(No Model.) 2 Sheets—Sheet 1

B. BOLING.

STEAM STEERING APPARATUS.

No. 590,536. Patented Sept. 21, 1897.

Fig. 1.

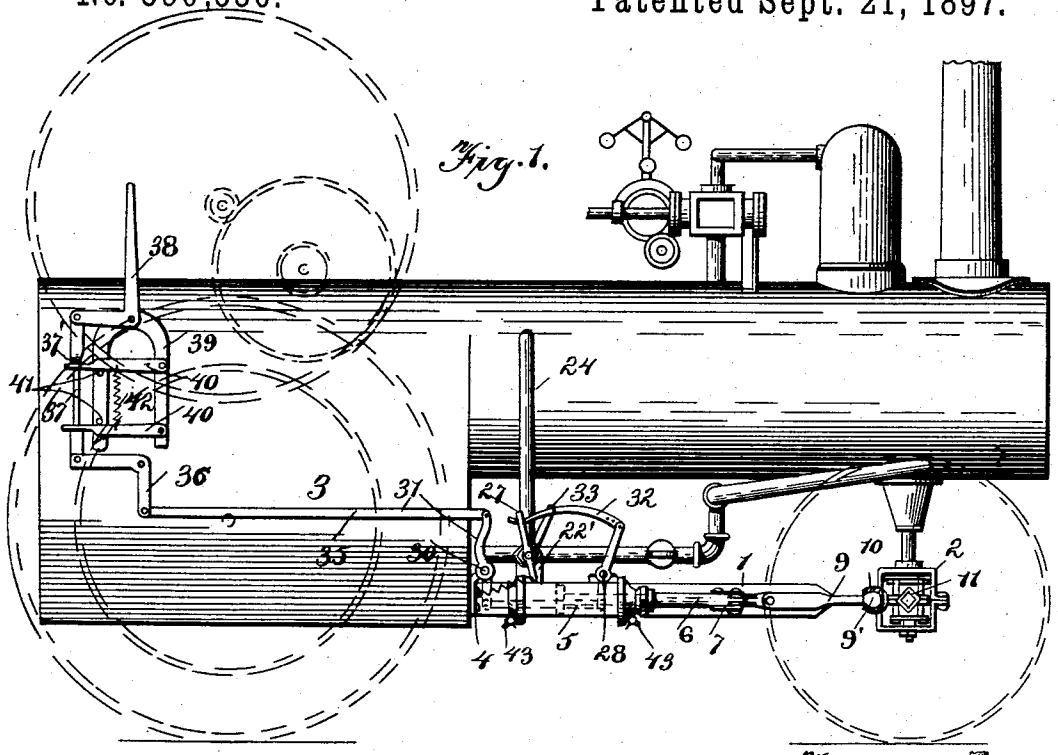


Fig. 2.

