

(No Model.)

2 Sheets—Sheet 1.

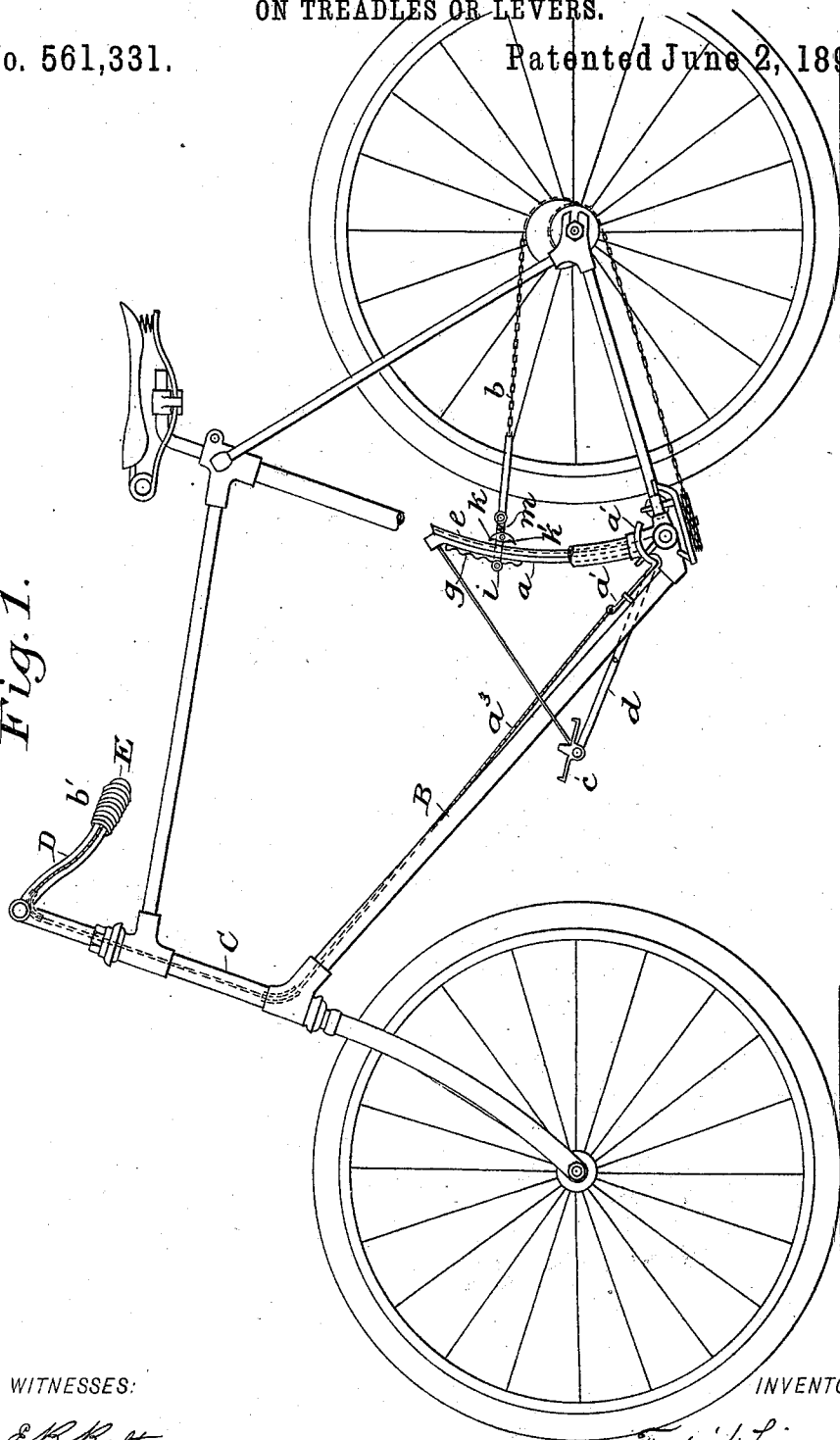
F. LJUNGSTRÖM.

