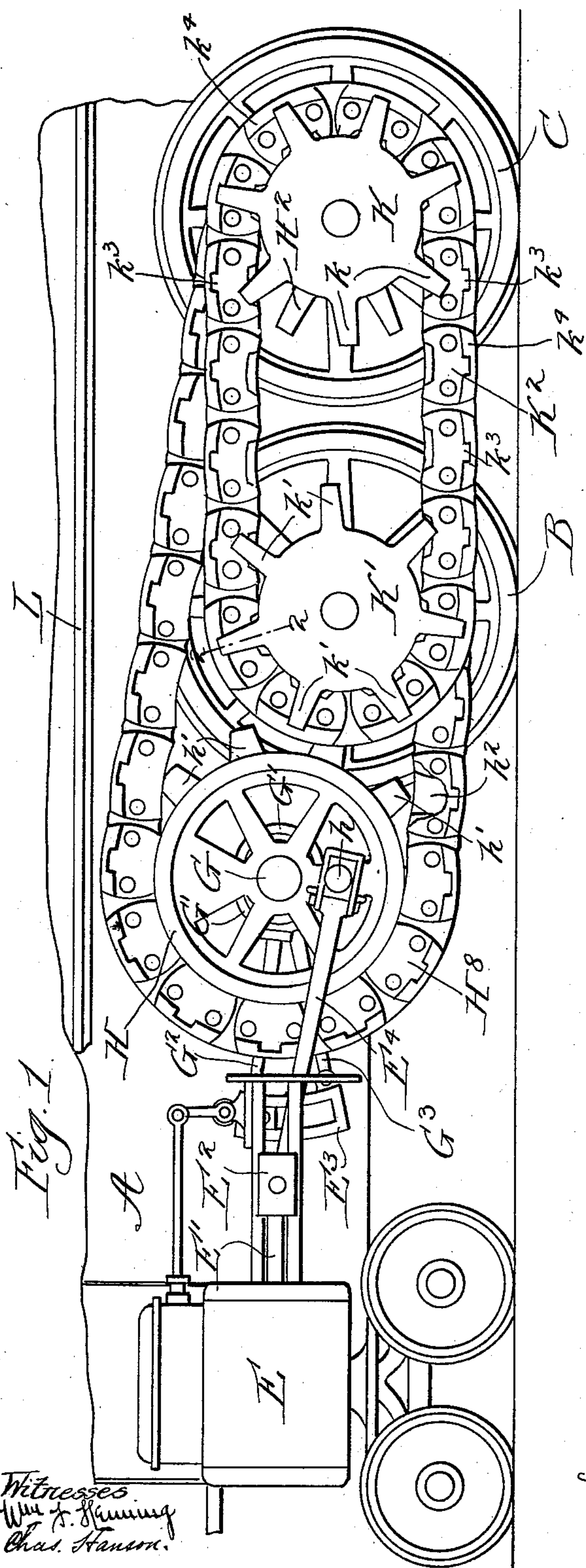


(No Model.)

