May 24, 1932. C. C. BERTRAM 1,859,909

REVERSING GEAR MECHANISM

Original Filed July 31, 1920 2 Sheets-Sheet 1

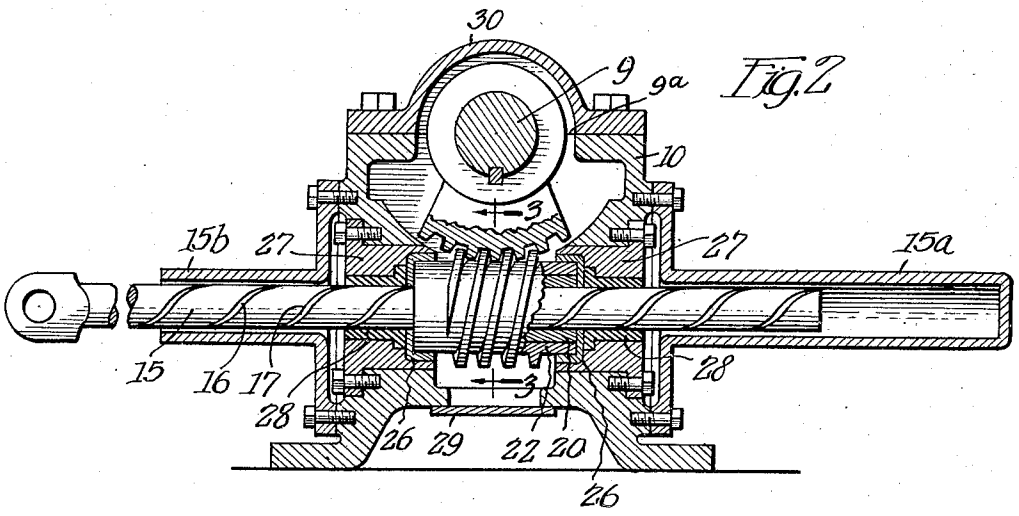

Fig. 2

Fig. 4

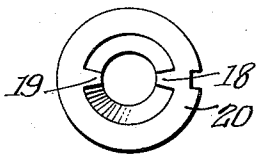

Fig. 3

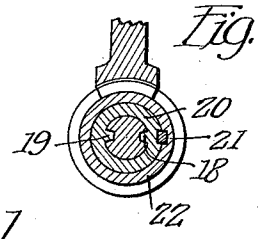

Fig. 1

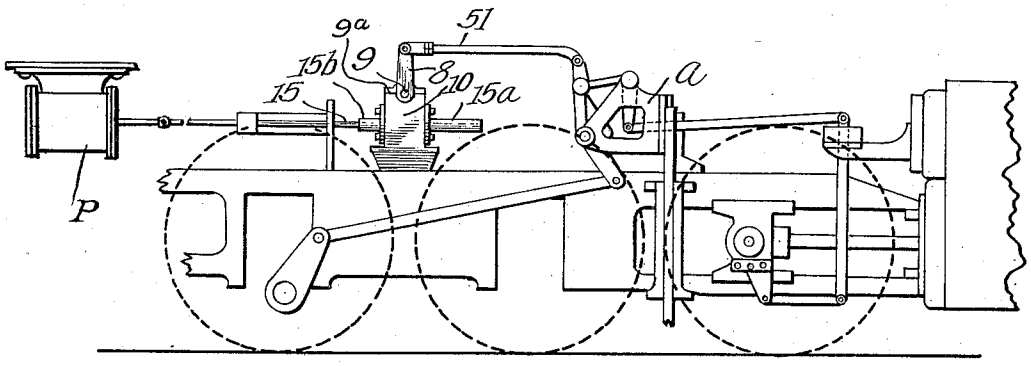

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Fig. 7

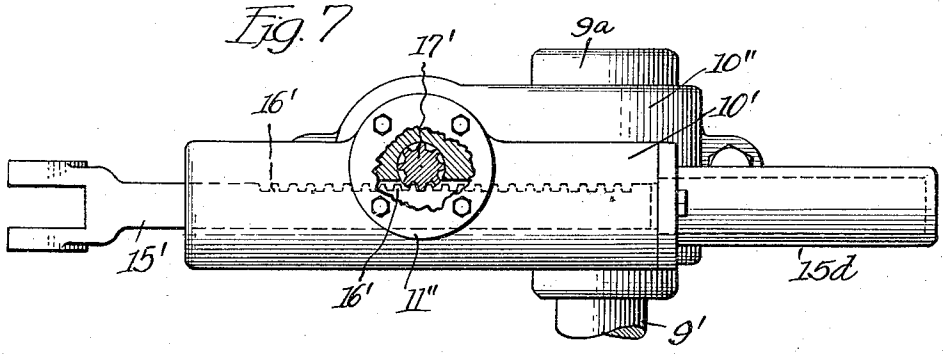


