R. HUMBLE.

CONNECTING ROD.

To all whom it may concern:

Be it known that I, ROBERT HUMBLE, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented new and useful improvements in Connecting-Rod Attachments, of which the following is a specification.

My invention relates to the connecting-rods of locomotive engines; and it consists in means for pivotally joining to each other the main and side rods of a locomotive and in the use of a "bushing" for such pivotal connection, in which the crank-pin turns.

This invention is an improvement on that patented to me jointly with John McLeod by Letters Patent No. 366,725, and dated July 19, 1887. Said patent is for the construction of said rods, which are made each with one end single and the other bifurcated, the bifurcated end of one rod embracing the single end of the next rod, where they are connected to the crank-pin. There are also described in the specification of said patent "sleeves" rigidly secured upon the crank-pins, by means of which all the weight and friction is thus borne by the sleeves and does not affect the crank-pins themselves, so that when the sleeves are worn out they can be readily replaced without disturbing the crank-pins.

In this invention I prefer to use rods constructed with single and bifurcated ends, as described in said patent; but I improve upon the construction shown in that patent by using, instead of a sleeve rigidly secured to the crank-pin, on which the rods freely turn, a bushing, in which the crank-pin freely turns, rigidly secured to the end of one of the rods connected with the crank-pin, and which also serves as a bearing for the end of the next rod.

By this construction I gain three material advantages.

First. The rods are joined directly to each other, so as to be practically continuous. The strains are thereby distributed throughout their united length and danger of breakage at any one point lessened, and they all can be slipped on or off the crank-pins without being disconnected from each other.

Second. By rigidly securing the bushing in one end of each rod, the straps and braces for that end of the rod are dispensed with, thereby materially lessening the expense of construction.

Third. By means of the bushing, the friction between the rods and the crank-pins in the ordinary construction, or between the rods and the sleeves of the crank-pins in the improved construction shown in said patent, which in them is unevenly distributed, since the rods, by their "thrust" or resistance, bear upon opposite sides of the crank-pin or sleeves, is in my improvement distributed uniformly over the entire surface of the crank-pin and the interior surface of the bushing, greatly diminishing the wear at any one point. The wear between the outer surface of the bushing and the rod turning upon it is very slight, as the motion is only that caused by the change of angle or alignment between the rods. The bushing is preferably keyed or otherwise rigidly secured in the rod, but may also be forged as an integral part of the rod, and it is also preferably secured in the bifurcated end of the rod.

In the drawings forming a part of the specification, Figure 1 is a side elevation, and Fig. 2 a plan view, of a pair of locomotive driving-wheels fitted with my improved connecting-rod, and showing also a portion of the cylinder and its guides and cross head. Fig. 3 is a sectional detail showing the manner of connecting the rods to each other and to the crankpin. Figs. 4 and 7 are detached views of one end of a rod fitted with the bushing, showing the manner in which the bushing is keyed rigidly in place. Fig. 5 shows the bushing as applied to the bifurcated end of a rod, and Fig. 6 as applied to the single end. Fig. 8 is a sectional detail showing the bushing made as an integral part of the single end of a rod, and Fig. 9 as an integral part of the bifurcated end. Fig. 10 is a sectional detail showing the bushing fitted with an adjustable lining, and Fig. 11 is a detached end view of the adjustable bushing-lining.

In the drawings, A is the main driving-wheel, and a its crank-pin. A' is one of the back driving-wheels, only one being shown, and a' its crank-pin. A₁ is the cylinder; A₂, the guides; A₃, the cross-head.

A is the main rod, which connects the cross-head with the main driving-wheel. A₁ is the side rod connecting the main driving-wheel with the adjacent back driving-wheel.
A' is a portion of the side rod connecting the first back driving-wheel with the second, showing that my improvement is applicable to a locomotive having any number of driving-wheels.

In this specification I designate the series of rods which actuate the driving-wheels on one side of the locomotive as the "connecting-rod," the individual parts of it being designated as above—viz., the "main rod," which connects the main or front driving-wheel to its cross-head, and the "side rods," which connect the driving-wheels with each other, and also as the "members" of the connecting rod.

The members of the connecting-rod are shown with one end bifurcated, the bifurcations having the eyes b, in which the bushing B is rigidly keyed, (excepting where said bushing is shown forged as a part of the rod,) said bushing being adapted to fit upon the crank pin and to serve as a bearing for it to turn in. The other end of each member of the connecting-rod is shown single and fitted with the straps D and brasses d, which are adapted to encircle and turn upon the bushing between the forks of the rod fitted with the bushing. The bushing is preferably fitted with a lining, 4, of bronze or other suitable metal, to reduce the friction. In order to compensate for the wear of this lining and the crank-pin, the lining may be divided into longitudinal sections, as shown in Figs. 10 and 11, and with its exterior surface slightly tapered, the interior surface of the bushing being oppositely tapered to conform to it. As the parts become worn the lining is removed, the sectional edges filed down, and the lining then replaced and forced to a sufficiently greater depth in the bushing to fit closely upon the crank-pin, and then properly secured in the bushing.

The crank-pin is provided with a disk, g', secured to the end by the nut g', to hold the rods on the pin and to receive the wear, and also with the collar h, embedded in the hub of the driving-wheel, with its outer surface projecting slightly from the hub, so as to receive the rear of the rods and prevent their contact with the hub. The brasses d are made slightly longer than the thickness of the rod, so as to project beyond its sides and separate it from the sides of the bifurcations of the other rod, thus receiving the side wear and allowing the necessary "play" between the rods.

I claim as my invention—

1. A locomotive connecting-rod having its members joined together, each junction being made by means of a bushing rigidly secured to one member and forming a bearing on which the other member partially turns.

2. The combination of the crank-pin of a locomotive driving-wheel and a bushing rigidly secured to one member of the connecting-rod, in which bushing the crank-pin freely turns, and which also forms a bearing on which another member of the connecting-rod partially turns, substantially as described.

3. A locomotive connecting-rod whose members are pivotally joined to each other and form a continuous whole, and which members can be applied to and removed from the crank-pins of the driving-wheels without being disconnected from each other, in combination with crank-pins turning freely within the pivots of the connecting-rod, substantially as described.

4. A locomotive connecting-rod in which one member is formed at one end with a tubular bearing within which the crank-pin freely turns, by means of which a junction is made with another member of the connecting-rod, partially turning upon it as an external bearing, whereby the members of the connecting-rod are joined together and one bearing made upon the crank-pin.

5. The combination of the crank-pin of a locomotive driving-wheel with a bushing rigidly secured to the bifurcated end of one member of the connecting-rod, in which bushing the crank-pin freely turns, and another member of the connecting-rod having its end embraced by the bifurcated end fitted with said bushing and turning freely on said bushing, substantially as described.

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

ROBERT HUMBLE.

Witnesses:  
V. A. TALAFOUS,  
F. A. KOCH.