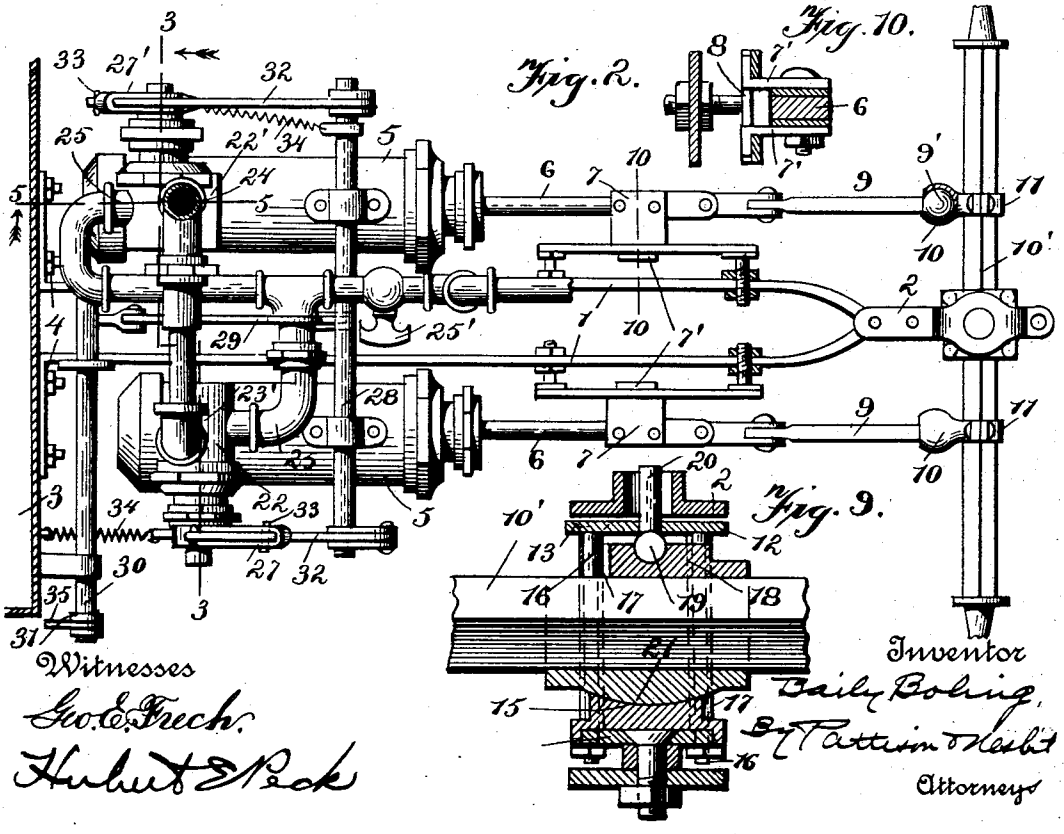


Fig. 10.

Fig. 9.

Witnesses
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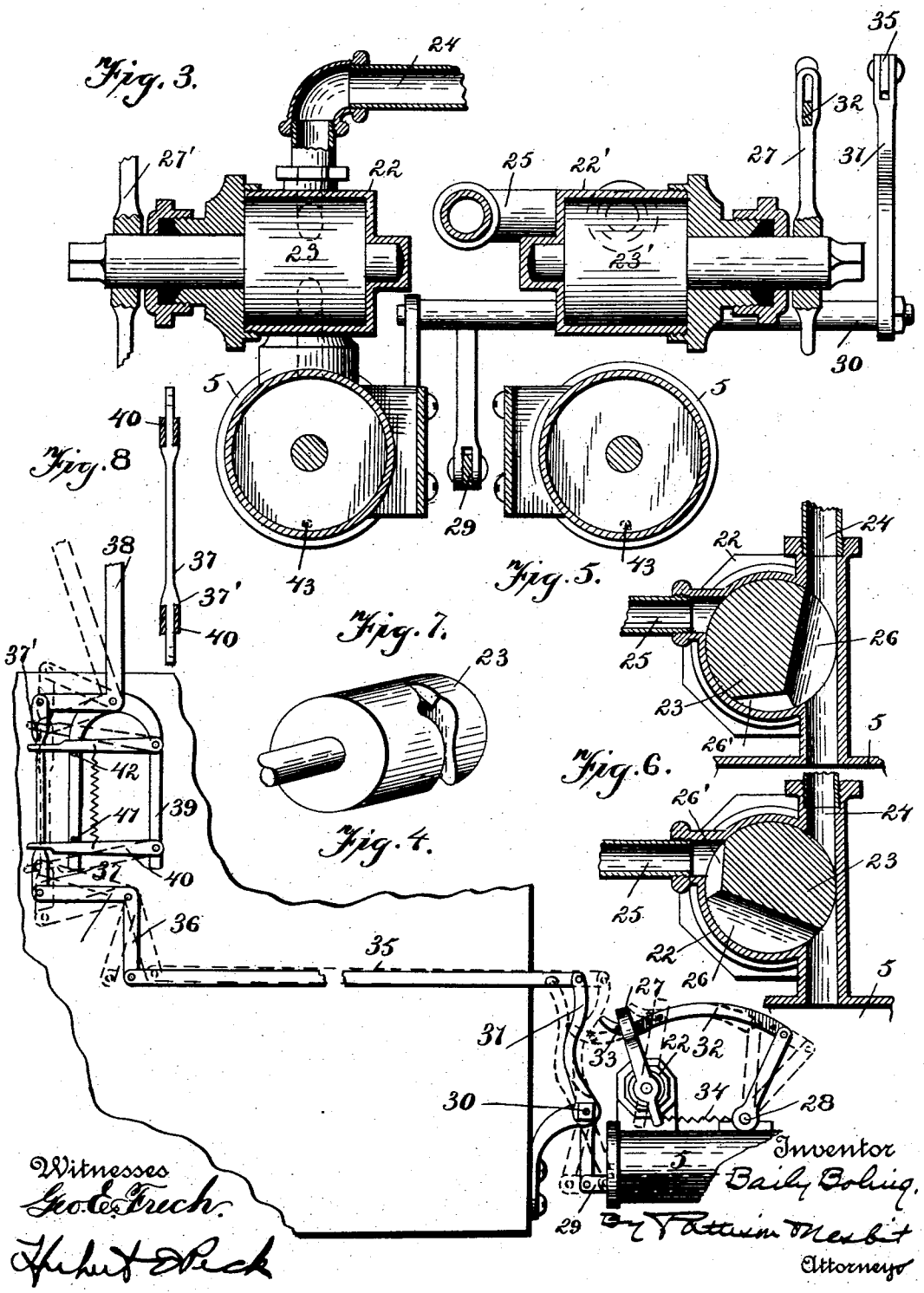
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(No Model.) 2 Sheets—Sheet 2.

