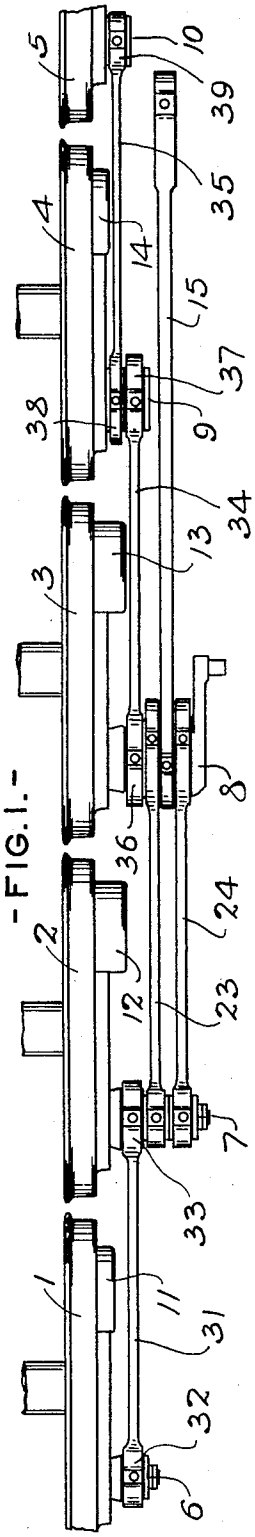
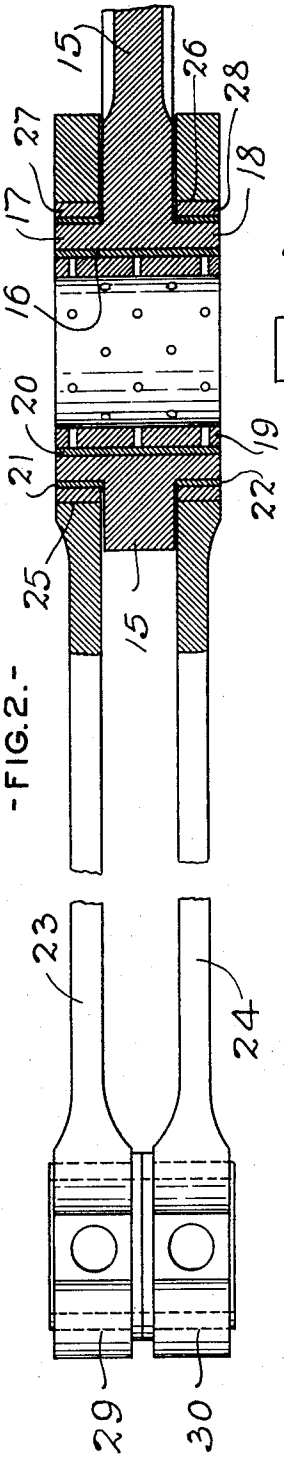
Nov. 21, 1933. R. J. FINCH 1,936,159

LOCOMOTIVE DRIVE ROD MECHANISM

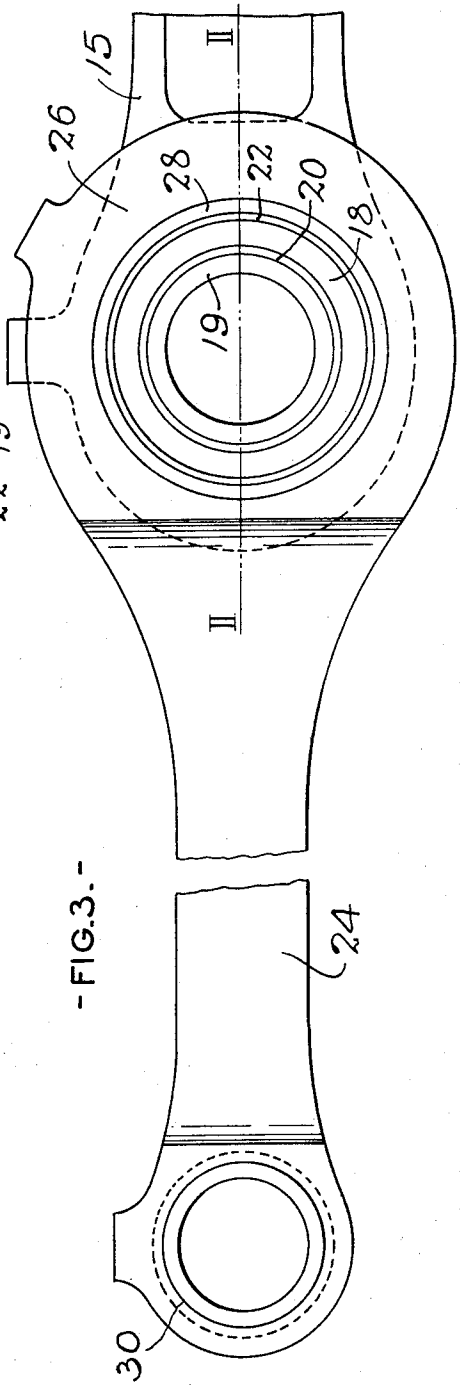
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-FIG.1.-



