arm, and an indicator having a shank insertible into said hollow arm and longitudinally adjustable therein, the indicator having an angular

point disposed in approximately parallel relation to the shaft, and means for holding the indicator set in adjusted position.

4. A device of the character described comprising a shaft having means whereby it may be centered upon and held against the extremity of a driving shaft, a member mounted upon the shaft and having a radially projecting hollow arm, an indicator having a shank insertible into and adjustable within the hollow arm and having a point extending approximately at right angles to the shank, the shank being provided with graduations, and means on the hollow arm for holding the shank in adjusted position.

5. A device of the character described comprising a shaft having a hollow head at one end formed with a socket, a centering pin inserted in said socket, a spring within the socket urging the centering pin outward, said head being formed with a disk-like portion, a clamp engaging over the disk-like portion to hold the shaft in centered relation to a driving shaft, an arm extending at right angles to the shaft, an indicator having a shank telescopically engaging said arm and graduated, and means for holding the indicator in adjusted positions.

6. A device of the character described comprising a shaft having a head and disk at one end and having a centering point, an arm extending radially from the shaft and carrying an adjustable indicator at its ends, means for holding the shaft in position upon the driving wheel and axle of a locomotive comprising a clamping bar having a forked end adapted to embrace said head and fit against the disk, a shackle engaging over the clamping bar and adapted to engage with the spoke of a locomotive driving wheel, and a screw having screw-threaded engagement with said clamping bar at the end remote from the fork and adapted to engage the rim of a locomotive.

In testimony whereof I hereunto affix my signature.

JOHN M. HOPKINSON.