B. BOLING.

STEAM STEERING APPARATUS.

No. 590,536. Patented Sept. 21, 1897.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

BAILY BOLING, OF SALEM, INDIANA, ASSIGNOR OF ONE-HALF TO RICHARD J. WILSON, OF SAME PLACE.

STEAM STEERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 590,536, dated September 21, 1897.

Application filed May 20, 1897. Serial No. 637,479. (No model.)

To all whom it may concern:

Be it known that I, BAILY BOLING, of Salem, in the county of Washington and State of Indiana, have invented certain new and useful Improvements in Steam Steering Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to steam steering mechanism for traction-machines, steamships, boats, and other water-craft, and particularly for traction-engines, the invention being herein shown and described in connection with an engine.

The object of the invention is to provide a simple and positively-controlled steam-actuated steering mechanism, also an improved connection between the said mechanism and the front axle, whereby the former will not be disturbed by the vertical oscillation of the axle on uneven roads, and also an improved rocking connection between the axle and the reach.

With these and other objects in view, as will appear as the nature of the invention is disclosed, said invention consists in the novel features of construction and in the combination and arrangement of parts hereinafter fully described and claimed, and illustrated by the accompanying drawings, in which—

Figure 1 is an elevation of a portion of a traction machine with my improved steering mechanism in position. Fig. 2 is a plan view of the mechanism and front axle. Fig. 3 is a vertical cross-sectional view on broken line 3 3 of Fig. 2. Fig. 4 is an elevation of the controlling-lever, showing its normal position in solid lines and its adjustments in dotted lines. Figs. 5 and 6 are sectional views taken on line 5 5 of Fig. 2, Fig. 5 showing the three-way valve in normal position passing steam to the cylinder and Fig. 6 showing the position of same exhausting the cylinder. Fig. 7 is a detail view of the valve. Fig. 8 is an edge view of a link connected to the controlling-lever. Fig. 9 is a sectional view of the reach-coupling. Fig. 10 is a view on line 10 10 of Fig. 2.