Fig. 6

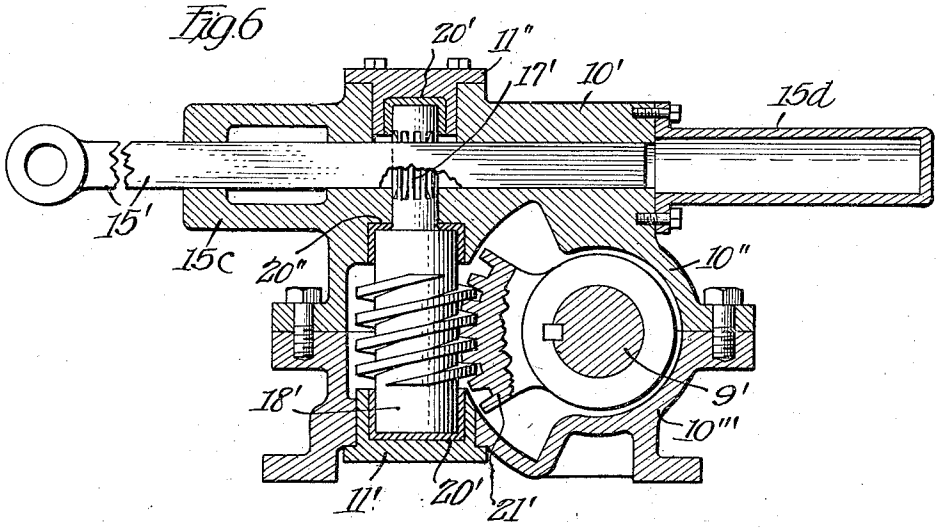
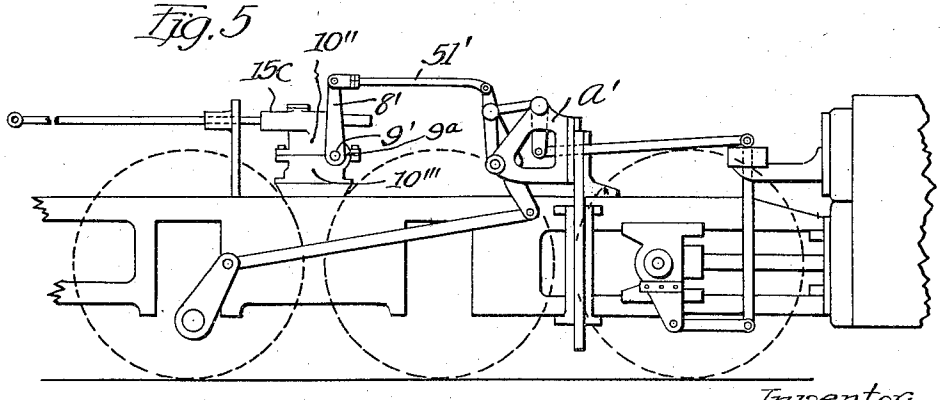


Fig. 5



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Patented May 24, 1932 1,859,909

UNITED STATES PATENT OFFICE

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REVERSING GEAR MECHANISM

Application filed July 31, 1920, Serial No. 400,504. Renewed October 15, 1931.