MECHANISM FOR CHANGING POINTS OF APPLICATION OF LOADS
ON TREADLES OR LEVERS.

No. 561,331.

Patented June 2, 1896.

Fig. 1.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

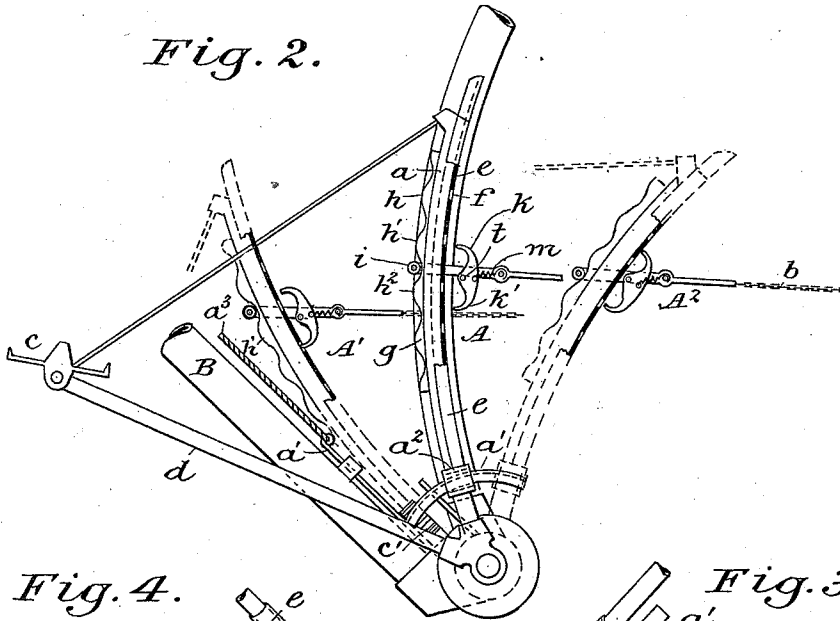


Fig. 4.

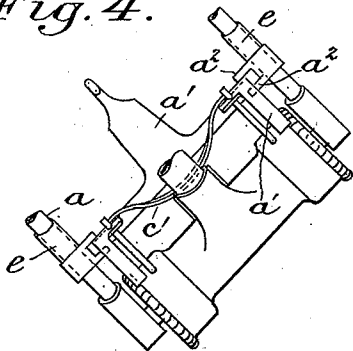


Fig. 3.

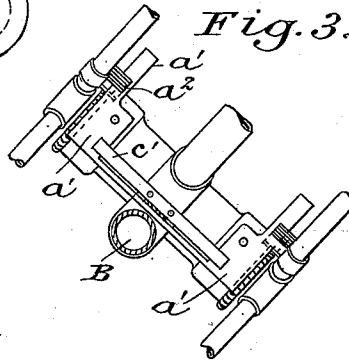


Fig. 5.

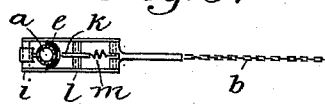


Fig. 6.

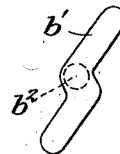
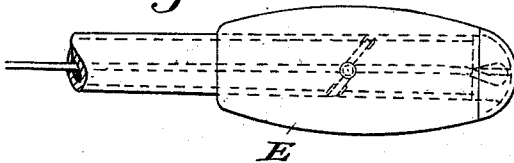


Fig. 6a

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UNITED STATES PATENT OFFICE.

FREDRIK LJUNGSTRÖM, OF STOCKHOLM, SWEDEN.

MECHANISM FOR CHANGING POINTS OF APPLICATION OF LOADS ON TREADLES OR LEVERS.

SPECIFICATION forming part of Letters Patent No. 561,331, dated June 2, 1896.

Application filed July 12, 1895. Serial No. 555,778. (No model.)