1 designates the bifurcated reach, contracted at its forward end, where it is secured to yoke 2, and at its rear end secured to the forward end of the engine fire-box 3, as indicated at 4. Cylinders 5 are secured in horizontal planes on opposite sides of the reach, with piston-rods 6 extending from the forward ends thereof and secured to cross-heads 7. Each cross-head includes angle-irons 7′, extended through and slidable in slots 8′ of brackets 8, secured in laterally-extended position on opposite sides of reach 1. From the cross-heads extend arms 9, formed with balls 9′ at their forward ends to fit sockets 10, the latter being secured by clips 10′ to front axle 11 on opposite sides of its center, as shown. The openings of the sockets are sufficiently large to afford all play necessary for arms 9, both in steering and in conforming to the position of the axle in passing over rough roads. This ball-and-socket connection, together with the pivotal connection of the rear ends of arms 9, permits of all possible play without in the least affecting the cylinders or pistons and cross-heads.

Within yoke 2 is frame 12, consisting of top plate 13 and the bottom plate 14, carrying concave bearing 15, the top and bottom plates being connected by bolts 16 and made rigid in their separated position by bolt-incasing sleeves 17. Secured to axle 11, within frame 12, is cuff 18, having on its upper side a rounded depression to embrace transverse bolt 19 on the under side of plate 13, the centering-bolt 20 for the whole connection extending upward from said bolt through yoke 2. The under side of the cuff is rounded at 21 to fit and rock in concave bearing 15, as the axle is oscillated by any unevenness of the road, the cuff having its turning center on bolt 19, as will be understood. A coupling is thus provided in which the reach and also the front of the engine structure are relieved of all rocking strains, which ordinarily are communicated thereto from the front axle.

On the upper sides of cylinders 5, adjacent their rear ends, are valve-casings 22 and 22′, respectively, in which are the three-way

valves 23 and 23′, respectively. Steam is admitted to both valve-casings through pipe connection 24 from the boiler, the inlet being on opposite sides of each casing, as shown, while connected to each casing on opposite side from its steam-inlet is exhaust 25, and this exhaust-pipe connection may lead forward and discharge in the stack of the engine. Cock 25′ may be used to diminish or prolong the exhaust when desired. Each valve is formed with a straight peripheral channel 26, which is set to admit steam to the cylinder, as seen in Fig. 5, when the engine is running straight ahead. Subchannel 26′ extends at an angle from channel 26 and serves to connect the cylinder with the exhaust, as in Fig. 6, when one or the other of the cylinders exhausts, as when changing the course of the engine.

For actuating valves 23 23′ the stems thereof are provided with longitudinally-slotted arms 27 27′, respectively, the former having forward and the latter backward inclination. Rock-shaft 28 is mounted transversely on cylinders 5 in advance of the valve-casings, said shaft being connected by link 29 to rock-shaft 30, located at the rear of the valve-casings and carrying arm 31, which is connected to the operating mechanism, presently to be described. Links 32 32′, which are pivotally secured to the cranks of shaft 28, extend, respectively, through slotted arms 27 27′, each link moving freely through its arm in one direction, but engaging same by means of pin 33 in moving in opposite direction, thus rocking the said arm and partially turning the valve, the extent of such movement being sufficient to turn the valve from the position indicated in Fig. 5 to that shown in Fig. 6. As the valves turn in opposite direction the valve-arms are engaged from opposite sides by the links from the rock-shaft, so that when one valve is being turned to exhaust the other valve is at rest, and vice versa. As before stated, the normal position of the valves is as shown in Fig. 5, with the steam-supply open to the cylinders and the exhaust closed, this position being maintained by springs 34, arranged as shown. Links 32 32′ are provided with several adjustments for connecting with the shaft-cranks, also the valve-arms, so that the parts may be adjusted for giving the valves a greater or less turn, as may be desired.

For actuating the valve-adjusting mechanism arm 31 of shaft 30 is connected by link 35 to bell-crank lever 36, fulcrumed on the side of the fire-box and from which extends vertically the link 37, which at its upper end is connected to the bell-crank operating-lever 38. By means of this connection opposite reciprocations of lever 38 serves to actuate the valve mechanism in the manner before explained, thus exhausting either cylinder and causing the front axle to be turned by the pressure in the other cylinder to the extent desired. Upon the release of lever 38 the valve which had been turned to exhaust resumes its normal position, the pressure in the cylinders is again equalized, and the machine follows the course indicated by such manipulation of the steering mechanism.

