No. 676,440. Patented June 18, 1901.

C. S. MILLS.

DEVICE FOR ROTATING DRIVING SHAFTS OF LOCOMOTIVES.

(No Model.) (Application filed Oct. 4, 1900.) 2 Sheets—Sheet 1.

Fig. 1.

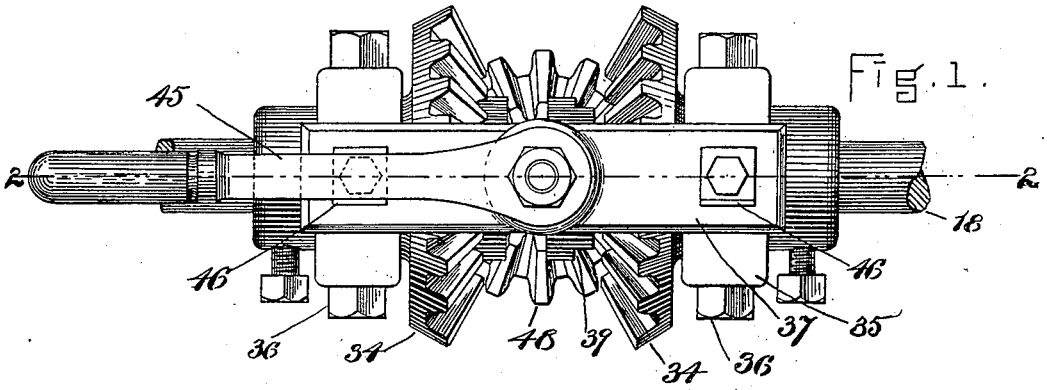
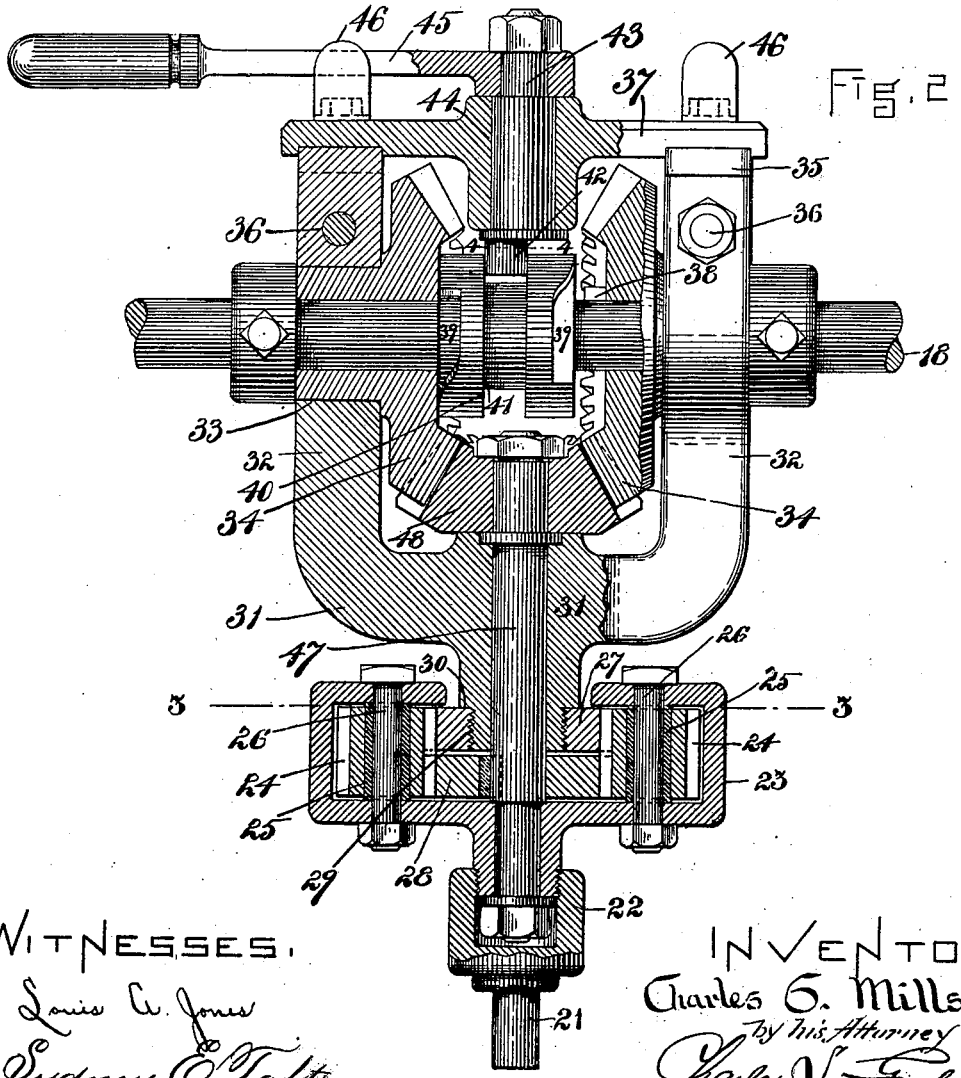