-FIG.2.-



-FIG.3.-

INVENTOR
Raymond J. Finch
BY
S C Yeaton
ATTORNEY

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LOCOMOTIVE DRIVE ROD MECHANISM

Raymond J. Finch, Schenectady, N. Y.

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4 Claims. (Cl. 105—84)

This invention relates to locomotive drive rod mechanisms.

In modern locomotives the magnitude of their power output requires power transmission parts of proportionately large size and great strength in order to withstand the stresses imposed upon them. The cylinder power is delivered to the front end of the main drive rod through the wrist pin of the reciprocating crosshead and throughout the drive mechanism to the individual connections of the coupling rods to the revolving driving wheels.

In driving mechanism where the entire amount of piston thrust is delivered to a single crank pin on a main driving wheel, from which it is delivered to the other driving wheels, a main crank pin is required of such large size as to produce many undesirable features hereinafter more definitely referred to. In order to avoid these undesirable features, mechanisms have been employed wherein the piston thrust is distributed to more than one crank pin, the stress on the main pin being reduced in proportion to the amount of stress which the additional pins are made to carry. Main driving rods arranged in tandem for this purpose are well known in the art. In the constructions employed in usual practice, however, the piston thrust is ordinarily transmitted through an eye formed on the end of the main drive rod which surrounds the main crank pin, and such constructions in order to insure the required strength are necessarily massive and of undesirably great weight. Further, these constructions are so arranged that the entire multi-part drive rod structure must be assembled and removed or replaced as a unit, this necessary handling of the joined parts together constituting a distinct disadvantage.

In common practice the sections of the drive rod mechanism have been coupled together by knuckle pins which are passed through jaws formed on an end of one of the sections and a tongue formed on an end of an adjacent section. Such connections while permitting the removal of any of the sections and providing compensation for the relative vertical movement of the wheels to which they are connected, when the vehicle is passing over irregular track, are undesirable in that they present an expensive maintenance problem. Also, where the knuckle pin arrangement is employed, the adjacent rod sections must be disposed in the same vertical plane, that is to say, in tandem, whereas by having the ends of each rod section surround the crank pin of the wheel to which it is connected, an advantage may be attained by disposing the sections in different vertical planes, in that the counterbalance block of intermediate wheels may be extended laterally so that the amount of counterbalance weight can be more nearly correctly applied, thus reducing the destructive hammer blow or dynamic augment of the static load on the track when the driving wheels are revolving. While it is not possible to attain a correct amount of counterbalance for all of the varying diameters of the wheels, it is well known that where small driving wheels are employed, insufficient space is available for counterbalance weights of the necessary size. A drive rod construction which provides a relatively great amount of space for counterbalance weights is highly desirable in the producing of a smooth running locomotive throughout the entire range of speed with a minimization of the destructive effects to the locomotive and the track which are produced by dynamic augment.

An object of the present invention is to provide an improved locomotive driving rod mechanism for transmitting the power stresses, wherein a substantial saving of weight is effected.

A further object is to provide a structure of the character described comprising a plurality of articulated parts which may be removed or replaced separately in proper sequences.

A further object is to provide a device of the character described wherein the knuckle connecting pin arrangement commonly employed is eliminated so as to provide additional space to permit more adequate counterbalancing, thereby reducing the destructive effects imposed by insufficient counterbalance and obviating other undesirable characteristics of knuckle pin structures.

A further object of the present invention is to provide a device of the character described wherein the jaw and tongue connecting arrangement between the rods is eliminated and the parts are connected in such manner as to adequately transmit the stress from one to the other through a joint of a smaller and lighter construction.

Other and further objects and advantages achieved by the present invention will be apparent from the following detailed description of a specific embodiment thereof.

In the accompanying drawing Figure 1 is a plan view of the driving rod mechanism of the instant invention attached to the crank pins of a plurality of driving wheels, the crank pins being shown in the same horizontal plane as the axles of the wheels; Fig. 2 is an enlarged broken view,

partly in plan and partly in horizontal section on the line II—II of Fig. 3, of a part of the mechanism showing the articulation between the main drive rod and adjacent twin sections; and Fig. 3 is a side elevation of the structure shown in Fig. 2.