Lever 38 is fulcrumed at the upper end of bracket 39, and pivoted to this bracket are the two arms 40, bifurcated at their ends to embrace link 37, upon which is formed shoulders 37′, which said arms 40 engage, thus making positive connection between the link and arms. The arms are held from swinging toward each other by stops 41 on bracket 39, and are connected by the contractible spring 42, whereby they are held normally in engagement with said stops. Thus with either a backward or forward movement of lever 38 one of said arms 40 is pulling against the other arm through the medium of the spring, and when said lever is released the spring moves the actuated arm back to its normal position, and these arms acting positively with link 37 serve to center the operating-lever and its connections as soon as freed by the operator. This mechanism, operating in conjunction with springs 34, serves to hold the whole valve-actuating apparatus centered when at rest. The opposite movements of the operating-lever and its connected parts are clearly shown in Fig. 4. Cocks 43 at the ends of the cylinders prevent compression of air behind the pistons, and those at the rear ends of the cylinders may be utilized for exhausting steam whenever necessary.

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

1. The combination, in a steam steering apparatus, with the oppositely-operating valves, and the arm carried by the stem of each valve, of a rock-shaft, and links extended therefrom and adapted to engage with opposite sides of the respective valve-arms, whereby the valves are operated alternately upon the opposite reciprocations of the shaft, substantially as shown and described.

2. The combination, in a steam steering apparatus, with the oppositely-operating valves, and the slotted arms carried by the stems thereof, of a rock-shaft, links extended therefrom through the slotted valve-arms, and pins on the respective links on opposite sides of the slotted arms, whereby the valves are alternately actuated upon opposite reciprocations of the rock-shaft, substantially as shown and described.

3. An operating mechanism for a steam steering apparatus, including an operating-lever, a link connected thereto which in turn is operatively connected with a steering apparatus, the link being capable of longitudinal reciprocation, and devices for holding the link normally in a fixed or given position with the operating-lever in like position, substantially as shown and described.

4. An operating mechanism for a steam steering apparatus, including an operating-

lever, a link connected thereto which in turn is operatively connected to a steering apparatus, the link having longitudinal reciprocation, two swinging arms adapted to positively engage the link, stops for holding the arms separated from each other, and a contractible spring connecting the arms and holding them normally in engagement with said stops, with the link and operating-lever normally in a given position, substantially as shown and described.

5. The combination with a valve-casing having alined connections with a steam-supply and a cylinder, of a rotatable valve in the casing formed with an elongated depression to connect the supply and the cylinder, the casing being formed with an exhaust-port, and the valve formed with an auxiliary depression communicating with but extending at an angle to said elongated depression for uniting the cylinder connection and the exhaust, substantially as shown and described.

6. In a steam steering apparatus, the combination of two cylinders and pistons therefor, a normally-closed inlet-valve for each cylinder, an arm extended from each valve-stem, a rock-shaft, and links loosely connecting the shaft and valve-arms, one link actuating one valve-arm and the other link passing loosely over the other valve-stem at each oscillation of the rock-shaft, substantially as shown and described.

7. The combination of reach 1, longitudinally-slotted bracket 8 secured thereto, cross-head 7, and oppositely-extended angle-irons 7′ secured to the cross-head and extending through the slotted bracket and embracing the inner side thereof, substantially as shown and described.

8. The combination with the axle, the reach having a yoke at its end embracing the axle, and a vibratory mounting for the axle within the yoke, substantially as shown and described.

9. The combination of the front axle, the reach having a yoke embracing the axle, a frame within the yoke pivotally mounted, a cuff embracing the axle within the frame, said cuff being centered at its top within the frame, and rounded on its under side to turn in the similarly-formed bottom of the frame, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

BAILY BOLING.

Witnesses:
AZARIAH LANNING,
GRANT ZINK.