Fig. 2.



WITNESSES.

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Fig. 3

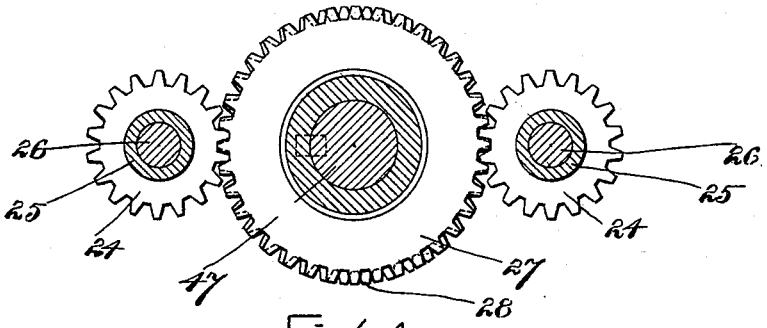


Fig. 4.

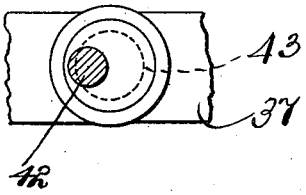


Fig. 5.

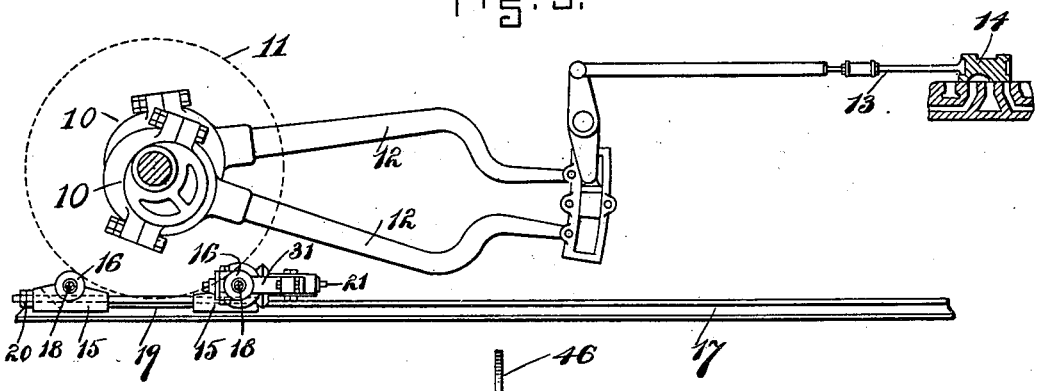
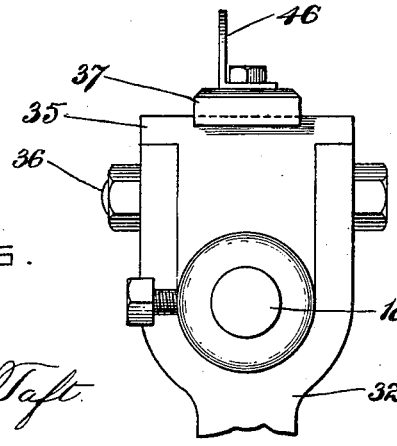


Fig. 6.



WITNESSES.