The specific embodiment of the instant invention is herein exemplified as employed in connection with a locomotive having five pairs of coupled driving wheels. The driving wheels 1, 2, 3, 4 and 5 are each provided with crank pins 6, 7, 8, 9 and 10 respectively, and counterbalance weights, (the weights being shown in the drawings for the wheels 1, 2, 3 and 4 only, and designated as 11, 12, 13 and 14 respectively). It will be understood that the present invention is not limited to the number of wheels for which it may be employed, nor to the relative position of the main drive wheel. In the instant case, the main drive wheel is the wheel 3.

The driving rod mechanism which transposes the reciprocating motion of the piston and its crosshead (not shown) into the revolving movement of the driving wheels comprises a main driving rod section 15, which is connected at its forward end to a crosshead wrist pin (not shown). The rear end of the section is provided with a bore 16, and outwardly extending annular flanges are formed on opposite sides of the section at the periphery of the bore, providing hubs 17 and 18. The crank pin 8, of the main drive wheel 3, extends through the bore and hubs, and a bushing 19, of the floating type, is disposed within the bore and hubs and surrounds the crank pin. A pressed-in sleeve 20 is disposed between the bushing and the inner surface of the bore and hubs. Wear caused by the revolving of the bushing within the bore and hubs is compensated for by renewal of the pressed-in sleeve 20, all of which is in accordance with common practice. The outer peripheries of the hubs 17 and 18 are encircled by renewable pressed-on sleeves 21 and 22 respectively. Extending rearwardly of the main rod section 15 is a pair of twin drive rod sections 23 and 24. The forward ends of the twin rod sections are formed with eyes 25 and 26 respectively which surround the hubs 17 and 18 respectively, and bushings 27 and 28 are interposed between the respective pressed-on sleeves 21 and 22 and the inner faces of the respective eyes 25 and 26. The rear ends of the rods 23 and 24 are formed with eyes 29 and 30 respectively which surround the crank pin 7 of the wheel 2.

It will thus be apparent that the main drive rod structure comprises the front sections 15 and the twin sections 23 and 24, and that the piston thrust is proportioned between the crank pins 7 and 8, resulting in a reduction of the size which would be required if one crank pin only carried the entire piston thrust. The revolving weight necessary to be counterbalanced is thus substantially reduced. Further, by the employment of the hubs 17 and 18 to transmit that part of the piston thrust not absorbed by the pin 8 to the pin 7, a lighter weight cross section of rod eye (i. e. the portion of the rod surrounding the bore 16) is permitted over that which would be necessary if the entire piston thrust was handled through an eye and one crank pin alone, thus still further reducing the revolving weight necessary to be counterbalanced.

A coupling rod section 31 is employed for the transmission of power from the crank pin 7 of the wheel 2, to the crank pin 6, of the wheel 1. The section 31 has eyes 32 and 33 formed on its opposite ends, in the usual manner. The eye 33 at the forward end surrounds the crank pin 7, in a plane inside the plane of the twin rod section 23 and the eye 32 surrounds the crank pin 6.

Power is transmitted to the wheels 4 and 5 by coupling rod sections 34 and 35 which sections are likewise formed with eyes on their opposite ends. The rearward eye 36 of the rod section 34 surrounds the crank pin 8, in a plane inside the plane of the rod section 23, and the forward eye 37 surrounds the crank pin 9 of the wheel 4. The rearward eye 38 of the rod section 35 surrounds the crank pin 9 in a plane within the plane of the rod section 34 and the forward eye 39 of the rod section 35 surrounds the crank pin 10 of the wheel 5. Bushings of the usual type are provided for the pins 6, 7, 9 and 10 and washers and securing nuts of usual construction are provided on the ends of these pins for securing the rod sections hereon. On the pin 8, an eccentric crank serves the function of the nut and washer, in the usual manner.

It will be noted that no knuckle pin connections are required between any of the rod sections. The rod section 31 is free to revolve about its crank pins in a way to accommodate the relatively different horizontal positions of the wheels 1 and 2. In usual practice the rod sections 34 and 35 would be disposed in the same vertical plane and have a knuckle pin connection between the two, this vertical plane being that of the rod section 35, so as to keep it close to the wheel 5 and provide the necessary clearance for the crosshead (not shown). In the present invention, however, no knuckle pin, as aforesaid, is required since either end of the rod 35 is free to revolve about its respective connection to the pins 9 and 10 of the wheels 4 and 5 to thereby compensate for irregularities in the horizontal alignment of the wheels. For the same reasons, no knuckle pin connections are necessary for the rod section 34.