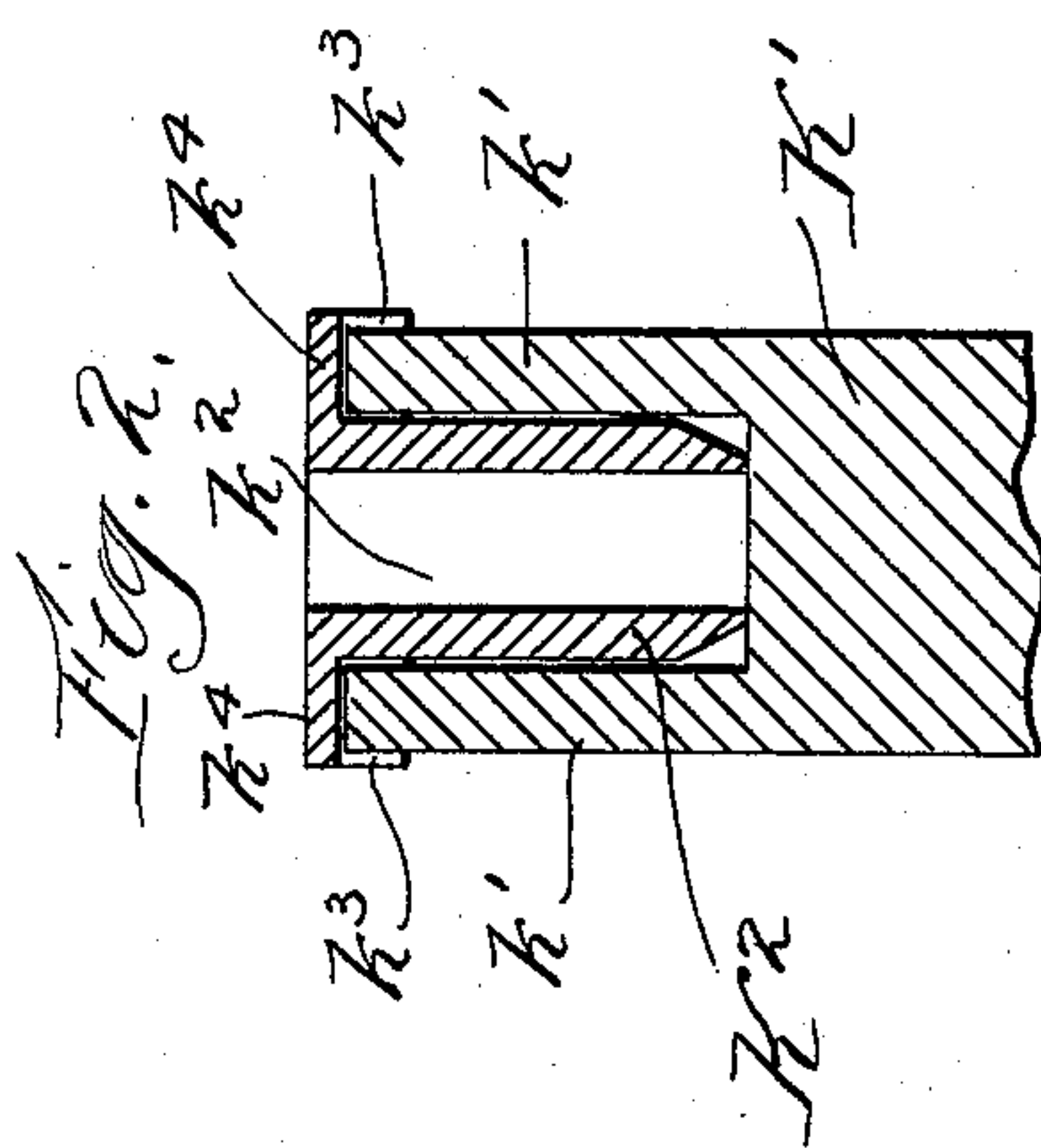
J. F. BERMINGHAM.  
STEAM ENGINE.

No. 578,478.

Patented Mar. 9, 1897.



Witnesses  
Wm. J. Skinning  
Chas. Hanson.



Inventor  
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Atty.



# UNITED STATES PATENT OFFICE.

JOHN F. BERMINGHAM, OF MARCELINE, MISSOURI.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 578,478, dated March 9, 1897.

Application filed May 25, 1896. Serial No. 592,979. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN F. BERMINGHAM, a citizen of the United States, residing at Marceline, in the county of Linn, State of Missouri, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

This invention relates to the transmission of power from the steam-cylinder of an engine to the working parts; and it consists, primarily, in mounting a sprocket-wheel upon the shaft carrying the eccentrics of the link-motion and driven by the connecting-rod and connecting said sprocket-wheel by a sprocket-chain with a sprocket-wheel upon the working shaft; in mounting upon a locomotive-frame adjacent to the steam-cylinder a shaft carrying the eccentrics of the link-motion, coupling said shaft by a connecting-rod with the cross-head of the piston-rod, and coupling sprocket-wheels at each end of said shaft with sprocket-wheels upon the axle of the trailing drivers of the locomotive by a sprocket-chain; in locating between the locomotive-drivers and the steam-cylinder an elevated shaft about in line with the piston-rod and carrying the eccentrics of the link-motion, coupling said shaft by a connecting-rod to the cross-head of the piston-rod, coupling sprocket-wheels upon the ends of this shaft by means of a sprocket-chain with sprocket-wheels upon the projecting ends of the axle of the trailing drivers, and driving back to the leading drivers therefrom by a chain belt connecting additional sprocket-wheels on said axle with sprocket-wheels upon the projecting axle ends of said leading drivers; in the peculiar construction of sprocket-wheels, sprocket-chain, and in the various other novel features hereinafter pointed out and claimed.