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UNITED STATES PATENT OFFICE.

CHARLES S. MILLS, OF WOLLASTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO WILLIAM H. HAMPSON, OF CAMBRIDGE, MASSACHUSETTS.

DEVICE FOR ROTATING DRIVING-SHAFTS OF LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 676,440, dated June 18, 1901.

Application filed October 4, 1900. Serial No. 32,047. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. MILLS, a citizen of the United States, residing at Wollaston, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Devices for Rotating Driving-Shafts of Locomotives, of which the following is a specification.

The object of this invention is to produce a device for transmitting power and particularly for rotating in either direction the driving-shaft of a locomotive-engine while stationary, whereby the valve or other parts of the engine may be adjusted.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings, Figure 1 is an end elevation of my improved device for rotating the driving-shaft of a locomotive. Fig. 2 is a sectional elevation taken on line 2 2, Fig. 1. Fig. 3 is a sectional plan taken on line 3 3, Fig. 2. Fig. 4 is a detail section taken on line 4 4, Fig. 2. Fig. 5 is a diagram view representing a side elevation of the main driving-wheel, eccentrics, and valve of a locomotive with my improved device in position thereon. Fig. 6 is a side elevation of a portion of the main supporting frame and box.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, Fig. 5, 11 is the main driving-wheel (shown in dotted lines) of a locomotive. 10 10 are the eccentrics; 12 12, the eccentric-rods; 13, the valve-stem, and 14 the valve.

In adjusting the valve the main drivers 11 on each side of the locomotive are first raised from the tracks by four sliding trucks 15 15, having rollers 16 journaled therein. One of the trucks 15 is placed upon the track 17 at each side of the driving-wheels 11, with the peripheries of the rollers 16 touching the periphery of the driver 11. The rollers 16 are fast in pairs to shafts 18, one of each pair bearing against one main driving-wheel, the other of each pair bearing against the other main driving-wheel on the opposite track. The trucks 15 15 on the same track are joined together by the rods 19, screw-threaded to receive nuts 20, and as said nuts are screwed up the trucks 15 are drawn toward each other and the drivers 11 are gradually raised from the track.

To adjust the valves 14 upon opposite sides of the locomotive, the main driving-wheels 11 are rotated by rotating one of the shafts 18 and the rollers 16 fast thereto. The driver is divided by marks upon the periphery into four equal parts. Said driver is rotated as described until each of the marks thereon comes in line with a stationary mark on the locomotive, when the valve-gear is adjusted until the valve is in the correct position with relation to the steam-ports.

The herein-described device for raising the drivers from the track is old, and as at present operated the shaft 18 is rotated by a hand-lever pivoted upon said shaft and having a pawl pivoted thereto, which engages a ratchet fast to said shaft. This manner of rotating the shaft 18, and thus rotating the driver, is slow, laborious, and inaccurate, and it is the object of my invention to perform this work—namely, that of starting, rotating, and stopping said driver, and thus moving the valve by the valve-gear connected thereto into different positions—in a short time and with accuracy by applying to the said shaft 18 a powerful, convenient, and compact device which transmits power to rotate said shaft and can be reversed instantaneously to rotate said shaft in opposite directions.

The device hereinbefore referred to consists of a spindle 21, to which the motive power is applied. Said motive power may be of any type convenient and accessible in the shop where the device is operated. The spindle 21 is provided with a flange 22, fastened by a screw-threaded portion to a rotary carrier-frame 23. Said carrier-frame has two pinions 24 24, each of the same diameter and number of teeth, journaled upon sleeves 25, said sleeves being rigidly fastened to the carrier-frame 23 by bolts 26. The pinions 24 24 are in mesh with two gears 27 and 28. Said gear 27 has thirty-six teeth and is stationary, being attached by a screw-threaded portion 29 against a shoulder 30 upon the main supporting-frame 31. The frame 31 has two arms

32 32 thereon, with bearings 33 therein to receive the hubs of the bevel-gears 34 34. One half of the bearings 33 is formed in each of said arms 32. The other half is formed by a cap-box 35, fastened by a bolt 36 to said arms, a tie 37 joining the two cap-boxes to each other. This construction of the frame—viz., forming the arms 32 to take one half of the bearings 33 and forming the other half of said bearings on cap-boxes 35—enables the mechanism to be attached to the roller-shaft 18 from one side of said shaft, and this construction is absolutely necessary in a machine of the character herein described for the reason that the mechanism cannot be attached to the shaft by sliding it onto the end thereof, said shaft having rollers attached thereto.