To all whom it may concern:

Be it known that I, FREDRIK LJUNGSTRÖM, mechanician, a subject of the King of Sweden and Norway, and a resident of Grefgatan, 44^b, Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Mechanisms for Changing the Points of Application of Loads on Treadles or Levers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an automatic device for changing the point of application of the load or power on treadles, levers, and similar parts with a reciprocating (oscillating) movement. The load or the power acts upon a bow, which is movable along the treadle-arm and which moves by itself along the same in consequence of the angular motion of the treadle. To the treadle is fixed an adjustable part into which the bow engages. By readjusting this part the bow can be brought to move in the one or the other direction along the treadle-arm and to stop at a desired point. The device is chiefly adapted for the treadles of velocipedes, but it may also be used on any treadle or lever where a change of the lever-arm of the power or the load is desired.

Figure 1 shows in elevation a velocipede provided with the device in question, while Fig. 2 shows a side view of the treadle, drawn to a larger scale, showing also in dotted lines the forward and backward position of the treadle-arm. Figs. 3 and 4 show some details seen from the top respectively from behind; and Fig. 5 shows another detail seen from the top. Figs. 6 and 6^a show the steering-handle.

The treadle has a triangular shape. Along its upward-extending arm *a* can the driving-chain *b* be moved. The pedal *c* is fixed to the forward-directed arm *d*. In the following the arm *a* is considered to be the lever, along which the point of application of the power or the load, which is considered to act on the chain *b*, is to be moved. According to the drawings the load acts on the chain; but such a case may be easily imagined that the motive power acts upon the chain, drawing the loaded lever *a* to and fro. The arm *a* is on its rear side provided with a sliding piece *e*, movable along the same and having a series of holes *f*, recesses, notches, or such like, and

on its fore side the arm *a* is provided with a longitudinal fixed ridge *g* with low teeth *h h'* *h''*, and so on.

The end of the chain *b* surrounds the arm *a*, the sliding piece *e*, and the ridge *g* by means of a bow *i*, which comes in somewhere between the said teeth. The bow is provided with two hooks *k k'*, which are made in one piece and situated in the plane of the arm *a*, these hooks being directed toward the sliding piece *e*, so that they can engage into the holes of said piece. The hooks can turn around the pivot *l* on the bow and tend to occupy the middle position (shown at A in Fig. 2) in consequence of the pull in the small spring *m*, situated opposite the pivot *l*. The readjustment of the sliding piece *e*—that is to say, its displacement along the arm—takes place by means of another bow-shaped sliding piece *a'*, fixed to the frame B and clasped by the said piece *e* by the two pivots *a''*.

From the sliding piece *a'* a chain, a rope or such like *a'''* ascends through the tubular parts B C D to the handle E. This handle is pivotally mounted on the end of the part D and is internally provided with a groove *b'*, running obliquely to the shaft of the handle, and into which enters a pivot *b''* from the shaft. Thus the handle is displaced in its own longitudinal direction when turned. The sliding piece *a'* is kept down by an overlying spring *c'*; but it can be drawn upward by turning the handle E, whereby the sliding piece *e* is moved upward on the arm *a*. During the oscillation of the arm *a* the angle which the chain forms with the arm is changed, in consequence whereof the upper hook *k* comes in contact with the arm when this is turned toward the one direction, and the lower hook *k'* comes in contact with the arm when this is swung toward the other direction. (Compare Fig. 2, in which the arm is shown in its extreme positions by dotted lines.)

By sliding upon the arm the piece *e* can be brought in such a position that the holes *f* come in position for engagement with the upper or the lower hook. Suppose that the piece *e* has such a position that the lower hook *k'* engages into a hole when the arm is swung forward, as at A, Fig. 2. The consequence will be that the hook at the beginning of the back motion of the arm toward the right holds on to

the piece *e* and that the bow, in which the chain *b* pulls, moves a step downward over the tooth *h'*. When the arm reaches a middle position, the hook *k'* leaves the piece *e* free in consequence of the variation of the angle between the chain and the arm. When the arm reaches the opposite extreme position, as at *A*², the upper hook *k* rests against the piece *e* without meeting a hole in the piece.