In the drawings, Figure 1 is a side elevation of so much of a locomotive as is necessary to an understanding of my invention. Fig. 2 is a detail in section on the correspondingly-numbered line in the first figure of the sprocket-wheel and the corresponding chain.

A represents the body of a locomotive, B the forward or leading drivers, and C the rear or trailing drivers. E is a steam-cylinder; E', the piston; E<sup>2</sup>, the cross-head; E<sup>3</sup>, the link-motion, and E<sup>4</sup> the connecting-rod. Heretofore the connecting-rod has been coupled to a

wrist-pin upon one of the drivers and motion communicated therefrom to the others by a parallel rod which was apt to break owing to the constant wrenching it received at the extremes of upward and downward motion. The application of power had also its disadvantages, as the axles of the drivers were necessarily so much below the plane of the steam-cylinder.

In my improvement I locate upon the locomotive-frame in a position sufficiently elevated to bring its axis practically on a level with the steam-cylinder or about on a plane with the axis of the piston-rod a transmission-shaft G, which carries the eccentrics G' of the link-motion, operating the eccentric-rods G<sup>2</sup> G<sup>3</sup> for reversing or slowing down or shutting off steam. Upon each end of this shaft outside of the locomotive-frame is fixed a large sprocket-wheel H, to which the connecting-rod on that side is coupled by a wrist-pin h, the rod on one side being just one-quarter ahead of the other in order to drive one side in advance of the other, as usual. The teeth h' of these sprocket-wheels are advisably set in the center of the wheels, and over them is thrown a sprocket-chain H<sup>3</sup>, each link of which is recessed or socketed, as at h<sup>2</sup>, to engage with the teeth as near as may be by rolling contact and prevent lost motion.

The axles of the drivers project outside of the wheels, and upon these projecting ends of the axle of the trailing drivers are secured sprocket-wheels H<sup>2</sup>, provided with twin teeth corresponding to those upon the eccentric-shaft and driven by the chain therefrom. By the side of these sprocket-wheels on the axle of the trailer are secured other sprocket-wheels K, which in this instance are made with twin teeth k', which rise parallel with each other, as shown in Fig. 2, and upon the projecting ends of the axle of the leading drivers are similar sprocket-wheels K', having like twin teeth k', over the two sprocket-wheels being thrown a chain K<sup>2</sup>, slotted centrally, as at k<sup>2</sup>, and having recesses k<sup>3</sup> in its flanged crown k<sup>4</sup> to receive the teeth of the sprocket-wheels, one tooth on each side. As the sprocket wheels and chains will be located outside of the plane of the drivers the running-board L will be extended sufficiently to cover and protect them. By this construc-



tion it is evident that the motion generated by the expansion of the steam in the cylinder acting where the piston and piston-rod is communicated to the intermediate shaft in a position most favorable for effective application of power, that such shaft through its sprocket wheels and chains drive the trailers and they drive back upon the leaders that the advantage of the leverage of the sprockets is secured in regulating the speed and in the application of power, and that the objectionable thumping due to the parallel rod and the danger owing to its liability to break are both obviated and done away with.

15 I claim—

The combination in a locomotive, of the steam-cylinders, piston-rods and cross-heads, the connecting-rods, an elevated shaft sup-

ported upon the locomotive-frame and carrying the eccentrics of the link-motion with which shaft said connecting-rod is coupled, sprocket-wheels upon the ends of said shaft, sprocket-wheels upon the projecting axle of the trailing drivers, sprocket-chains connecting the two pairs of sprocket-wheels, a second pair of sprocket-wheels upon said axle, sprocket-wheels upon the projecting axle of the leading drivers, and a chain belt connecting said sprocket-wheels, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

JOHN F. BERMINGHAM.

Witnesses:

ROBT. L. WHEELER,  
E. H. TAYLOR.