The bevel-gears 34 turn loose upon the shaft 18 and are each provided with a tooth 38, one the reverse of the other and each adapted to engage a recess or space 39 in a clutch member 40. Said clutch member is splined to the shaft 18 and is provided with an annular groove 41, which engages an eccentric-pin 42 upon a rock-shaft 43, which is rocked in a bearing 44 in the tie 37 by a hand-lever 45. Said hand-lever is limited to a half-rotation by the stops 46, fast to said tie 37.

The gear 28 has two more teeth than the gear 27, and as the gear 27 is stationary it will be seen that as the pinions revolve the gear 28 will be rotated two teeth at each rotation of the carrier-frame 23. The gear 28 is fast to a driving-shaft 47, having a bearing in the main frame 31. Said driving-shaft has a bevel-pinion gear 48 fast thereto and meshes the bevel-gears 34. The carrier-frame 23 rotates upon the driving-shaft 47 as a bearing.

The operation of the device as a whole is as follows: Assuming the necessary power to be transmitted to the spindle 21 to rotate the same, the carrier-frame 23 will rotate upon the driving-shaft 47, carrying the pinions 24 with it. Said pinions meshing, the stationary gear 27 will be rotated upon the sleeves 25, and as the number of teeth in the gear 28 differs from the number in the gear 27 said gear 28 will be rotated during one rotation of the carrier-frame an amount proportional to the said difference in teeth, in the present instance two teeth. As the gear 28 is fast to the driving-shaft 47, said shaft will be rotated with said gear 28 and the bevel-pinion 48 fast thereto, thus rotating the shaft 18 through one of the bevel-gears 34 and clutch 40 in one direction when one of said bevel-gears is engaged with said clutch and in the opposite direction when the other bevel-gear is engaged therewith. It will be seen that by turning the hand-lever 45 from one of the stops 46 to the other the mechanism will be reversed through the clutch 40 and bevel-gears 34, thus reversing the shaft 18 and, through the rollers 16, the main driving-wheel 11. I prefer to run the spindle 21 at a speed of about one hundred rotations per minute, and with the relative proportions and numbers of teeth shown in the drawings this would give the driving-shaft 47 about six rotations per minute, thus reducing the speed, and consequently increasing the power for rotating the shafts 18. It is evident that the number of pinion-gears on the carrier-frame might be varied without departing from the spirit of my invention. I have described my invention as particularly adapted to rotating the driving-shafts of locomotives; but it is evident that the combination of gearing therein shown may be applied to other devices for reducing speed and increasing power without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire by Letters Patent to secure, is—

1. In a device of the character described, a rotatory carrier-frame, means for rotating said carrier-frame, a pair of pinion-gears journaled thereon, a main supporting-frame, a stationary gear fast to said supporting-frame, a driving-shaft adapted to rotate in bearings in said supporting-frame and upon which driving-shaft said carrier-frame rotates, a rotatory gear fast to said driving-shaft, said pinion-gears intermeshing said stationary and rotatory gears, a roller-shaft upon which said supporting-frame is supported, means for detachably attaching said supporting-frame to said roller-shaft, and gearing connecting said shafts.

2. In a device of the character described, a rotatory carrier-frame, means for rotating said carrier-frame, a pair of pinion-gears journaled thereon, a main supporting-frame, a stationary gear fast to said supporting-frame, a driving-shaft adapted to rotate in bearings in said supporting-frame and upon which driving-shaft said carrier-frame rotates, a rotatory gear fast to said driving-shaft, said pinion-gears intermeshing said stationary and rotatory gears, a roller-shaft upon which said supporting-frame is supported, means for detachably attaching said supporting-frame to said roller-shaft, gearing connecting said shafts, and mechanism for reversing the direction of rotation of said roller-shaft.