During the next oscillation of the arm the described displacement downward of the bow is repeated, so that the bow is again moved one step and so on, until the end of the series of holes in the piece *e*. The adjustment of the piece *e* necessary for this displacement is obtained by turning the handle *E* a certain degree. If this handle is turned in the opposite direction, the piece *e* occupies another position, so that the holes *f* come in position for engagement with the upper hook *k* when the arm is swung toward the right, while the lower hook does not engage into any hole. The bow is then moved upward. If the handle is turned to a middle position of the same—that is to say, so that the pivot *b*³ will come to be situated as shown in Fig. 6^a—the piece *e* will come to occupy such a position that neither the upper nor the lower hook comes into a hole, wherefore no displacement of the bow takes place. Hence it is evident that a displacement upward or downward of the bow can be interrupted in a desired moment by turning the handle back to its middle position, and thus it is evident that the bows *i* can be placed upon the arms *a* at a desired distance from the shaft of the arm during the driving according to the desired gear.

The described device might be somewhat modified according to the purpose of the lever. Principally this concerns, however, only the mechanism for the readjustment of the piece *a'*, because this mechanism has in the above description evidently been adapted to the form of the velocipede.

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

1. In combination in a bicycle or the like having the lever or treadle arm, the chain or connection from the treadle, a movable coupling between the chain and arm and the pawl and adjustable rack between the coupling and the treadle-arm with means for adjusting the same, one of said parts being located on the treadle-arm and the other on the coupling said pawl being operated to shift the coupling by the angular movement of the treadle, substantially as described.

2. In combination with a bicycle or the like, the lever or treadle, the chain, the shifting coupling between the chain and lever, the teeth *h* carried by the lever for holding the

coupling and the pawl-and-rack connection between the coupling and the arm, one of said parts being located on the treadle-arm and the other on the coupling said pawl being operated by the angular movement of the arm, substantially as described.

3. In combination with a bicycle or the like, the lever or treadle, the chain, the shifting coupling, the teeth *h* carried by the treadle-arm, the shifting rack-sleeve with adjusting means therefor and the double pawl carried by the coupling and operated by the angular movement of the treadle to shift the coupling up or down, substantially as described.

4. In combination, the treadle-arm, the shifting sleeve *e* thereon having holes, a series of teeth *h* on one side of the arm, the chain, the coupling between the same and the treadle engaging the teeth *h*, and the double pawl pivotally connected to the coupling and adapted to engage the holes in the sleeve, substantially as described.

5. In combination, the treadle-arm, the shifting rack-sleeve thereon, the coupling carrying the pawl having hooks *k* *k'* and means for moving the rack-sleeve and to hold the same either up or down or in middle position, in the latter of which the pawl is free from engaging the teeth of the rack, substantially as described.

6. In combination, the treadle-arm, the shifting rack-sleeve thereon, the coupling carrying the pawl having the hooks *k* *k'*, means for moving the rack-sleeve and to hold the same either up or down or in middle position, in the latter of which the pawl is free from engaging the teeth of the rack, said rack having the teeth on the opposite side from the pawl to engage and hold the coupling in place, substantially as described.

7. In combination, the treadle, the shifting rack-sleeve the double pawl, the coupling carrying the same and the spring for holding the double pawl out of action, substantially as described.

8. In combination, the treadle, the shifting rack-sleeve the double pawl engaging the same, the coupling carrying the pawl and means for operating the rack-sleeve consisting of the curved piece *a'* movable up and down along the standard and the connection therefrom to the handle for operating the same, said curved piece *a'* being struck from the pivot of the treadle-arm as a center substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FREDRIK LJUNGSTRÖM.

Witnesses:

ERNST SVANQVIST,
A. F. LUNDBORG.