The present invention relates in general to reversing gear mechanism and more particularly to mechanism of the character referred to operable from a distant point, and has special reference to the provision of an improved arrangement of irreversible driving mechanism therefor;

The principal objects of the present invention are the provision of an improved form reversing gear mechanism and more specifically one adapted for ready installation in existing structures; the provision of an improved gearing, and more particularly, irreversible gearing, for establishing a driving connection between a suitably driven element and the mechanism to be moved thereby; the provision of an improved valve-gear moving and reversing mechanism adapted for application to the present arrangement of tumbling shaft and associated parts; the provision in general of an improved arrangement of motion converting and transmitting elements, and one especially adapted for controlling the valve-mechanism of steam engines; together with such further and additional objects as may be below set forth.

Mechanism of the character referred to have a general field of usefulness, and are of particular utility in the operation of the valve mechanism of large steam engines.

For the purposes of illustration, therefore, the inventions have been shown structurally embodied in form adapted for application to the tumbling shaft of a railway locomotive engine in such a manner as to function as gearing for opening and closing, and for reversing, the valve mechanism thereof.

In the accompanying drawings, therefore,—

Figure 1 is an elevational view illustrative of part of the cylinder and associated driving mechanism and valve-gear operating mechanism of a railway locomotive, having a structure embodying the present invention suitably arranged and included therein;

Figure 2 is a longitudinal sectional elevational view, on an enlarged scale, of part of the structure of Figure 1;

Figure 3 is a sectional view of a detail of construction, taken on the line 3—3 of Figure 2;

Figure 4 is an elevational view of another detail of construction;

Figures 5 and 6 are views similar to those of Figures 1 and 2 illustrative of another embodiment of the invention, and

Figure 7 is a top plan view of the structure illustrated in vertical section in Figure 6.

Referring first to Figure 1 of the drawings, there has been indicated generally adjacent to the point indicated at "A" a Baker-Pilliod type valve gear for controlling admission of fluid to the locomotive cylinders. This is connected by a so-called "short reach rod" 51 to the mechanisms embodying the present improvements now to be described.

The customary tumbling shaft, 9, is operatively connected to the reach rod, 51, by means of an arm, 8.

Referring now to Figure 2 of the drawings, there is provided a casing structure, 10, within which is mounted the gearing for operating the tumbling shaft, 9. This gearing includes primarily an actuating rod 15 reciprocated in any desired manner, (preferably however from a power cylinder P at a distant point). Such rod 15 has a double spiral groove 16, 17, with which engage projections 18, 19 on a sleeve 20. As a result of this symmetrical arrangement a balanced operative construction is attained and shearing of the projections 18 and 19 is rendered unlikely. To the sleeve 20 secured, preferably by the key 21, a spiral worm, 22, engaging a toothed segment, 23, fast on the tumbling shaft, 9, rotatable in bearings 9*a* in the casing 10.

The two sleeves, 20, 22, are preferably coterminous and are conveniently closed at their ends by retaining members 26, 26, which serve as dust caps. It will be apparent that by making the spiral gear in two parts, as by providing the two separable nested sleeves 20, 22, injury to or wear of either of the sleeves, will not require discarding of both.

Step bushings 27, 27, are provided at each end of the spiral gear and are provided with step-bearings, 28, which serve not only to

support the rod 15 but also as abutment members for the gear 22 and retainers for the hub-caps 26.

The hollow center of the casing structure, 10, above described, is provided with suitable cap pieces, 29, 30, forming a lubricant cellar for the several gearing elements.

It will readily be appreciated that the several parts, to-wit: the bushings, 27, 27, bearings, 28, 28 and end-caps, 29, 30, together form removable closures to enable the disassembly of the gearing mechanism from the casing. To permit of such disassembling operation being readily performed, the means securing these several parts to the casing, 10, are all easily reached from the exterior of the casing 10.

For enclosing and protecting the projecting portions of the rod 15, there is detachably applied at each end of the casing, 10, housings, 15*a*, 15*b*, which further serve to prevent the ingress of extraneous matter such as dirt or moisture into the casing 10.

Referring now more particularly to Figures 5 to 7 of the drawings wherein there is illustrated another embodiment of the invention, it will be observed that there is here again illustrated an adaptation of the invention to the Baker-Pilliod type of valve gear for controlling the admission of fluid to the locomotive cylinders, indicated generally at A'. This is connected as before to the tumbling shaft 9' by the so-called "short reach rod" 51' and the arm 8'.