3. In a device of the character described, a rotatory carrier-frame, means for rotating said carrier-frame, a pair of pinion-gears journaled thereon, a main supporting-frame, a stationary gear fast to said supporting-frame, a driving-shaft adapted to rotate in bearings in said supporting-frame and upon which driving-shaft said carrrier-frame rotates, a rotatory gear fast to said driving-shaft, said pinion-gears intermeshing said stationary and rotatory gears, a roller-shaft upon which said supporting-frame is supported, means for detachably attaching said supporting-frame to said roller-shaft, a pair of bevel-gears loose upon said roller-shaft, a bevel-pinion fast to said driving-shaft, a slid-

able clutch, 40, splined to said roller-shaft, and means for sliding said clutch alternately into and out of contact with said bevel-gears.

4. In a device of the character described, a rotatory carrier-frame, means for rotating said carrier-frame, a pair of pinion-gears journaled thereon, a main supporting-frame, a stationary gear fast to said supporting-frame, a driving-shaft adapted to rotate in bearings in said supporting-frame and upon which driving-shaft said carrier-frame rotates, a rotatory gear fast to said driving-shaft, said pinion-gears intermeshing said stationary and rotatory gears, a roller-shaft upon which said supporting-frame is supported, said supporting-frame having two arms 32, cap-boxes 35 by which said supporting-frame is attached to said roller-shaft, and gearing connecting said shafts.

5. In a device of the character described, a rotatory carrier-frame, means for rotating said carrier-frame, a pair of pinion-gears journaled thereon, a main supporting-frame, a stationary gear fast to said supporting-frame, a driving-shaft adapted to rotate in bearings in said supporting-frame and upon which driving-shaft said carrier-frame rotates, a rotatory gear fast to said driving-shaft, said pinion-gears intermeshing said stationary and rotatory gears, a roller-shaft upon which said supporting-frame is supported, said supporting-frame having two arms 32, cap-boxes 35 by which said supporting-frame is attached to said roller-shaft, a tie joining said cap-boxes to each other, and gearing connecting said shafts.

6. In a device of the character described, a rotatory carrier-frame, means for rotating said carrier-frame, a pair of pinion-gears journaled thereon, a main supporting-frame, a stationary gear fast to said supporting-frame, a driving-shaft adapted to rotate in bearings in said supporting-frame and upon which driving-shaft said carrier-frame rotates, a rotatory gear fast to said driving-shaft, said pinion-gears intermeshing said stationary and rotatory gears, a roller-shaft upon which said supporting-frame is supported, said supporting-frame having two arms 32, cap-boxes 35 by which said supporting-frame is attached to said roller-shaft, a tie joining said cap-boxes to each other, a bevel-pinion fast to said driving-shaft, a slidable clutch 40 splined to said roller-shaft, a pair of bevel-gears loosely mounted upon said roller-shaft, and means supported by said tie for sliding said clutch alternately into and out of contact with said bevel-gears.

7. In a device of the character described, a rotatory carrier-frame, means for rotating said carrier-frame, a pair of pinion-gears journaled thereon, a main supporting-frame, a stationary gear fast to said supporting-frame, a driving-shaft adapted to rotate in bearings in said supporting-frame and upon which driving-shaft said carrier-frame rotates, a rotatory gear fast to said driving-shaft, said pinion-gears intermeshing said stationary and rotatory gears, a roller-shaft upon which said supporting-frame is supported, said supporting-frame having two arms 32, cap-boxes 35 by which said supporting-frame is attached to said roller-shaft, a tie joining said cap-boxes to each other, a bevel-pinion fast to said driving-shaft, a slidable clutch 40 splined to said roller-shaft, a pair of bevel-gears loosely mounted upon said roller-shaft, said clutch having an annular groove, a rock-shaft arranged to rock in a bearing in said tie, an eccentric-pin upon said rock-shaft engaging said annular groove, and means for rocking said rock-shaft and sliding said clutch alternately into and out of contact with said bevel-gears.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES S. MILLS.

Witnesses:
CHARLES S. GOODING,
SYDNEY E. TAFT.