The disposition of the rod section 34 in a plane outside the plane of the rod section 35 provides space for making the counterbalance block 13 of the main drive wheel 3, thicker than it could otherwise be made and thereby provides a more perfect counterbalance of the revolving and reciprocating weight to be balanced in the main drive wheel. Usually the space limitations at this location restrict the counterbalance to unsatisfactory limits. It is to be further noted, that as the main crank pin 8 and the rod sections surrounding it, have been reduced in size and weight, less weight is required for the counterbalance thereof. It will thus be apparent that the construction of the present invention effectively minimizes the discrepancies between the counterbalance required and the amount possible to obtain, with consequent beneficial result of reducing the hammer blows, or dynamic augment, on the track when the driving wheels are revolving. The instant invention, therefore, makes for a locomotive characterized by smoother running qualities throughout its entire range of speed with a minimum destructive effect on the track.

While the hubs 17 and 18 are shown formed integral with the main rod section 15 it is obvious that in place of the hubs a ring or bushing

may be used which will preferably, but not necessarily, be fitted tightly in a corresponding bore in the section 15, and if desired positively secured therein. Or in place of mounting the sections 23, 24 upon the outwardly extending hubs 17, 18 these hubs may be dispensed with and inwardly extending hubs formed on or secured to the sections 23, 24 and extending into the bore of the section 15 in an obvious manner may be used.

While there has been hereinbefore described a specific embodiment of the present invention, it will be apparent to those skilled in the art that many and various changes and modifications may be made thereto without departing from the spirit of the invention, and it will be understood that all and any such changes and modifications that fall within the scope of the appended claims are contemplated as a part of the present invention.

The invention claimed and desired to be secured by Letters Patent is:

1. A multiple connecting rod for a locomotive, comprising a main rod section having an end for connection with a cross head and an opposite solid end provided with an eye for connecting said section with the crank pin of a main driving wheel; and a pair of auxiliary rod sections, each section of the pair being independently articulated at one end with said solid end of the main rod section at a side thereof, each extending from said solid end in a direction opposite to that of said main rod section, and each having a separate bearing at its opposite end for pivotal connection with a common crank pin of a driving wheel adjacent said main driving wheel, whereby the entire force of the cross head that is transmitted to said common pin will be transmitted independently of the main crank pin by said main and auxiliary rod sections, the auxiliary rod sections each transmitting a portion of said force transmitted by said main rod section.

2. A multiple connecting rod for a locomotive, comprising a main rod section having an end for connection with a cross head and an opposite solid end provided with an eye for connecting said section with the crank pin of a main driving wheel; and a pair of auxiliary rod sections, each section of the pair being independently articulated at one end with said solid end of the main rod section at a side thereof, each extending from said solid end in a direction opposite to that of said main rod section, and each having separate pivotal connecting means at its opposite end for a common crank pin of a driving wheel adjacent said main driving wheel, whereby the entire force of the cross head that is transmitted to said common pin will be transmitted independently of the main crank pin by said main and auxiliary rod sections, the auxiliary rod sections each transmitting a portion of said force transmitted by said main rod section.

3. A multiple connecting rod for a locomotive, comprising a main rod section having an end for connection with a cross head and an opposite solid end provided with an integral boss on each side thereof, and an eye extending through said end for connecting said section with the crank pin of a main driving wheel; and a pair of auxiliary rod sections, each having an eye at one end thereof engaging one of said bosses, providing an independent articulation between the main rod section and each auxiliary rod section independent of said main crank pin, said auxiliary rod sections extending from said solid end in a direction opposite to that of said main rod section and each having a separate bearing at its opposite end for pivotal connection with a common crank pin of a driving wheel adjacent said main driving wheel, whereby the entire force of the cross head that is transmitted to said common pin will be transmitted independently of the main crank pin by said main and auxiliary rod sections, the auxiliary rod sections each transmitting a portion of said force transmitted by said main rod section.

4. The combination, with a locomotive having a cross head, a main driver having a main crank pin, and another driver having a crank pin, the main driver being disposed between said cross head and said other driver, of a main connecting rod connected at one end to the cross head and provided at its other end with an integral boss at each side thereof and pivotally mounted through said bosses upon said main crank pin; and a pair of separate parallel rods each having an orifice at one of its ends pivotally engaged with one of said bosses, and each having an orifice at its opposite end pivotally engaged with said other driver crank pin.

RAYMOND J. FINCH.