Turning now to Figure 6 of the drawings, there is shown a casing 10' within which is mounted the gearing for operating the tumbling shaft 9'. This gearing includes primarily an actuating rod 15' reciprocated in any desired manner, as before suggested. Such rod, 15', is non-circular, and is supported in the casing for reciprocation therethrough.

The rod, 15', is provided with teeth 16' engaging the pinion, 17', formed on the reduced part of the spiral worm, 18'.

The gear 18' is held in position in the casing 10' and against longitudinal movement by means of the bushings 20', 20', one of which is disposed in the removable cap member 11' and the other in the casing 10', and the reduced outer end of the gear member 18' is disposed in a bushing 20'' carried in a removable cap member 11''.

The spiral worm 18' engages a segmental rack 21' carried on the tumbling shaft, 9', in the casing 10'.

The casing 10' is made in two parts, 10'' and 10'''. These parts are detachably attached for ready separation in any convenient manner.

It will be obvious upon inspection of Figure 6 of the drawings that this construction permits the removal of various elements contained in the casing 10' with facility.

For enclosing and protecting the projecting portions of the rod, 15', the casing, 10', is provided at one end with the integral housing extension, 15*c*, and at the other end with the housing 15*d* detachably mounted thereupon.

It will be understood, of course, that the worm and segment structures 18, 19, and 18', 19', above described, provide an irreversible connection for operating the valve gear mechanism.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. In a reversing gear mechanism, in combination, a gear casing with gearing disposed therein, and end members detachably mounted upon said casing for closing said casing and holding the gearing in predetermined relation to the casing, and a member movable through said casing for actuating said gearing, said member extending beyond the casing, and a housing structure on the casing for enclosing the projecting portion of said actuating member, both the closing members and the housing structure being attached to the casing by means readily removable from the exterior of the casing, whereby the gearing and actuating member may be readily disassembled from position in the casing.

2. In a reversing gear mechanism, in combination, a gearing casing, a revoluble element in said casing, a member movable through said casing for imparting rotary movement to said revoluble element, an end bearing in said casing in which said movable member moves and by which said revoluble element is held against endwise movement in one direction, said movable member projecting beyond both ends of said casing, means for readily removably retaining said bearing, and a housing at each end of the casing and extending therefrom to enclose those portions of the movable member extending beyond the casing.

3. In a motion transmitting mechanism forming a unitary structure adapted to be attached to a power operated mechanism and to receive a part of the tumbling shaft of a locomotive reversing gear mechanism which includes, in combination, a casing provided with a chamber containing bearings for the tumbling shaft, a segmental gear receivable in said casing for attachment to said shaft, a revoluble element mounted in a portion of said casing adjacent to said chamber and operatively engaging with said segmental gear to form an irreversible connection, an end bearing in said casing for preventing endwise movement of said revoluble element but, upon removal of said bearing, permitting the ready removal of said revoluble element without disturbing said segmental gear, and a motion transmitting element extending through said revoluble element for impart-

ing motion thereto, said motion imparting element being mounted in said end bearing.

4. In a bodily removable unit mechanism for operating locomotive reverse gears and the like, in combination with the shaft to be moved, a casing having separable parts adapted to embrace said shaft and form spaced bearings therefor, a segmental gear in said casing adapted to be affixed to the portion of said shaft between said bearings, a worm in said casing for driving said segmental gear disposed on an axis at an angle thereto to form an irreversible connection, bearings in said casing for said worm readily removable to permit of removal of the worm, and a reciprocating member extending from said casing and mounted in bearings in said casing and operatively connected to impart movement to said worm, removal of one of said worm bearings permitting removal of the worm and said reciprocating member.

5. In a valve gear reversing mechanism for locomotives, in combination with the tumbling shaft of a locomotive valve gear, a casing having separable parts forming bearings for and embracing and supporting said tumbling shaft, a driven gear element in said casing and fixed to said tumbling shaft, a motion imparting means also in said casing including relatively operably connected elements one of which is reciprocable and projects from the casing and is angularly related to and forms an irreversible connection with said driven gear, and removable bearings in one of the parts of said casing for supporting and retaining the latter of said connected elements forming said motion imparting means.

In testimony whereof I have hereunto signed my name.

CLARENCE C. BERTRAM.